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Research published scientific research aimed both economic development and clarification of the current economic phenomena and processes. As a result, conclusions and proposals offered by the authors address both academic - scientists, teachers and students - as well as decision makers. We emphasize the importance of scientific contributions, together with the clarity of concepts, methodologies and conclusions offered.

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OPENING SESION

ETHICAL FINANCE AND THE VATICAN BANKING SYSTEM: THE REFORMS OF POPE FRANCIS

Raffaele SANTORO[1]

Federico GRAVINO[2]

Abstract:

Vatican finance is characterized by its service to charity. The tools used and the organization of structures are closely linked to the mission of the Church. In this perspective Vatican financial activity is marked by specific ethical rules. In the same way the Vatican banking system is organized to meet solidarity goals. On several occasions Francis has intervened to improve the organization of the administration, controls and supervision of these activities. Vatican financial and banking system highlights the autonomy of this system. However, it is called to enter into relations with other states. Therefore, a problem of coexistence between norms, principles and practices arises when Vatican economic rules are not characterized only by the specific religious nature but represent an expression of a State.

Keywords: *ethical economy and finance, charity, Vatican banking system, solidarity, religious rules*

JEL classification: *A13, D63, D64*

Economy and finance in the universal mission of the Catholic Church

The universal mission of the Catholic Church also involves her economic and financial activity (Fuccillo, 2023, 90). It is exercised through temporal goods, which the Catholic Church has the right to acquire, preserve and alienate «in order to achieve its proper ends» (can. 1254 § 1).
In this perspective temporal goods have specific legal characteristics. They are universal goods, therefore they have an ecclesiastical public nature and are subject to the authority of the Catholic Church. The activities of purchase of property (cann. 1259-1272), administration (cann. 1273-1279), contracts and in particular alienation (cann. 1290-1298) present a particular discipline in consideration of the purposes that characterize the actions of the Church.
By divine right the spiritual nature of the ecclesial body needs an external structure that also consists of adequate economic means (Chiappetta, 2011, 531). All these assets are subject to a full patrimonial capacity independent of any civil authority. The need to dispose of temporal goods is based on the very nature of the Church and on the fulfilment of the task entrusted to her. It must attain the goals of «ordaining divine worship, providing an honest sustenance for the clergy and other ministers, exercising works of sacred apostolate and charity, especially at the service of the poor» (can. 1254 § 2) (De Paolis, 2011, 97).
In this sense, the goods and instruments of exercise of economic and financial activities are aimed at the service of the Church's universal mission (Dalla Torre, 2020, 38). In particular, this matter is characterized by the service to charity. This element, which is a qualifying part of the Church's

[1] *University of studies of Campania "Luigi Vanvitelli", via Mazzocchi 68 (Palazzo Melzi) – 81055 Santa Maria Capua Vetere (CE), raffaele.santoro@unicampania.it.*
[2] *University of studies of Florence, via delle Pandette 32 – 50127 Firenze (FI), federico.gravino@unifi.it.*

social action in every age (Floris, 2015, 629), is highlighted by the Compendium of the Social Doctrine of the Church that qualifies it as «the supreme and universal criterion of the entire social ethics» (Pontifical Council for Justice and Peace, 2005, n. 204). Charity, which is the condition of visibility of social injustice (Monzel, 1959, 53), makes it possible to select the economic structures that place man at the centre and those in which competition and profit are the only protagonists. It is not a simple attitude of compassion but it is a moral and juridical obligation that falls on the individual believer, regardless of his place and role, as on the institutional apparatus (Fiorita, 2016, 17). Christian charitas translates the theological virtue of fraternity, which calls for attention to men as a consequence of attention to God. It founds the legitimacy of the canonical order and guides the faithful to be close to men and to concretize the love of God (Berlingò, 1991, 152).
The principal purpose of the canonical order is the salvation of souls. Therefore, his mission concerns man, his personality, his dignity, his integral salvation (Urru, 2001, 32) also in matters that do not seem to have elements in common with the Gospel message. In this sense the Pontiffs invite us to identify and use ethical economic models, that is, in conformity with the Catholic precepts that guide the person as faithful and as a citizen (Fuccillo, 2022, 232). Therefore, economy and finance represent areas of new evangelization, subjects for reflection and possible solutions that humanize, evangelize and christianize society and, more concretely, the economy and its operators (Schlag, 2021, 420). However, the possibility of a new evangelization does not mean proposing a Catholic model of economy but training economic operators to a 'financial education' (Pirovano, 2020, 73), which identifies ethical ways of creating and distributing wealth. The intersection between the economic categories and the mission of the Church is constituted by the criterion of the dignity of man that must be recognized and protected in every social dynamic (Galasso, Mazzarese, 2008, 44). His respect allows us to live «authentically human relationships, of friendship and sociality, of solidarity and reciprocity, also within economic activity and not only outside it or 'after it» (Benedict XVI, 2009, n. 36).

The teaching of the Catholic magisterium

The Catholic Church intervenes with acts of the Magisterium to «proclaim moral principles also about the social order, and likewise pronounce judgment on any human reality, insofar as the fundamental rights of the human person or the salvation of souls require it» (Code of Canon Law, can. 747 § 2, 1983). The economy and finance are among these realities and the intervention of the Church intends to guide human behavior and choices to achieve a social balance (Manzone, 2001, 34; Tettamanzi, 2009, 89; Coppola, 2015, 2).
From the end of the nineteenth century (Crepaldi, Colom, 2005, 10) the Catholic Church read the transformations of the economy and she defined a social doctrine that intends to protect the person, as a man and as a believer (Sorvillo, 2016, 40). The Catholic perspective towards the economy is positive. It constitutes an area of personal and professional fulfilment of the person. Therefore, the objective of the Catholic magisterium is to highlight the contribution that the economy makes to every sector of society and to find a balance between person, market and State (Nuccio, 1984, 411; Todeschini, 2004, 42).
n the Encyclical Letter *Rerum Novarum* of 1891 Leo XIII stresses that the economic dimension must contribute to the integral development of the person and positively affect the life of individuals and communities (Leo XIII, 1892, n. 15). The Pontiff inserts the economy into a broader discourse that also involves work, the relationship between employer and worker and the demand for the exercise of rights (Antonazzi, De Rosa, 1991, 89). The document states that economic relations must be characterized by justice, so that they can protect the dignity of the person. The human dimension is not far from the economic one. In this perspective Pius XI promulgates the Encyclical Letter *Quadragesimo Anno* in 1931. He believes that «the natural object of any

intervention of society itself is to help in a supplementary way the members of the social body, not already to destroy and absorb them» (Pius XI, 1931, n. 80).
The most important transformations are introduced with the reflections of the Second Vatican Council. Globalization also affects the economy (Siciliani, 2006, 5) and this calls for analyzing the system and preserving the dynamics of equality (Pinto de Oliveira, 1994, 35). An economic system can be called just if it «protects the inviolable and fundamental rights of man and promotes more just and more human relations» (John XXIII, 1961, n. 196).
Man represents the center of every dynamic, also of that economy, contractual and financial. The Dogmatic Constitution on the Church *Lumen Gentium* affirms that the Church needs human resources to carry out her mission which is not glory on earth but the expansion of humility by her example (Second Vatican Council II, 1964, 5; Second Vatican Council, 1966a, 991). The Pastoral Constitution Gaudium et spes confirms this position and recalls that those who dedicate themselves to the ministry of the Word of God must use «the ways and means proper to the Gospel, which, in many respects, differ from the means of the earthly city» (Second Vatican Council, 1966b, 1025). Therefore, the Fathers of the Council point out that economic and material means are instrumental to the purposes for which they are used. Not the opposite. This perspective also applies to the economic and financial activity of the Catholic Church.
The magisterium following the Second Vatican Council develops and deepens these reflections. The Encyclical Letter of Paul VI Populorum progressio of 1967 underlines the difference between the Occidental economic systems and those of underdeveloped countries. These imbalances affect the whole world and are an obstacle to the realization of peace. Therefore, it is necessary to define anew the principles that underpin economic dynamics to contribute to the promotion of a plenary humanism (Paul VI, 1967, n. 42).
The teachings of John Paul II devote much space to this matter. The first reflection has to object the job, that it is one of the motors of the economy. The Encyclical Letter Laborem exercens of 1981 defines work as «an expression of the human person and a place of fulfilment of his personal, community and spiritual vocation. Through work man realizes his vocation and, in a certain sense, becomes more human» (John Paul II, 1981, n. 9). The relationship between man and economic resources is completely subverted: the economy is one of the fruits of man and on it man has dominance. Therefore, the Pontiff rejects the idea that capitalism constitutes an «untouchable dogma in economic life» (John Paul II, 1981, n. 14).
In 1987 he published the Encyclical Letter *Sollicitudo rei socialis*. An entire chapter deals with «Authentic human development» and highlights that economic crises involving peoples can only be resolved if man is placed at the centre and social disparities are eliminated (John Paul II, 1988, nn. 27-34). The need for a change of perspective is highlighted in the Encyclical Letter *Centesimus annus*. Man is the origin of economic needs. He chooses the goods to be produced and consumed for the well-being of his life. Man is conceived as «a person, a relational being, an autonomous subject of moral decision, who builds the social order through this decision» (John Paul II, 1991, n. 13). Social, political and economic institutions must also follow this path. In this sense the necessary transformations are not only economic but involve the entire human race with the aim of «to build a more dignified life, to make every person's dignity and creativity grow effectively, his ability to respond to his own vocation and, therefore, to the call of God contained in it» (John Paul II, 1991, n. 29). Therefore, the Magisterium of John Paul II strengthens the principle of an economy truly in conformity with Catholic values and places man and his integral development at the centre.
The social transformations of the twentieth century (globalization of markets, collapse of communist regimes and depletion of natural resources) have strengthened the intervention of the Catholic Church in the economic and financial sector.
On several occasions Benedict XVI has argued the need to eliminate the disparities that exist between peoples. In a context that tends to encourage more and more individualism, the first

service of the Church is to educate in the social sense, attention to neighbour, solidarity and sharing» (Benedict XVI, 2008).
The 2005 Encyclical Letter *Deus caritas est* introduces a reflection on the relationship between justice and charity. The Church is called to make an important contribution in this direction through the presence of competent, trained Christians who direct their actions to the ethical model of economy. This, like other matters, is foreordained to the mission of the Church (Benedict XVI, 2005, nn. 30-37) and charity is implemented by the principles of solidarity and responsibility towards others (Benedict XVI, 2005, nn. 19-24).
The theme of charity as the foundation of the economy is demonstrated in the 2009 Encyclical Letter Caritas in Veritate. Benedict XVI affirms that if charity is the universal mission of the Church, every man must act for «the formation of a single family of peoples, united in common fraternity» (Benedict XVI, 2009, n. 13). Every choice of man is the exercise of his freedom. Therefore, the value of charity must guide economic actions according to the principles of justice, solidarity, subsidiarity and the common good. The Pontiff highlights the elements that have separated the economy from charity. Capitalism, contractualism and the market have excluded solidarity from the economic sphere. It is necessary to touch again the root of the economy, which is the integral growth of the human person (d'Arienzo, 2009, 7). Solutions can be offered by the economy of communion, corporate social responsibility, ethical finance, responsible tourism and fair trade.
Moreover, Benedict XVI recalls that economics and finance are connected to each other. This link needs a change in lifestyles in terms of consumption and savings and a fair and equitable use of natural resources. In this perspective, economics and finance can take on an ethical dimension, if man directs the actions of institutions according to charity in truth (Casile, 2011, 31). Therefore, the document aims to lay the foundations of a «new humanistic synthesis» (Benedict XVI, 2009, n. 21). This founds the relationship between charity and truth. This report aims to overcome «the tendencies towards a short-term economy» (Benedict XVI, 2009, n. 32) to support «the logic of the gift without counterpart that must find a place within normal economic activity» (Benedict XVI, 2009, n. 37). The Pontiff invites us to create alliances between the third sector, companies and the State and to define a new model of solidarity economy. In fact, the main purpose of every economic activity is to form institutional realities that place the integral development of man at the centre of their action. If this balance is transformed, man lives a condition of sin, because «the conviction of the need for the autonomy of the economy, which must not accept 'influences' of a moral nature, has led man to abuse the economic instrument in an even destructive way» (Benedict XVI, 2009, n. 34).
This purpose has been further hindered by the use of technological and digital tools in the financial field (Ghidini, Girino, 2021, 64). Their diffusion even within the economic circuits of the Catholic Church has defined new modalities of subsidy for the needs of the Church (can. 222 CIC) (Negro, 2017, 41). The faithful can choose to donate and make offerings through credit cards or debit cards. In some parishes and dioceses, the possibility of making donations through these technologies has been expressly provided[3] for by the placement of POS terminals in places of worship.
An additional obstacle to the realization of an ethical economy and finance is represented by virtual currency. The system of cryptocurrencies and blockchain technology has also involved the artistic heritage of the Catholic Church (Gravino, 2022, 189). The non-profit foundation Humanity 2.0 and the company Sensorium, specialized in NFTs (*Non-Fungible Tokens*) and *Blockchain*, have signed an agreement for the digitalization and digital enjoyment of religious cultural assets present in the Vatican Museums. The faithful, possessing a digital wallet (*ewallet*), have the possibility to purchase with cryptocurrency the available religious digital asset of their interest and

[3] The Italian Catholic Church has expressly provided for such grant methods on the website www.sovvenire.chiesacattolica.it.

use it through computers and virtual reality headsets. In compliance with the principles regarding the circulation of temporal goods, the collaboration has no commercial purpose but aims to spread the inestimable value of the Vatican's artistic heritage worldwide.
However, these new modalities of economic and financial development have prompted the Catholic Church to verify the conformity of the system with Catholic teaching. The only compatibility parameter is the realization of the human being, whose economic behaviors must be oriented towards communication, participation, cooperation, and transparency (Wilhelms, Wulsdorf 2021, 68). If this is the purpose, an economic action is ethically compliant if it creates an inclusive and supportive economy. In this perspective, on the one hand, virtual currency could meet the requirements of the Catholic model, allowing access even to those excluded from traditional banking circuits and unable to benefit from the universal destination of goods (Zamagni, 2012, 47). On the other hand, the risks associated with financial losses, the absence of an authority regulating the system, and cyber piracy could favor the protagonism of an economy at the expense of people (Sandonà, 2020, 442). These reflections should not encourage the non-use of new financial technologies. Rather, they call for a revolution in the economic paradigm (Rothlin, 2021, 332) to protect the common good as the good of all the people who are part of the social community (Martínez, 2020, 340).
In this perspective, the Italian Episcopal Conference has expressed itself with three documents: *Ethics and Finance* in 2000, *International Finance and Moral Action* in 2004, and *Ethics, Development, and Finance* in 2006. The widespread use of digital technologies has given finance a new role. This dynamic demands an analysis of the main economic and social issues. A change of approach is required. It is necessary to educate man to responsibility, inspired by faith and the Social Doctrine of the Church, identifying general criteria that can allow the evaluation of attitudes and behaviors that make man aware of being part of the life of a family and a community whose needs he shares (Grasso, 2011, 50), because the advantage that each one derives from being part of a certain community cannot be separated from the advantage that others also derive from it, since the interest of each one is realized together with that of the others, not against (as happens with private good), nor regardless of the interest of others (as happens with public good) (Bertone, 2007, 31).

The economic Magisterum of Pope Francis

These reflections have been expanded and strengthened by the teachings of Francis. Since the beginning of his pontificate, the Pontiff has recommended the rediscovery of the value of solidarity, ethical finance, and poverty (Francis, 2013a) in order to «combine teaching with socio-economic evolution» (Francis, 2013b).
In the Apostolic Exhortation *Evangelii Gaudium* of 2013, he affirms the need to realize an economy of inclusion (Francis, 2013c, n. 53), which prefers the person, the universal destination of goods, and not the realization of exchanges. Francis believes it necessary to «seek new solutions through a reallocation of ethics in the economy that can create a more humane social balance and order, through decisions, programs, mechanisms, and processes specifically oriented towards a better distribution of income and an elimination of inequality in the markets themselves» (Francis, 2013c, n. 204). Acting in the opposite direction means that money is at the center of the system and man becomes a tool of the 'logic of discarding' (Tornielli, Galeazzi, 2015, 206) that generates gaps and imbalances.
An economy oriented towards the common good and social peace must be based on certain principles: «the whole is greater than the part» (Francis, 2013c, nn. 234-237) means that the common good is not that of a few; «time is greater than space» (Francis, 2013c, nn. 222-225) in the sense that the time of the economy cannot be reduced to the short term imposed by the financial markets but it takes decades to initiate and bring to completion a real change; «unity

prevails over conflict» (Francis, 2013c, nn. 223-230) also in economics, which often follows principles that accentuate diversity rather than unite and succumb to the logic of competition; «reality is more important than the idea» (Francis, 2013c, nn. 231-233) in the sense that often the economy is based on impractical models and does not take into account the real problems that affect society (food waste, lack of resources, poverty, inequality). Respect for these principles should remember that man is a being in relationship and that this idea is central to an ethical model of economics (L'Huillier, 2017, 115).

The economic crisis that the current era is going through is the result of the social crisis that increases poverty, inequalities, failures. The economy of inclusion, which Francis urges to realize in numerous interventions, presupposes that man abandons his selfishness, his exclusive productive capacity of goods and services, and revenue maximization, forgetting his responsibility within society. «The global crisis affecting finance and the economy reveals its imbalances and, above all, the serious lack of an anthropological orientation that reduces the human being to only one of his needs: consumption» (Francis, 2013c, n. 56). Therefore, the Pontiff invites man to an integral conversion before an economic one because «to establish an economy friendly to people, it is necessary to reverse the primacy of the economy over the human being» (Francis, 2013c, n. 55). Economy and finance are at the service of the common good, of the entire community, and of every single man who is «the author, the center, and the end of all socio-economic life» (Second Vatican Council, 1966b, n. 63).

The foundation of this perspective is the love of God the creator, which, as Francis states in the Encyclical Letter *Lumen Fidei* of 2013, «helps to find models of development that are not based solely on utility and profit but that consider creation as a gift, of which we are all debtors; it teaches to identify just forms of government, recognizing that authority comes from God to be at the service of the common good» (Francis, 2013d, n. 55). Therefore, the Pontiff affirms that «every social corruption», such as the economic issue, can be, «is nothing but the consequence of a corrupted heart, which more than being forgiven must be healed» (Francis 2013f, 15). Therefore, Francis believes that if the international business community can count on many men and women of great honesty and personal integrity, whose work is inspired and guided by high ideals of justice, generosity and concern for the authentic development of the human family, it is possible to ensure that wealth is at the service of humanity and not the government.

The priority of moral law over market logics and profits is also highlighted in the encyclical letter *Laudato Si'* of 2015. The Pontiff affirms that «the rejection of ethics opens the doors to an economic imperialism that exists in the world unopposed, since both legislative tools and public institutions capable of resizing or demolishing it are lacking in the world» (Francis, 2015a, n. 175). If ethics guides the logics of economy and finance, the culture of discard, which is a protagonist in contemporary society, loses strength in favor of the inclusion of every human being. This change of perspective aims to protect the dignity of the person through «actions in favor of the most disadvantaged, such as those for the smallest within a family» (Francis, 2015b). Therefore, the Pontiff believes that politics should prevail over economy and finance because only in this way can man focus on the common good (Francis, 2015a, n. 189). Additionally, He calls for the formation of an ecological economy, understood as «cessation of consumeristic, greedy and irresponsible development and as redistribution of opportunities for healthy growth especially for those who fail to receive protection of their dignity» (Francis, 2015a, n. 191). These transformations require a change in forms of governance as well. Every State must foster conditions for inclusive democracy, rethinking and redistributing available resources, and ensuring the participation of all in the management of collective goods (Francis, 2015a, n. 179).

The constant growth of the financial crisis has prompted further intervention. With the document *Oeconomicae et pecuniariae quaestiones. Considerations for an Ethical Discernment Regarding Some Aspects of the Present Economic-Financial System* of 2018, the Congregation for the Doctrine of the Faith and the Dicastery for Promoting Integral Human Development have called for «developing new forms of economy and finance, whose practices and rules are directed

towards the progress of the common good and respectful of human dignity, in the sure path offered by the social teaching of the Church» (Congregation for the Doctrine of the Faith, Dicastery for Promoting Integral Human Development, 2018, n. 5).

The revolution introduced by the Pontiff has generated a new lifestyle. Economy of Francesco is the movement that aims to correct growth models that do not respect creation, life, family, and equity (Fuccillo, 2022, 239). The Pontiff's goal is to define an ethical finance that requires the realization of «an economy that makes live and does not kill, includes and does not exclude, humanizes and does not dehumanize» (Francis, 2019). He hopes to achieve a pact to change the current economy and give a soul to the economy of tomorrow: «Your universities, your companies, your organizations are workshops of hope to build other ways of understanding the economy and progress, to fight the culture of discard, to give voice to those who have none, to propose new lifestyles. As long as our socio-economic system still produces a victim and there is only one discarded person, there can be no celebration of universal fraternity» (Francis, 2019).

In the Encyclical letter *Fratelli Tutti* of 2020 Francis emphasizes that «together with technological progress there is a deterioration of ethics and a weakening of spiritual values and of the sense of responsibility ... but how beautiful it would be if the growth of scientific and technological innovations were also matched by ever greater equity and social inclusion!» (Francis, 2020, n. 31). However, the world of finance is far from the lives of most people. In this way, it prejudices the most vulnerable and «strengthens power interests that lead to creating a new culture at the service of the most powerful, in which the poor are always those who lose» (Francis, 2020, n. 52). Therefore, «it is up to governments and their financial models to rehabilitate a healthy politics not subjected to the dictate of finance and to put human dignity back at the center, in order to build alternative social structures that we need» (Francis, 2020, n. 168).

The Covid-19 health emergency has created greater distances between social classes: «Many of our brothers and sisters in the human family, especially those on the margins of society, are effectively excluded from the financial world. For this reason, it is now time to recognize that markets, especially financial ones, are not self-governing. Markets must be supported by laws and regulations that ensure they operate for the common good, ensuring that finance, instead of being merely speculative or financing only itself, operates for the much-needed social goals in the context of the current global health emergency» (Francis, 2021).

The economic conversion of man must start from the change of values that are the foundation. These «are not a cage that mortifies freedom and economic creativity. Indeed, it is quite the opposite, or at least it can be. In fact, if we want the future world to be habitable and worthy of man, the economy must be more free from the power of finance and more creative in seeking forms of production oriented towards integral ecology» (Francis, 2022b).

The magisterium of Pope Francis has contributed to redefining the ecclesiastical approach to economic and financial matters. On several occasions, he has reminded of the true nature of the temporal goods available to the Church, emphasizing that «the entities of the Holy See acquire and use temporal goods not for themselves, like private owners, but in the name and authority of the Roman Pontiff, for the pursuit of their institutional purposes, equally public, and therefore for the common good and at the service of the Church» (Francis, 2023a). In this perspective, it is necessary to be «pioneers from within the economic life of integral human development» (Francis, 2023b).

Francis's vision is global. Economics can no longer be practiced as a discipline isolated from the rest of the academic field: it must listen to ethics, sociology, history, law and political science, as well as physics, biology, and even theology (Giraud, 2020, 538). Economy and finance produce consequences that harm people, the environment, and the climate. The tools that the economy uses can encourage this conversion and form ambitious entrepreneurs who look not only for profit but also for social and environmental impact.

This theme has been the subject of deep reflection in the apostolic exhortation *Laudate Deum* of October 4th, 2023. Thinking that every reality is the result of the power of technology and economy

and that, for this reason, it encounters infinite and unlimited growth is a mistaken thought. What should be safeguarded is only exploited because man puts consumption before every other need (Francis, 2023c, nn. 20-23). In this way, the common good receives no protection, and the means and instruments that economy and finance use do not care for what is God's gift and not man's property. The damages that this approach causes to the environment and the climate are countless, favoring the forced displacement of millions of people who can no longer live in their lands. Therefore, the Pontiff highlights the inseparable link between the values of peace, justice, and respect for creation and the earth, on the consideration that the commitment to the safeguarding of the entire universe becomes the opportunity to establish forms of dialogue, common collaboration, mutual knowledge, and above all, protection of the dignity of the person who is in the image and likeness of God.

The economic and financial model of the Vatican City State: from teaching to legislative reforms

The centrality of the person, the achievement of integral human development, and inclusivity (Benedict XVI, 2009, no. 65) represent the boundary between economic actions consistent with religious precepts and opportunities for the exercise of power. An ethical finance system places at its core the realization of humanity according to the principles of participation, cooperation, and transparency. An economy guided by these principles pursues the common good understood as the possibility of an effective and complete realization of all individuals. These elements represent the line of continuity in the pontifical teaching on economic and financial matters.

These principles have inspired a reform of the banking and financial system of the Vatican City State (Braida, 2016, 201). The numerous legislative reforms, many of which are attributed to Francis, have been inspired by certain principles: oversight of entities engaged in financial activities (Francis, 2013g); coordination of economic and administrative affairs of the Holy See and the Vatican City State (Francis, 2014); separation of the function of administration and management of assets, entrusted to the Administration of the Patrimony of the Apostolic See (APSA), from that of oversight and control, which characterizes the activities of the Secretariat for the Economy (Francis, 2016). Furthermore, the ownership and administration of the liquidity of funds and securities of the Secretariat of State have been transferred to the Administration of the Patrimony of the Apostolic See under the oversight of the Secretariat for the Economy (Francis, 2020).

The Institute for the Works of Religion (IOR)[4] was the first institution to be involved (Ravà, 2003, 42). Francis's goal was to harmonize the dynamics of the bank with the mission of the universal Church (Casuscelli, 2013, 5; Dammacco, 2014, 259). Over time, the relationship between preaching evangelical poverty and the use of wealth has been criticized (Consorti, 2015, 10). These behaviors and scandals related to financial collapses (Oliosi, 2018, 322) have hindered the realization of the universal mission of salvation. In 2013, Francis established a Pontifical Commission to monitor this goal (Francis, 2013d). At the end of this monitoring phase, the Pontiff confirmed the functions of the institute. He reiterated the importance of the institute for the life of the Catholic Church and the Vatican City but reminded that the IOR is called to serve with care and to provide specialized financial services to the Catholic Church worldwide. In this perspective, Francis introduced precise rules for combating money laundering, strengthened computer systems and customer data verification, and adopted a mandatory staff training plan. Furthermore, the Statute was re-approved in 2019 to adapt the structures and activities of the

[4] The information of the Institute (legal nature, structure, functions) can be found on the institutional website http://www.ior.va.

Institute to the needs of the times (Zalbidea, 2019, p. 365). With a pontifical rescript of August 23, 2022, the Pontiff transferred to the IOR the administration and management exclusively of the financial activities and liquidity of the Holy See and the institutions connected to it (Francis, 2022). For this reason, Francis has reformed the regulations on transparency, supervision, and financial information, the system for the prevention and combating of money laundering and terrorist financing, and the supervisory and regulatory activities of entities professionally engaged in financial activities.

The purposes characterizing Vatican financial activities must be oriented towards the protection of the fundamental rights of the human person, in order to «realize a new economic-productive order, socially responsible and human-sized» (Benedict XVI, 2009, no. 41). Instead, financial activities «foster an economy of exclusion and develop a globalization of indifference when they do not protect consumers» (Francis, 2013, no. 54). The risk that the economy harms people must be avoided. An ethically compliant economic model requires consumers and investors to transform monetary structures into practices serving people, introducing a revolution in the economic paradigm.

The Vatican banking sector has been among those most involved in Francis's reforms. With Law No. CXXVIII of 2010, crimes of fraud and counterfeiting of currency were typified by punishing activities such as manufacturing, alteration, circulation, import, transport, and possession of counterfeiting tools (Art. 1) (Pontifical Commission for the Vatican City State, 2010a, 440). Law No. CXXIX of 2010, amended by Law No. XXIX of 2013 regulated the issuance of legal tender collector coins intended for circulation in the Vatican City State (Pontifical Commission for the Vatican City State, 2010b, 215). In 2014 Law No. LXIV amended Law No. CXXX of 2010 and identified the characteristics of coins and denominations, reproduction, replacement, and withdrawal of euro banknotes, and introduced measures to counter irregular reproduction of banknotes (Pontifical Commission for the Vatican City State, 2014, 615-626).

The Vatican legal system has also intervened to counter the growth of organized crime through traditional economic and financial channels (Fuccillo, 2015, 143). Law No. CXXVII on the prevention and combating of money laundering and terrorist financing established the Financial Information Authority (FIA) with functions of financial information and supervision (Ricciardi Celsi, 2015, 235). In 2020 it became the Authority for Supervision and Financial Information (ASIF)[5]. It interacts with the financial intelligence units of 152 countries and supervises compliance with Vatican law on the prevention and combating of money laundering (Fuccillo, 2013, 3). Financial wrongdoings increasingly utilize tools connected to digital technologies. The Permanent Mission of the Holy See to the International Organizations in Vienna highlighted that criminal activities pursue their objectives through the use of cryptocurrencies. These virtual currencies launder money and become a channel for increasing migrant trafficking to Europe. It is therefore necessary to develop «secure technological solutions, mechanisms for identifying virtual assets to increase transparency and combat illegal actions within these services, promote prevention campaigns on smuggling, and specific training programs»[6]. In order to counter the use of cryptocurrencies as a means of commissioning illegal transactions, the Vatican City State enacted Law No. XVII of October 8, 2013, containing rules on transparency, supervision, and financial information, whose Art. 5, lett. g), prohibits «the provision of services for issuing, exchanging, trading, or brokering of cryptographic, electronic, virtual, or synthetic currency» (Arrieta 2021).

With the Apostolic Constitution *Praedicate evangelium* of 2022, the Pontiff defined the organization of the structure and functions of the economic organs of the Holy See. This document fully realizes the work begun by the Pontiff in 2014. The motu proprio *Fidelis dispensator et*

[5] All the information about the profile, the history and the statute of the ASIF can be found on the website http://www.vatican.va.

[6] he full text of the declaration can be found on http://www.vaticannews.va.

prudens (Francis, 2014, 164-165) established the Council for the Economy, the Secretariat for the Economy, and the Office of the General Auditor. The three bodies are responsible for the control, direction, management, and auditing of the economic activities of the Holy See (Begus, 2015, 289; Pinotti, 2015, 283). These bodies exercise their competencies both within (Zannotti, 2022, 210).

The Vatican financial system between black lists, white lists and relations between legal systems

The international legal personality of the Vatican City State also translates into a system of autonomous economic and financial rules. These are necessary for the functioning and achievement of the State's purposes. However, sovereignty is not exercised only within the Vatican territory but also requires external spaces. Economic exchanges with other States create a comparison between the legal systems that characterize them with the aim of «participating in the efforts of the international community aimed at protecting and promoting the integrity, stability, and transparency of the economic and financial sectors and preventing and combating criminal activities» (Francesco, 2013g).

An example is provided by public procurement. In 2016, the Vatican City State joined international conventions against corruption. This made it necessary to amend the Vatican criminal code regarding crimes against public administration (Arrieta, 2021, 343). With the law of May 19, 2020, *The Diligence of a Good Father*, the Holy See and the Vatican City State guaranteed transparency, control, and competition in the contractual procedures entered into. For state aspects, article 1 regulates four objectives: ensuring the sustainable use of funds through unified and planned management; ensuring transparency in the contract award procedures; protecting equal treatment and non-discrimination of bidding entities; promoting effective competition among bidders themselves through measures to counteract any illicit agreements. Ethical aspects, on the other hand, are addressed in article 5 § 1, which requires that economic choices and interlocutors be ethical, administrative autonomy, and subsidiarity of entities, fair collaboration between them, fair division of procedural responsibilities in favor of subjects other than those who direct the entity, planning and rationalization of expenses, and elimination of unnecessary operations. Additionally, the regulatory framework is inspired by various fundamental principles: objective and impartial transparency of award procedures; combating conflicts of interest, corruption, and illicit agreements in competition matters; equal treatment of operators in all phases of the procedure; integrity and protection of documentation.

Unlike state economic models, canonical economy and finance are characterized by a dual profile: the spiritual one connected to the Holy See, which is the governing body of the universal Church (can. 361), and the institutional one, which concerns the Vatican City State, the territory over which the full sovereignty of the Holy See is recognized. The Roman Pontiff is the common element in both dimensions. He is the sovereign of the State and represents pro tempore the Holy See. The procedural rules of economic and financial management reflect this dual profile. There is a strong connection between state bodies and the Roman Pontiff in economic matters. Proposals are elaborated by the Secretariat for the Economy and examined by the Council. The subsequent phase is the approval of the Pontiff. Each assessment aims to ensure the protection of assets, the reduction of financial and institutional risks, the best management of human resources of the entities, and the correct compliance with approved programs and budgets.

Vatican banking and financial structures are subject to Vatican law. Article 3 of law no. LXXI of 2008 provides that matters not expressly regulated are subject to Italian law. Economic and financial regulations fall into these matters. They are also governed by general international law and the provisions of treaties and other agreements to which the Vatican City State is a party

(Sarais, 2020, 303). These rules have found wide application since the adoption of the euro in 2001 (Ricciardi Celsi, 2018, 70). This choice required the modification of internal guidelines in line with those of other EU countries. From this perspective, the Vatican City State has adopted EU regulations on the transparency of financial operations and the fight against money laundering and economic crime (Cavana, 2015, 282; Lugato, 2019, 131). In particular, with law no. XVIII of 2013, amended by law no. CCXLVII of 2018, the Vatican City State regulated market abuse and insider trading and assigned to the Financial Information Authority (FIA) the task of adopting specific regulations to combat money laundering and terrorist financing (Bettetini, 2014, 365; Cortesi, 2015, 46). This regulatory adjustment is also the result of the application of article 11 of the Treaty on European Union. Vatican economic and financial management institutions must comply with specific transparency requirements and subject their sources of funding to control systems and evaluation of the legitimacy of their use (Folliero, 2013, 13).

The organization of the Vatican financial and banking system highlights the autonomy of this system (Tozzi, 2009, 1). However, it is called upon to relate to other States (Durisotto, 2017, 3), whose economic rules may hinder the application of the principle of financial autonomy of the Vatican City. On the one hand, state systems follow profit and wealth logics, while on the other hand, the Vatican system aims to protect the common good and the fundamental rights of the human person (Zamagni, 2009, 32). Managing these inter-jurisdictional relations questions Vatican authorities about the possibility of fully exercising their financial autonomy and applying their own rules when a financier or investor is subject to the laws of another State. In this regard, in 2017, the Financial Information Authority issued an Instruction containing the blacklist of high-risk countries that do not adopt strategies in their anti-money laundering and counter-terrorism financing systems.

In other cases, the principle of financial autonomy has been limited due to the failure of the Vatican system to comply with EU and supranational economic rules. The absence of a financial transparency system has hindered anti-money laundering regulations, which are one of the fundamental rules of any economic system. For example, after the Bank of Italy no longer authorized Deutsche Bank Italy to provide POS and ATM services to the Vatican City State, economic institutions had to comply through the enactment of specific anti-money laundering legislation (Fuccillo, 2013, 2). To this end, in 2009, the Vatican City State and the European Union signed a Monetary Convention. Adherence to the common currency bound the Vatican State to implement EU rules for both existing and newly established credit institutions.

Furthermore, the absence of a Vatican central bank has favored the application of European monetary conventions on internal territory and increasing control by European institutions. These dynamics have caused, for example, a radical transformation of the IOR to ensure the broadest possible transparency of financial transactions. This interaction between legal systems can limit the Vatican financial system, whose rules come into contact with those of other systems, coexist, but are the expression not only of a State but also of a religious system. In particular, this perspective involves Italy, which is among the countries most involved in interaction with the Holy See, and Italian laws do not find automatic application in the Vatican City State. An attempt at dialogue was made through the Tax Convention concluded with Italy in 2015. It allowed the Italian Minister for the Economy to publish a decree in 2017, whereby the Vatican City State was included in the white list of countries for tax relations with Italy. The document improved economic and financial relations between the two States at a time when many legal systems were renewing internal laws to ensure transparent and traceable fiscal operations.

The results of the Convention were very positive because it made it possible to apply Italian taxation to financial activities conducted in the Vatican City State but capable of affecting the Italian legal system. Indeed, Article 1 provides for the exchange of tax information between the authorities of the two States, with the Vatican obliged to communicate the Authority responsible for exercising this function (Rivetti, 2017, 2102).

The difficulties in defining mutual economic relations prejudice Vatican activities. Religious tourism is an evident consequence. Pilgrims who come to the Vatican from all over the world may be hindered in their economic choices and suffer a violation of their religious freedom when engaging in economic activities. Moreover, these activities could be limited in countries where the Catholic religion does not have sufficient room for exercise (Fuccillo, 2023, 97). Therefore, it is necessary for the relationship between Vatican financial activities and the principle of transparency to be regulated differently within this State, which is the temporal expression of a religious confession. From this perspective, economics and finance are instrumental to the universal mission of the Church, whose spiritual activities cannot be limited by agreements signed by the Vatican City State.

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SECTION I. FISCAL ISSUES IN THE GLOBALIZED ECONOMY & FINANCIAL MICROECONOMICS

THE IMPACT OF PERSONAL INCOME TAX PROGRESIVITY ON SEVERAL MACROECONOMIC INDICATORS AT EU27 LEVEL FOR 2000 - 2022 PERIOD

Alina Georgeta AILINCĂ[7]

Abstract:

In the context of recent macroeconomic developments and the increasing need for financial support from the state, at the level of the European Union countries, it arise the question of a revision or even reform of public policies. Therefore, using panel data at the EU27 level, the article aims to analyze the impact of personal income tax progressivity, measured by several methods, on macroeconomic indicators such as: Taxes on individual or household income, Inflation, consumer prices, GDP growth and Investment share of GDP by institutional sectors, Unemployment rate and Annual net earnings. The results, more or less in line with expectations and economic theory, can also be particularized on specific groups of countries (e.g. countries that still have the single quota) to be able to motivate the reintroduction of progressive taxation.

Keywords: *taxation, fiscal efficiency, fiscal progressivity, macroeconomic implications*

JEL classification: *H24, H21, E24*

Introduction

Tax as an instrument of fiscal policy can have a positive or negative effect on economic growth. An increase in taxes can lead to a decrease in the income of individuals and can affect the purchasing power and can be reflected in the reduction of aggregate demand and decrease in production and can lead finally to the decrease in economic growth. But the pursuit of fiscal

[7] *3rd degree researcher, PhD., Centre For Financial And Monetary Research „Victor Slăvescu", 13 Septembrie Way, Academy House, B Building, 5th Floor, 5th District, Post Code 050711, Bucharest, Romania, e-mail: alinageorgetaailinca@gmail.com .ORCID:* https://orcid.org/0000-0002-2086-8275 .

progressivity does not necessarily mean the increase of taxation, but rather the more correct placement of taxation on various social categories, so a balanced and socially fair placement of the tax burden. The increase in fiscal progressivity may suggest an increase in the restrictive character of the fiscal policy, thus shortcomings in the sphere of supporting economic growth and tempering unemployment, but it could reduce also the deficit of the balance of payments and inflation.

Therefore, it is interesting to analyze whether fiscal progressivity, focusing only on progressivity at the level of personal income, measured by a series of methods, contributes or not to the improvement of some macroeconomic parameters or vice versa.

Description of the Problem and Literature Review

Some studies support the positive effects of fiscal progressivity, others, on the contrary, present serious reservations regarding its ability to support the economy. Thus, the work of Weller and Rao (2008) tests, for the period 1981-2002, several sources of macroeconomic data to see the connection between fiscal progressivity and economic stability, economic growth, inequality and fiscal policy, noting that taxation progressive gives the decision-makers the ability to conduct anti-cyclical fiscal policies, which contribute to economic stability, at the same time there is no evidence that the progressiveness of taxes leads to the reduction of economic growth (an idea also supported by the studies of Roed and Storm, 2002; Li and Sartre, 2004).

Conversely, according to the authors Weller and Rao (2008), the level of government spending and capital mobility can have a negative effect on progressivity. At the same time, progressivity can suggest the decrease of social inequality (Hassan and Bogetic, 1999 – study on fiscal progressivity in Bulgaria, before the introduction of the single quota) and bringing additional revenues to the budget since those who earn more will contribute more to the increase of revenues (Schmitt, 2003). Equally, progressive taxation can improve the automatic stabilization function of the tax system. More exactly, progressiveness can act similarly, as strongly in effect, as the demand mechanism (Auerbach and Feenberg, 2000), while demonstrating strong correlations between tax revenues and output gap (Swanepol and Schoeman, 2002), thus the progressive structure of taxes leading directly to the stabilization of production.

On the negative side, less progressive personal income taxation may be associated with higher capital flows and even lower long-term top marginal tax rates (Weller and Rao, 2008). At the same time, the reduction of marginal tax rates is extremely well correlated with the decrease in the unemployment rate, and as the levels of tax rates decrease, investment and/or consumption increase, also the real growth rate of wages (Gentry and Hubbard, 2002; Vermeer, 2022 etc.).

Methodology and Data

The article aims to analyze the correlations and the results of a regression equation that will clarify the connection between a series of macroeconomic indicators (Taxes on individual or household income, Inflation, consumer prices (annual %), GDP growth (annual %), Investment share of GDP by institutional sectors, Unemployment, total (modelled ILO estimate), Annual net earnings - Single person without children earning 50% of the average earning) show in table 1 also the tax progressivity related to the personal income tax. Progressivity is measured by four methods. At the same time, the number of income tranches/thresholds taken into account and its possible influence is added to the analysis. The analyzed period is 2000-2022; the data sources are Eurostat, World Development Indicators or DG Taxes and Customs, the method of investigation is panel data base.

The first method takes into account Musgrave and Thin's (1948) approach to measuring progressivity. The method of Musgrave and Thin (1948) shows a measure of progressivity through an index of distributional fiscal progressivity (M, M=(1-Ga)/(1-Gb)) which takes into account the evolution of the Gini coefficient before and after taxation. The Gini coefficients, before and after taxation, are also presented in table 1.

The second method takes into account progressivity measured by the gap between the divisions by categories of persons (e.g. single people without children who earn 50% and 167% of the average income) subject to taxation according to the share of income obtained from the average income.

The third method puts the implicit tax rate on labour at the centre of the analysis, so progressivity is taken into account through the evolution of implicit taxation on labour. The first three methods were also used in previous studies, in a different context of analysis, but also as a capitalization of the project "Progressive taxation - theoretical and empirical analyzes at the level of EU27 member countries", developed within the Victor Slavescu Centre for Financial and Monetary Research (coord. Ailinca, 2023).

The fourth method refers to the difference between the highest (top) and the lowest marginal personal income tax rate. The main indicators used are shown in the table below (see Table 1).

Table 1

The initial indicators selection and description

Indicators' notation	Indicators Description	Measurement unit	Source
TIHIpGDP	Taxes on individual or household income	Percentage of gross domestic product (GDP)	Eurostat[GOV_10A_TAXAG__custom_6850410]
Gcoef	Gini coefficient of equivalised disposable income	Coefficient (scale from 0 to 100)	Eurostat, EU-SILC survey [ILC_DI12__custom_7037173]
Gcoefbst	Gini coefficient of equivalised disposable income before social transfers (pensions included in social transfers)	Coefficient (scale from 0 to 100)	Eurostat [ILC_DI12B__custom_7037129]
TRsp50	Tax rate, Single person without children earning 50% of the average earning	%	Eurostat, [EARN_NT_TAXRATE__custom_6850679]
TRsp167	Tax rate, Single person without children earning 167% of the average earning	%	Eurostat [EARN_NT_TAXRATE__custom_6850727]
Itrlabour	Implicit Tax rate on labour	%	DG taxation and customs union, TAXUD
Tspitr	Top statutory personal income tax rates (including surcharges), 2000-2023	%	DG taxation and customs union
ICP	Inflation, consumer prices (annual %)	%	World Development Indicators
GDPG	GDP growth (annual %)	%	World Development Indicators
InvGDP	Investment share of GDP by institutional sectors	%	Eurostat
Ur	Unemployment, total (modelled ILO estimate)	% of total labour force	World Development Indicators
ANE	Annual net earnings (Single person without children earning 50% of the average earning)	euro	Eurostat

Source: Author's selection

Results

In order to analyze the interrelationship between fiscal progressivity (studied by the four methods) and the macroeconomic variables presented in the methodology, we first study the statistical properties of the variables, such as the average value, standard deviation, skewness, and kurtosis (see Table 2).

The standard deviation, with some exceptions, shows in most cases close to the average, being below the average for the targeted explanatory variables, suggesting a lower spread than the average and a grouping around the average. Also, the mean and median are close in value for all the predictive variables studied, suggesting a relatively symmetrical distribution.

We notice that the independent variables Met 1 and NTR are above the value of 1, which indicates that they are substantially and positively skewed, while for the methods - Met2, Met3 and Met4 there is an adverse Skewness. Thus, data are roughly skewed for Met2 and Met3 and moderately skewed for Met4. For Met 1 and NTR the kurtosis is above 3, which indicates that the distribution is leptokurtic, producing more values than a normal distribution, while for Met2, Met3 and Met4 the Kurtosis is below 3, suggesting that, in relation to the normal distribution, it produces fewer and less extreme values.

Table 2

The statistical description of the variables

Observations: 621	TIHIPGDP	ICP	GDPG	INVGDP	UR	ANE	MET 1	MET 2	MET 3	MET 4	NTR
Mean	7.480	2.850	2.541	22.700	8.401	9839.237	1.373	13.038	34.362	39.801	4.252
Median	6.110	2.184	2.574	22.260	7.360	8786.070	1.349	13.930	34.400	43.000	4.000
Maximum	29.000	45.667	24.370	54.300	27.470	29319.280	1.775	28.520	46.600	62.280	23.000
Minimum	2.000	-4.478	-14.839	10.690	1.810	879.980	1.120	-0.100	20.400	10.000	1.000
Std. Dev.	4.757	3.691	3.780	4.377	4.276	6290.500	0.110	6.721	5.877	13.542	3.407
Skewness	2.066	4.804	-0.319	0.958	1.511	0.492	1.056	-0.118	-0.369	-0.634	2.741
Kurtosis	8.194	43.113	7.621	8.096	5.711	2.236	4.331	2.395	2.375	2.338	13.458
Jarque-Bera	1139.898	44023.100	563.151	766.722	426.631	40.176	161.339	10.912	24.187	52.978	3612.243
Probability	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.000
Sum.	4645.1	1770.2	1578.1	14096.9	5217.1	6110166	852.4	8096.6	21339.1	24716.2	2640.2
Sum Sq.Dev.	14027.3	8448.5	8858.9	11876.1	11333.6	2.45 E +10	7.5	28005.8	21413.5	113694.4	7196.8

Source: Author's calculations, EViews12 processing

Based on the above information, it can be constructed an Augmented Dickey-Fuller (ADF) unit root test and present the descriptive statistics of the models. The Table 3 demonstrates that all of the variables utilized in this investigation are stable at order 0.

Table four shows the correlation matrix between the dependent variables: Taxes on individual or household income (TIHIpGDP), Inflation, consumer prices (ICP), GDP growth (GDPG), Investment share of GDP by institutional sectors (InvGDP) and Unemployment, total (Ur), Annual net earnings (Single person without children earning 50% of the average earning) (ANE) and the proposed methods for fiscal progressivity.

We thus observe that all methods show positive correlations with Taxes on individual or household income, and Method 4 has the most significant positive correlation, while ICP, GDGG with all methods have insignificant negative correlations.

Table 3

Augmented Dickey-Fuller unit root test for selected variables

Variables tested for ADF	T-statistic	Mackinnon critical value at 5%	P-value	Order of integration	Observation
TIHIpGDP	-3.6784	3.4171	0.0245	I(0)	Stationary
ICP	-13.2502	-3.4171	0.0000	I(0)	Stationary
GDPG	-19.4795	-3.4171	0.0000	I(0)	Stationary
InvGDP	-7.4145	-3.4171	0.0000	I(0)	Stationary
Ur	-7.6990	-3.4171	0.0000	I(0)	Stationary
ANE	-4.4809	-3.4171	0.0017	I(0)	Stationary
Met 1	-6.1103	-3.4171	0.0000	I(0)	Stationary
Met 2	-4.9008	-3.4171	0.0003	I(0)	Stationary
Met 3	-4.5600	-3.4171	0.0013	I(0)	Stationary
Met 4	-4.2153	-3.4171	0.0045	I(0)	Stationary
ntr	-4.5102	-3.4171	0.0015	I(0)	Stationary

Source: Author's calculations, EViews12 processing

Table 4

The correlation matrix of the variables

	TIHIpGDP	ICP	GDPG	InvGDP	Ur	ANE	Met 1	Met 2	Met3	Met 4	NTR
TIHIpGDP	1										
ICP	-0.175	1									
GDPG	-0.132	0.163	1								
InvGDP	-0.073	0.212	0.248	1							
Ur	-0.188	-0.134	-0.138	-0.288	1						
ANE	0.615	-0.237	-0.134	-0.157	-0.280	1					

Met 1	0.375	-0.065	-0.065	-0.192	0.116	0.289	1				
Met 2	0.389	-0.218	-0.132	-0.152	-0.056	0.709	0.215	1			
Met 3	0.410	-0.051	-0.110	0.092	0.058	0.200	0.418	0.236	1		
Met 4	0.632	-0.176	-0.133	-0.246	0.008	0.650	0.404	0.690	0.342	1	
NTR	0.107	-0.067	-0.052	-0.266	-0.139	0.495	0.014	0.424	-0.094	0.380	1

Source: Author's calculations, EViews12 processing

Also, the unemployment rate (Ur) highlights that only Met2 and the number of trances (NTR) show negative correlations with the methods that highlight fiscal progressivity. INVGDP shows a single positive but insignificant correlation with Met3. Same as TIHIpGDP, ANE is positively correlated with all methods and highly significant with the methods Met2 and Met4. In order to be able to reveal more information, we proceed to develop a series of regression equations.

Generically, the equations are represented as:

$Y=\alpha+\beta1x1+\beta2x2+\beta3x3+\beta4x4+\beta5x5+\varepsilon$

Where: Y= the dependent variables chosen successively as: Taxes on individual or household income (TIHIpPIB), Inflation, consumer prices (ICP), GDP growth (GDPG), Investment share of GDP by institutional sectors (InvGDP) and Unemployment, total (Ur), Annual net earnings (Single person without children earning 50% of the average earning) (ANE)

α= Constant; β1-6=Slope or x1-X5 coefficients;

x1-x5= the coefficients of the regression or the independent variables, or M1-M4 method and NTR –number of income tranches; ε= error term.

Table 5 shows, in a centralized way, the connection between the predictor variables and the response variable. Thus we observe that:

- For the dependent variable TIHIpGDP only the Met3, Met4 and NTR methods are significant because they have a p-value below 0.05,
- For the variable ICP only the method Met2 is adequate,
- For the dependent variable GDPG none of the progressivity methods are adequate,
- For the variable InvGDP only the methods Met1, Met3, Met4 and NTR have a suitable p-value,
- For Ur only the methods Met1 and NTR are ok,
- For the ANE only the independent variables Met1, Met2, Met4 and NTR are suitable.

It can be considered as appropriate the R-squared of 0.455253, respectively of 0.5955 presented only for the equations what explains the dependent variables TIHIpGDP and respectively ANE.

Thus, we can consider that progressivity, calculated by certain methods presented above, cannot explain to a large extent the evolution of inflation, economic growth and unemployment, but it can influence to some extent the evolution of investments. Despite these shortcomings, fiscal progressivity can significantly influence and explain the evolution of income from the personal income tax and especially of net annual personal earnings.

Table 5

The Regression equation results for TIHIpGDP, ICP, GDPG, INVGDP, Ur, ANE

Method: Least Squares and 621 included observations				Coefficient	t-Statistic	Prob.
Dependent Variable	TIHIpGDP	Independent Variable	C	-8.8847867	-4.80748	0.0000
R-squared	0.455253		Met 1	2.781976	1.861819	0.0631
Adjusted R-squared	0.450824		Met 2	-0.039082	-1.29521	0.1957
F-statistic	102.7927		Met 3	0.143196	5.134338	0.0000
Prob(F-statistic)	0.0000		Met 4	0.21659	13.53636	0.0000
Durbin-Watson stat	0.1334		NTR	-0.122771	-2.550592	0.0110
Dependent Variable	ICP	Independent Variable	C	4.5910	2.4345	0.0152
R-squared	0.0504		Met 1	-0.2827	-0.1846	0.8536
Adjusted R-squared	0.0427		Met 2	-0.1097	-3.5487	0.0004
F-statistic	6.5308		Met 3	0.0151	0.5286	0.5973
Prob(F-statistic)	0.0000		Met 4	-0.0160	-0.9760	0.3295
Durbin-Watson stat	0.9077		NTR	0.0461	0.9337	0.3508
Dependent Variable	GDPG	Independent Variable	C	5.1518	2.6336	0.0087
R-squared	0.025565		Met 1	0.1876	0.1181	0.9060
Adjusted R-squared	0.017643		Met 2	-0.0421	-1.3127	0.1898
F-statistic	3.227044		Met 3	-0.0487	-1.6432	0.1009
Prob(F-statistic)	0.006942		Met 4	-0.0155	-0.9114	0.3624
Durbin-Watson stat	1.56432		NTR	-0.0067	-0.1313	0.8956
Dependent Variable	InvGDP	Independent Variable	C	31.7284	15.0232	0.0000
R-squared	0.1527		Met 1	-8.3111	-4.8471	0.0000
Adjusted R-squared	0.1458		Met 2	0.0452	1.3045	0.1926
F-statistic	22.1724		Met 3	0.1615	5.0471	0.0000
Prob(F-statistic)	0.0000		Met 4	-0.0681	-3.7073	0.0002
Durbin-Watson stat	0.3856		NTR	-0.2471	-4.4744	0.0000
Dependent Variable	Ur	Independent Variable	C	3.2805	1.4903	0.1367
R-squared	0.0355		Met 1	4.2116	2.3566	0.0188
Adjusted R-squared	0.0277		Met 2	-0.0398	-1.1015	0.2711
F-statistic	4.5330		Met 3	-0.0056	-0.1664	0.8679
Prob(F-statistic)	0.0005		Met 4	0.0199	1.0381	0.2996
Durbin-Watson stat	0.1929		NTR	-0.1745	-3.0302	0.0025
Dependent Variable	ANE	Independent Variable	C	-9371.4980	-4.4683	0.0000
R-squared	0.5955		Met 1	5874.0470	3.4497	0.0006
Adjusted R-squared	0.5922		Met 2	413.9070	12.0372	0.0000
F-statistic	181.0941		Met 3	-1.0101	-0.0318	0.9747
Prob(F-statistic)	0.0000		Met 4	101.4419	5.5633	0.0000
Durbin-Watson stat	0.2291		NTR	411.3624	7.4994	0.0000

Source: Author's calculations, EViews12 processing

Thus, the result for the most appropriate methods for personal income tax collections as a percentage of GDP and for annual net personal incomes (ANE) is shown in table 6. It is thus

observed that the number of tranches and the methods of calculating the progressivity, complement each other between them very well, and method 4, which is based on the difference between the highest and the lowest marginal rates, supports very well the idea of progressiveness in relation to the expected effect in the economy.

Table 6

The final Regression equation results only for TIHIpGDP and ANE

Method: Least Squares and 621 included observations				Coefficient	t-Statistic	Prob.
Dependent Variable	TIHIpPIB	Independent Variable	C	-5.732476	-6.507139	0.0000
R-squared	0.450311		Met 3	0.156277	5.873286	0.0000
Adjusted R-squared	0.447639		Met 4	0.212659	17.1079	0.0000
F-statistic	168.4845		NTR	-0.146183	-3.134465	0.0018
Prob(F-statistic)	0.0000					
Durbin-Watson stat	0.1266					
Dependent Variable	ANE	Independent Variable				
R-squared	0.5955		C	-9380.2130	-4.5149	0.0000
Adjusted R-squared	0.5929		Met 1	5857.7220	3.6111	0.0003
F-statistic	226.7351		Met 2	413.8105	12.0914	0.0000
Prob(F-statistic)	0.0000		Met 4	101.3400	5.6503	0.0000
Durbin-Watson stat	0.2291		NTR	411.7686	7.7255	0.0000

Source: Author's calculations, EViews12 processing

In the annex, the results of heteroscedasticity and multicollinearity are presented only for two more significant equations, more precisely for TIHIpGDP and ANE, shown in Table 6.

Based on the details above, we can also perform a Granger causality test. Thus, eliminating the connection of the dependent variables between themselves and the independent variables between themselves, and taking into account only the connection between the dependent and independent variables with a p-value below 5%, we observe the following situations presented in table 7.

Thus, although the GDP is not explained well enough above the idea of fiscal progressivity of the personal income tax, nevertheless Met2 and Met4 seem to build an explanation for the GDP from the perspective of Granger causality. At the same time, for unemployment and net annual personal income, an adequate Granger causality seems to be provided by the Met1 method - based on the Gini coefficient, before and after taxation.

Table 7

The Granger Causality Test Results for selected variables

Pairwise Granger Causality Tests		
Date:09/11/23		
Sample:1621		
Lags 2 Obs. 619		
Null Hypothesis:	**F-Statistic**	**Prob.**
Met 2 does not Granger Cause GDPG	3.43299	0.0329
Met 4 does not Granger Cause GDPG	3.87236	0.0213
Met 1 does not Granger Cause UR	5.83879	0.0031
Met 1 does not Granger Cause ANE	15.5704	3. E - 07

Source: Author's calculations, EViews12 processing; only results with a probability below 0.05, and only the conditioning of the methods on the selected macroeconomic indicators are presented above.

Conclusions

The increasing need for budget revenues as well as the need to establish society on the most correct and equitable basis reveals, at least for the countries of Central and Eastern Europe where the single tax rate is still kept, the importance of achieving a significant fiscal reform.

This reform framework should also include the transition to progressive taxation of personal income, more or less moderate - with a larger or smaller number of tax brackets. Thus, the present study econometrically explores the importance of the fiscal progressivity of the personal income tax (through 4 methods) on some macroeconomic variables. The results indicate that Taxes on individual or household income (TIHIpGDP) and Annual net earnings (ANE) are the most influenced by fiscal progressivity, and the method that stands out the best is method 4 - which takes into account the difference between the maximum and minimum personal income tax rates. At the same time, although to a lesser extent, investments can also be connected with the evolution of the fiscal progressivity of the personal income tax.

Future Directions

The study can also be extended to more limited groups of countries at the EU27 level, so as to capture the distinct characteristics of the countries (e.g. countries that always have had a progressive quota, countries which have recently switched to a progressive quota and countries which still have a single quota) from the perspective of the impact of the fiscal progressivity of the personal income tax on the main macroeconomic variables.

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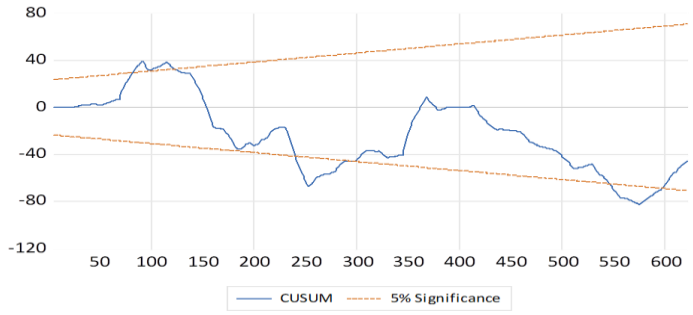
Annex

Table 1

The assessment results for explaining TIHIpGDP regression equation

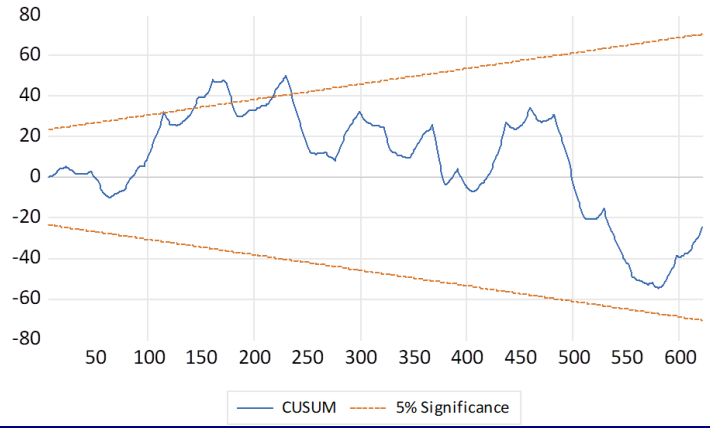
Fact-findings verifications	F - Statistics			P-value
Ramsey RESET -Stability test	166.1351			0.0000
Heteroskedasticity Test: Breusch-Pagan-Godfrey	36.24503			0.0000
LM test	2216.6440			0.0000
Multi-Collinearity test for initial equation	Coefficient variance	Centered VIF	Result analysis	Observations
MET 3	0.000708	1.213130	VIF<10	No interconnectivity of independent variables
MET 4	0.000155	1.405753	VIF<10	No interconnectivity of independent variables
NTR	0.002175	1.252570	VIF<10	No interconnectivity of independent variables

CUSUM test	

Source: Author's calculations, EViews12 processing

Table 2

The assessment results for explaining ANE regression equation

Fact-findings verifications	F - Statistics			P-value
Ramsey RESET -Stability test	48.58086			0.0000
Heteroskedasticity Test: Breusch-Pagan-Godfrey	24.10325			0.0000
LM test	1109.6090			0.0000
Multi-Collinearity test for initial equation	Coefficient variance	Centered VIF	Result analysis	Observations
MET 1	2631386	1.2332	VIF<10	No interconnectivity of independent variables
MET 2	1171.2510	2.0362	VIF<10	No interconnectivity of independent variables
MET 4	321.6747	2.2703	VIF<10	No interconnectivity of independent variables
NTR	2840.9130	1.2692	VIF<10	No interconnectivity of independent variables
CUSUM test				

Source: Author's calculations, EViews12 processing

THE ROMANIAN VEGETABLE PROCESSING SECTOR BETWEEN PRODUCTIVITY AND ITS CAPACITY TO ENSURE SELF-SUFFICIENCY

Cornelia ALBOIU[8]

Abstract:

The purpose of this paper is to analyze the evolution of the vegetable processing sector and to calculate several indicators such as number of employees, value of production, gross value added, apparent labor productivity, investment rate and to make some comparisons with other EU countries. According to the representatives of the sector, the market of canned vegetables is not yet very well anchored, although it has an important potential, given that almost half of the canned vegetables are imported. At the same time, farmers complain that lower quality production is wasted as the opportunity to process it is quite limited. There are many vegetables basins that lack the presence of a processing company or processing cooperatives formed by farmers' themselves. The study concludes that the revitalization of the sector requires important investments in processing companies, in new production technologies and processing cooperatives/producer groups.

Keywords: *vegetable processing sector, productivity indicators, investments*

JEL classification: *Q13, Q19*

Introduction

This study analyzes the potential of vegetable processing industry to contribute to local economy development, based on sustainable development criteria, including economic indicators, placing the vegetable processing industry from Romania in a European context. In this sense, we adapted a conceptual analytical model based on Porter's diamond used to evaluate the position of companies, in order to position Romania's vegetable processing industry in a national and European context, with the aim of providing the best development prospects for this sector as well as to make a comparison with the main competitors from the EU.

Creating value added for agricultural products is known as one of the most important managerial operations in local sustainable economic development (Zhang, Li and Min, 2018). In fact, adding value to local agricultural products contributes to the achievement of rural economic development goals, directly by establishing an adequate base for improving job creation and local economy (Barbier, 2007). Some of the most important positive effects of economic development include: 1) ensuring food security, 2) increasing the contribution of exports to GDP and 3) improving the creation of sustainable jobs (Van der Velde, Green, Vanclooster and Clothier, 2007). It is worth

[8] *PhD, Institute of Agricultural Economics, Romanian Academy, Bucharest, Romania, e-mail:*

noting that the development of agro-industries has been known as an important contributor to local economic development. Consequently, the creation of value added can effectively help sustainable development in its economic and social dimensions.

For example, Spain holds a significant share of the world saffron market by developing the domestic packaging industry for this special product (Sanjuán-López & Resano-Ezcaray, 2020). As another example, Germany is a major exporter of natural extracts from horticultural crops through the development of processing industries. However, Germany's domestic production of horticultural crops accounts for about 0.27% of the global production. These economic achievements resulted from the development of the processing industries of local production of raw materials.

Local processing can be an important income and development source for the local community and this can be achieved through investments in processing at local level.

In addition, the lack or insufficiency of modern processing and packaging facilities limits the potential of adding value to the production of vegetables in established vegetable basins. To address these challenges, a series of policies and measures are needed to support the cultivation and processing of fruit and vegetables. These include subsidies to farmers, investments in modern processing and packaging facilities and promoting the processed products on local and world markets.

Some of the constraints to local economic development in the fruit and vegetable processing sector include 1) insufficient infrastructure and supply chain contracting 2) insufficient investments in the processing industry to create value added and 3) poor development of necessary infrastructures for export.

Methodology and Data

To solve these problems, many countries have developed medium and long-term initiatives for financing, establishing the necessary infrastructures for industrial development, creating jobs, expanding exports, reducing taxes and building educational infrastructures, most of which focusing on the development of local agro-processing industries (Ciani et al., 2020).

The paper is based on data sources from Eurostat, the National Institute for Statistics, as well as on the conclusions of some companies from Romania and the EU that conducted research in this field. The main indicators used are the number of companies, average number of employees per company, value of production, gross value added, gross operating surplus, apparent labor productivity, operating profit ratio, investment rate. These indicators were calculated to see where Romania's processing industry is positioned compared to other EU member states that are important competitors for the national fruit and vegetable processing industry. Data from the period 2011-2021 were used to calculate these indicators.

Results

The European imports of processed fruit and vegetables steadily increased from 2017 to 2021. About 26% of the total volume of imports of processed fruits and vegetables come from developing countries. Germany, the Netherlands, France, the United Kingdom, Italy and Belgium are the most important importers and provide the best opportunities for suppliers from developing countries. Covid-19 has not resulted in a lower demand. However, it has increased import prices, due to higher transport charges. The products with the higher potential in 2021 were cashews, peanuts, canned tropical fruit and vegetables, table olives and frozen berries. The products obtained in a sustainable and environment-friendly manner, which support a healthy lifestyle, will have better opportunities to be placed on the European market.

Europe is the largest market in the world for processed fruit and vegetables, absorbing almost half of global deliveries. In the last three years, the European imports of processed fruit and vegetables steadily increased. In 2020 and the first half of the year 2021, the value of imports increased by a higher rate than the average due to the effects of Covid-19 pandemic. Production decline and frequent bottlenecks led to higher prices in certain major groups of products, mainly in those originating from Asia. In 2021, the volume of imports decreased by 3.3. on year. The increase of home consumption and demand for convenient and easy-to-prepare vegan foods are the main drivers of market growth.

The market of preserved products ready for retail sale is limited in the European Union. Almost 80% of this category of products is produced and marketed in Europe, mostly by large multinational companies. Only 23% of preserved fruit and vegetables come from developing countries. Germany, France, the United Kingdom and the Netherlands together account for 55% of all imports in this segment. Poland and Belgium are the fastest growing markets, with average annual growth rates of 9% and 6% respectively. The products with the fastest import growth rates in the last five years were pickled cucumbers (6.4% annual rate), Agaricus mushrooms (5.4%), shell beans (3.4%) and mixed vegetables (2.9%). There are better opportunities for the products that can be supplied in bulk packaging (such as cans) than for products ready for retail sale, as there is less competition for bulk products.

In the EU, the value of processed fruit and vegetables amounted to 51.5 billion EUR, or 6.5 % of the total value of food industry production. Fruit and vegetable processing take place across the EU, but five member countries were responsible for over two-thirds (69.1 %) of total production value in 2021; these were Italy (22.3 %), Spain (15.1 %), Germany (11.8 %), France (10.2 %) and the United Kingdom (9.8 %), which shows quite a high concentration.

In addition to being consumed directly and traded as raw commodities, fruit and vegetables are also processed into a wide range of food products. These can be grouped into frozen, dried and preserved fruit and vegetables (canned vegetables, jams, fruit jellies and dry fruits) (72.5 % of sold production), juices (19.6 %), tomato ketchup (3.2 %), fruit and vegetable preparations (4.1 %) and dehydrated group of dried fruits and homogenized fruit and vegetables (1.3 %).

As regards the specific products, the highest production values were for non-concentrated orange juice (frozen exclusively) accounting for 4.2 % of total processed fruit and vegetables, followed by tomato ketchup (3.2 %) and apple juice (2.9 %).

Overall, the EU was a net importer of processed fruit and vegetables, but some member states had trade surpluses, including Spain and Italy.

In Romania, according to an analysis **conducted by KeysFin** in 2020, the turnover of fruit and vegetables increased by 17.4% compared to 2019 and reached a historic maximum of 24.4 billion

RON. By sub-segments, trade recorded the highest increase, by 19%, with a turnover of 20.8 billion RON, the processing activity was up by 12% (1.4 billion RON turnover), while the turnover of fruit and vegetable producers increased by 5% from 2019, to 2.1 billion RON in 2020. For the next years, the above-mentioned study estimated a continuation of the increasing trend that began in 2014, to reach a record level of 28 billion RON as a result of increasing consumption, as well as of inflationary pressures of about 10% in 2020 and 2021.

Value of fruit and vegetable processing industry

The production value of the fruit and vegetable processing industry had an increasing evolution from 2011 to 2020, with a +36.6% growth rate compared to 2011 and annual growth rates of about +4% compared to 2019 and 2020. However, compared to the other member states with which the comparison was made, Romania has the lowest production value, half of that of Hungary and 10 times lower than the value of production from the fruit and vegetable processing factories in Poland. This denotes the need to improve the valorization of production in Romania and the use of the growth potential provided by the production of raw materials and by the growing demand of the population.

Table 1

Value of production in the fruit and vegetable industry 2011-2020, compared to other EU member states

	2011	2015	2016	2017	2018	2019	2020	2020/ 2011 dynamics	2020/2015 dynamics
Italy	9,927.9	10,529.1	10,745.7	11,450.8	11,774.0	11,861.9	12,579.2	26.7	19.5
Hungary	712.6	749.6	850.1	926.9	848.0	849.9	921.3	29.3	22.9
Poland	3,467.9	3,979.5	4,117.9	4,451.2	4,568.6	4,550.3	4,597.9	32.6	15.5
Romania	**332.9**	**437.1**	**369.1**	**436.1**	**457.4**	**406.0**	**454.7**	**36.6**	**4.0**
France	7,076.4	7,187.8	7,399.9	7,422.3	:	8,266.9	7,928.0	12.0	10.3

Source: author's calculations based on Statistics Eurostat (europa.eu) data

Evolution of the number of enterprises

According to Eurostat data, in the year there were 818 registered enterprises for the processing and preservation of fruit and vegetables, with a turnover of 199 million EUR, with 1794 employees, which obtained a profit of 16.7 million EUR. This places Romania at half the number of enterprises in Italy, Poland and France, but above the number of enterprises in Hungary. The top five enterprises cumulated 40% of the turnover in the subsector and accounted for 32% of employees,

obtaining 52% of profit, in other words the top five enterprises covered almost half of the fruit and vegetable processing sector.

Table 2

Number of enterprises in the fruit and vegetable processing industry

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020/ 2011 dynamics	2020/ 2015 dynamics
Italia	**1,788**	**1,738**	**1,778**	**1,753**	**1,726**	**1,775**	**1,768**	**1,741**	**1,646**	**1,749**	**-2.2**	**1.3**
Hungary	**534**	**533**	**515**	**536**	**544**	**559**	**578**	**554**	**534**	**537**	**0.6**	**-1.3**
Poland	**952**	**1,050**	**928**	**976**	**1,085**	**1,127**	**1,220**	**1,472**	**1,435**	**1,416**	**48.7**	**30.5**
Romania	**249**	**266**	**284**	**319**	**365**	**411**	**478**	**619**	**682**	**818**	**228.5**	**124.1**
France	**1,176**	**1,235**	**1,361**	**1,397**	**1,282**	**1,388**	**2,550**	**1,447**	**1,593**	**1,689**	**43.6**	**31.7**

Source: author's calculations based on Statistics Eurostat (europa.eu) data

The distribution by sub-segments reveals a relatively balanced market: thus, 43% of companies were active in trade, in primary production respectively, and the rest in fruit and vegetable processing.

The number of enterprises in the category *Processing and preservation of fruit and vegetables* increased each year in the analyzed period, also as a result of the development of units that manufacture perishable food preparations from fruits and vegetables (such as salads, peeled or cut vegetables) also included in this category. On the other hand, the average number of employees per enterprise decreased, which suggests that many newly-established enterprises are smaller in size. Comparatively, Romania has the lowest number of employees, i.e. 7.5 employees / enterprise, less by half compared to the other analyzed countries.

At the same time, an analysis of the sector made by Finkeys reveals that the number of employees increased by 1.9% compared to 2019, and was by 21% above the level of 2016, to reach 27.5 thousand employees in the entire sector in 2020. Thus, the labor force in the trade and processing sector increased by 7% in each segment, reaching 15.7 thousand employees and 4.3 thousand employees respectively in 2020, while primary producers had by 10% fewer employees than in 2019, respectively 7.5 thousand in 2020.

Table 3

Number of employees per processing enterprise

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020/2011 dynamics	2020/2015 dynamics
Italy	16.5	16.3	16.3	16.9	17.3	17.7	18.6	19.3	20.9	20.8	26.1	20.2
Hungary	14.6	14.8	15.0	15.1	15.0	15.1	15.3	15.6	15.6	15.7	7.5	4.7
Poland	34.3	31.4	34.1	33.0	30.3	30.9	29.6	26.8	27.8	28.2	-17.8	-6.9
Romania	22.7	20.7	19.3	17.2	15.8	11.9	10.7	8.8	8.5	7.5	-67.0	-52.5
France	21.4	19.3	18.2	16.5	19.7	18.4	10.4	19.0	17.3	16.6	-22.4	-15.7

Source: author's calculations based on Statistics Eurostat (europa.eu) data

The number of employees per enterprise in the fruit and vegetable processing industry had a negative trend in the period 2011-2020, with the largest decrease compared to the other analyzed countries (-67% as compared to 2011 and -52% as compared to 2015). The processing industry in Romania also had the lowest number of employees per enterprise, which denotes that most enterprises are small-sized in terms of number of employees.

Apparent labor productivity

The apparent labor productivity is calculated as ratio of gross value added to the number of employees. Labor productivity in the fruit and vegetable processing industry is the lowest compared to the analyzed countries, even though in the last 10 years an important growth rate was noticed, higher than that of Italy and France, for instance (by +36% compared to 2011 and 26% compared to 2015), Table 4. The apparent labor productivity in the fruit and vegetable processing and preservation industry is three times lower in Romania than in France and almost twice lower than in Poland, but the investment rate and the operating profit rate have comparable values (even higher, but we should not forget that the gross value added is lower in Romania).

Table 4

Apparent labor productivity, thousand EUR

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020/2011 dynamics	2020/2015 dynamics
Italy	56.8	49.4	53.6	57.1	58.8	61.6	60.7	61.1	61.2	60.7	6.9	3.2
Hungary	19.5	18.9	20.1	21.8	20.2	21.8	21.6	22.7	23.5	27.3	40.0	35.1
Poland	23.0	23.7	23.7	24.4	26.6	25.6	26.2	30.5	32.1	33.1	43.9	24.4
Romania	**13.0**	**14.4**	**15.1**	**14.3**	**14.0**	**12.7**	**16.4**	**15.5**	**16.3**	**17.7**	**36.2**	**26.4**
France	56.9	59.9	58.8	63.0	64.3	61.2	63.7	:	69.6	67.7	19.0	5.3

Source: author's calculations based on Statistics Eurostat (europa.eu) data

Gross value added per employee in the fruit and vegetable processing industry

Although the gross value added had an increasing evolution in the investigated period, this remains far below the values of France and Italy, and even compared to Poland and Hungary. This is due to insufficient production capacities and to the fact that very small amounts of vegetables intended for processing are produced in Romania, processing being based on semi-processed imported products (from the Asian area inclusively). According to the representatives of the Interprofessional Fruit and Vegetable Organization, less than half of the raw materials grown in Romania are destined to processing factories. Although there are no official data on the degree of coverage of the processing capacity from the food industry, according to the representatives of the sector, this is 60-70% in summer and below 40% in winter, the largest deficit being found in tomatoes for processing. Romania covers only 10% of the sales of tomato paste and *zacusca* (vegetable stew), as against 60-70% in the 1990s. As China benefits from the advantage of large productions and cheap labor, it massively exports tomato paste in Romania, generally of poor quality, according to the statements of the representatives of the sector. The total fruit and vegetable processing capacity is approximately 160,000 tons/year (ProdCom

Interprofessional Fruit and Vegetable Organization). Tomato paste, vegetable hotchpotch, soup vegetables and frozen vegetables have the highest share in the vegetable processing sector.

Investment rate

The investment rate calculated as ratio of investment value to value added to the cost of factors. This ratio refers to the investments of enterprises in fixed assets (buildings, equipment, etc.) to the value added created during the production process. For this indicator, the enterprises in the fruit and vegetable processing sector had a very good dynamics, with a 90% growth rate in the period 2020/2015, the highest among the other analyzed countries. This reveals a position of confidence regarding the possibility of business development in this field and adaptation to market requirements.

Table 5

Investment rate, percentages

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2020/2011 dynamics	2020/2015 dynamics
Italy	**26.0**	**48.0**	**23.7**	**30.4**	**23.2**	**24.4**	**25.3**	**27.4**	**28.1**	**22.2**	**-14.6**	**-4.3**
Hungary	**21.3**	**22.1**	**21.4**	**29.0**	**28.9**	**22.1**	**27.3**	**31.6**	**33.5**	**30.7**	**44.1**	**6.2**
Poland	**22.2**	**25.0**	**27.1**	**27.5**	**25.5**	**25.9**	**25.2**	**21.8**	**25.1**	**21.2**	**-4.5**	**-16.9**
Romania	**36.4**	**29.6**	**28.6**	**39.3**	**24.7**	**34.4**	**39.9**	**28.1**	**44.6**	**47.9**	**31.6**	**93.9**
France	**27.4**	**19.1**	**25.7**	**19.7**	**22.7**	**18.7**	**23.3**	**:**	**20.0**	**22.4**	**-18.2**	**-1.3**

Source: author's calculations based on Statistics |Eurostat (europa.eu) data

As regards the production capacity, as very small quantities of vegetables intended for processing are produced in Romania, processing is based on semi-processed products from import (from the Asian area inclusively). According to the representatives of the Interprofessional Fruit and Vegetable Organization, less than half of the raw material grown in Romania is destined to processing factories. Although there are no official data on the degree of coverage of the processing capacity from the food industry, according to the representatives of the sector, this is 60-70% in summer and below 40% in winter, the largest deficit being found in tomatoes for processing. Romania covers only 10% of the sales of tomato paste and *zacusca* (vegetable stew), as against 60-70% in the 1990s. As China benefits from the advantage of large productions and cheap labor, it massively exports tomato paste in Romania, generally of poor quality, according to the statements of the representatives of the sector. The total fruit and vegetable processing capacity is approximately 160,000 tons/year (ProdCom Interprofessional Fruit and Vegetable Organization). Tomato paste, vegetable hotchpotch, soup vegetables and frozen vegetables have the highest share in the vegetable processing sector.

Romania is a net importer of processed products, the Romanian processing factories only partially covering their need for raw materials from domestic production. In 2019, the processing and preservation of fruit and vegetables represented a low percentage of the value added of the food sector, of about 3%, by sectors such as meat and meat products, flour products and dairy. The distribution of fruit and vegetables also represents a very low percentage of the gross value added of the food sector, i.e. 5%. Consumer services account for around 1%. This denotes a sector where the formation of value added on the food chain is very low and unbalanced and highlights the need for chain reorganization. Therefore, the supply of fresh and processed fruit and vegetables has quite a low value added, mainly due to the poor organization of producers (under 1% degree of association, compared to 45% the EU average, or over 100% in the Netherlands,

which has producer organizations, association of producer organizations and cross-border cooperatives) (Alboiu, 2022).

The processing industry representatives claim that "the market of canned fruit and vegetables in Romania is not very well crystallized, although its potential is significant, taking into account that almost half of the canned fruit and vegetables are produced outside the country". The strength of the most important producers in the processing industry is that they produce their own raw material or they have concluded firm, long-term contracts with farmers from Romania; these contracts also include their financial support (for the purchase of inputs), a model that is followed by the most important companies (Alexandri C, Luca L, Ionel I, Leonte J., 2023).

The lack of temperature controlled warehouses in the proximity of vegetable basins, as well as of processing centers or the insufficiency of packaging for transport put pressure on local producers, who have to sell their production immediately after harvesting. At the same time, farmers consider that they can no longer bear the increased costs of energy and fertilizers, whether they produce vegetables intended for fresh consumption or for processing. This adds to other uncertainties, such as climate change, problems related to workforce, difficulties in maintaining contractual relations and in understanding the functioning of the EU common market organization by the Romanian fruit and vegetable sector at a level similar to that in the other EU member states.

Conclusions

In Romania, the processing industry has significantly grown in recent years, although it still does not have the full ability to adapt to the market, and is not fully anchored yet to primary producers' needs, on the one hand, and to consumers' demand, on the other hand.

The gross value added per employee in the fruit and vegetable processing industry has relatively good growth rates compared to the countries with which the comparison was made (Italy and France), yet slightly below that of Hungary.

An important increase has been also noted in the investment rate in recent years, which reveals the industry's potential for growth and adaptation to the market.

Production value continues to remain at a low level compared to the other four analyzed countries, up to ten times lower in 2020 compared to Poland, for example. This denotes the need to improve production valorization in Romania and the use of the growth potential offered both by the production of raw materials and the increasing demand of the population.

In conclusion, important investments are needed to reach the objective of this industry to contribute to local development and for a better valorization of local raw materials. The National Strategic Plan provides such opportunities, and the investments in off-farm conditioning, storage and processing of agricultural and horticultural products is one of the measures of the National Strategic Plan that will contribute to the consolidation of enterprises in food industry, by providing non-refundable public support for modernization investment projects of up to 3 million EUR per project (this value can increase up to 7 million EUR in the case of projects for setting up processing companies and even 10 million ER for the new investments in fruit and vegetable processing.

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*** Institutul National de Statistică, Bilanțuri Alimentare

OPTIMISATION OF FINANCING AND INSURANCE MECHANISMS IN THE HEALTH CARE SYSTEM IN THE CONTEXT OF EUROPEAN PRACTICE

Corina CĂUȘAN [9]

Svetlana GOROBIEVSCHI[10]

Abstract:

Actuality. *The concept of the medical system and its systemic approach, analysis of the financing of the health system, etc. - constitute important categories in the study of health services. At the moment, the overall analysis proves that the current financing mechanism is becoming insufficient, and the medical insurance companies declare themselves dissatisfied with the function they perform, respectively, the process of resiliency of the medical system is impossible. These circumstances suggest that the financial management of the health system requires conceptual changes. In the context of the accession of the Republic of Moldova to the EU, public policies and mechanisms for financing and ensuring the health system become particularly current, together with the medical normative acts, which require the revision of the health protection system.*

The objective. *It consists in the resilience of the national public health financing model in the Republic of Moldova through the thorough analysis and synthesis of existing scientific concepts and practices in the world and their adaptation to the national medical culture.*

Research methods. *In order to achieve the stated objective, the authors documented themselves, performed the selection and bibliographic synthesis of information from national and international medicine. Graphical, tabular and comparative analysis methods were used for visual and representative interpretation. Grouping, synthesis, induction and deduction methods were used.*

Results. *Although none of the existing global public health financing models can claim to be universal, analyzing the weaknesses of different public health financing models and the experiences of their use in certain countries have been essential in formulating the optimal model for the Republic of Moldova, which claims to join the EU. The optimal variant of resilience of the medical financing system in the Republic of Moldova is argued to be: completing the Bismark system with elements of the Semashko system. The argumentation of this model emerged from the functional-structural approach and the dialectical interrelations between the functions of the system and the structure of the studied object - the health and social protection system created.*

Originality. *The study of the strengths and weaknesses of each model and the specific experiences of the selected countries was of key importance in formulating the conceptual aspects of financial management in public health. The authors performed a complex analysis of different health systems from different countries of the world and the Republic of Moldova, determining the opportunities and criteria for improving the system of local medical services. The relevance and variability of the obtained results allowed the authors to formulate the essential theoretical and practical foundations in the field of public health and to argue the option of a more efficient financing mechanism for this field in the Republic of Moldova.*

Keywords: *public health, health protection, health systems, public health financing models, health system resilience.*

JEL classification: *A10, A1, H5*

[9] *University of European Political and Economic Studies "Constantin Stere" (USPEE), Chisinau e-mail:kausankorina@gmail.com.*

[10] *USPEE, Chisinau. Emai: gsvetic@gmail.com. ORCID: https://orcid.org/0000-0003-4600-881X .*

1. Introduction

Globalization processes that take place in modern conditions make it possible to develop effective mechanisms of state influence aimed at the development of regions. Important experience has been accumulated worldwide in the training sector and funding models in the context of public health. Many countries are striving to expand free health care coverage, optimize funding sources, in order to increase efficiency. The planning and financing of medical institutions is of exceptional importance for improving the forms and methods of managing the financing and insurance mechanism in the health system, as well as for improving the efficiency of medical institutions. In fact, healthcare is a branch of the country's national economy. Planning also ensures the proportional development of healthcare institutions, eliminates disproportions in providing the population with medical personnel, beds, equipment, improving management forms and methods. All this allows the labor force to fully fit into its function and, at the same time, will allow it to increase labor productivity. The security of modern planning in the medical system, under the conditions of the transition to the principles of the market economy, loses its mandatory functions, acquiring more and more a recommendable character, based on the function of forecasting, which elaborates various types of public health protection programs and the environment. The way of organizing production and human life in space is one of the attributions of a state, aimed at preserving the community and the working capacity of the habitat. However, the choice of the regional development objective and the way to achieve its strategic directions, each country determines it individually, because there are differences in the socio-economic development of the regions. It should be noted that many countries use the principle of decentralization of power. These are mainly functions related to the social sphere: public utilities, medical assistance, education, etc. These are mainly functions related to the social sphere: public safety services, health services, education, etc.

A coherent health services market was created in the Republic of Moldova. The introduction of compulsory healthcare insurance, despite the difficulties, contributes to the safety of the healthcare system in an unstable economic situation. Mandatory Medical Insurance Funds ensure the collection and accumulation of insurance contributions and payments, their intended use for financing medical assistance for Moldovan citizens. The new system ensures the provision of a minimum of free medical assistance within the territorial programs of compulsory medical insurance, allows the establishment of non-departmental quality control of the medical and diagnostic process, to begin the restructuring of medical assistance, in accordance with the needs of the population to move to a more rational use of resources within medical (IM) and preventive (IMP) institutions.

The facts prove that the functioning of the mandatory health care insurance system has qualitatively changed the system of financial relations between the state and medical institutions.

The recent prosperity on a global scale is one of the causes of the problems faced by governments in the field of health insurance: as countries develop economically, the population tends to spend an increasing part of the GDP on health services. Figure 1 shows the percentage of GDP withdrawals for the years 2018-2022.

The authors mention that the higher the GDP withdrawals, the higher the quality of medical services, having a primary impact on public health and quality of life.
In the opinion of Cristina Copăceanu, it is mentioned that, «The increasing expectations affect the general level of demand for medical services, but also their structure, everywhere in the world the reforms in the field of health, however, are particularly complex. Financing the health care system has become a major problem, and the search for more effective tools and techniques is something characteristic of most health care systems both nationally and internationally»**[**1,p.8].

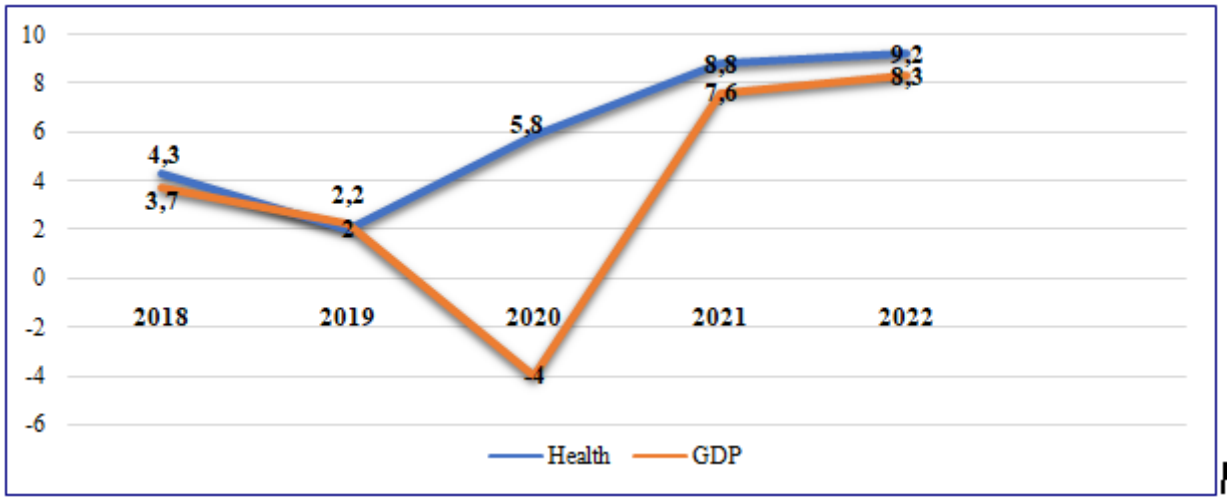

Figure 1. Real annual growth in health expenditure per capita and GDP, in European middle-income countries, 2018-2022[11,13].

Source: www.numbeo.com/health-care/rankings_by_country.jsp?title=2022-mid&region=150

https://www.numbeo.com/health-care/

It should be mentioned that the authors analyzed various theoretical-methodological views regarding the nature of the financing mechanism of the health care system. Thus, the approach to the notion of financing mechanism is related in correlation with the concept of financial mechanism which, in specialized literature, is treated as a much broader category.

The authors agree with the opinion of Cristina Copaceanu, "The financial mechanism represents a system of managing financial relations by the bodies with financial functions by means of financial levers, instruments and methods, based on the economic laws and normative acts of the state"[1, p.9], with which the authors of the article generally agree.

But, in order to identify the opportunities to make the financing mechanism of the health system more efficient and to confirm definitively the opinion of the scholar, it is proposed to study the financing systems in the European Union, fig.2.

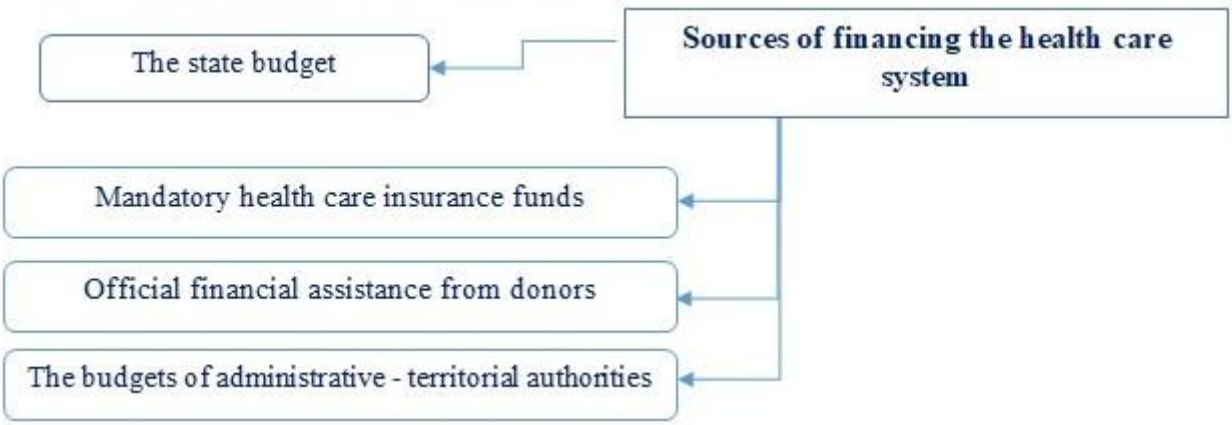

Figure 2. Sources of financing the health care system

Source: developed by the authors

As we see from fig. 2, the health financing mechanism represents a combination of public and private resources. Since public spending cannot increase significantly in the future due to high public deficits, the main challenge for policymakers is to bring more money into the system from private sources. Another important aspect in the financing mechanism of the health care system is its financing sources, which are represented in figure 2.

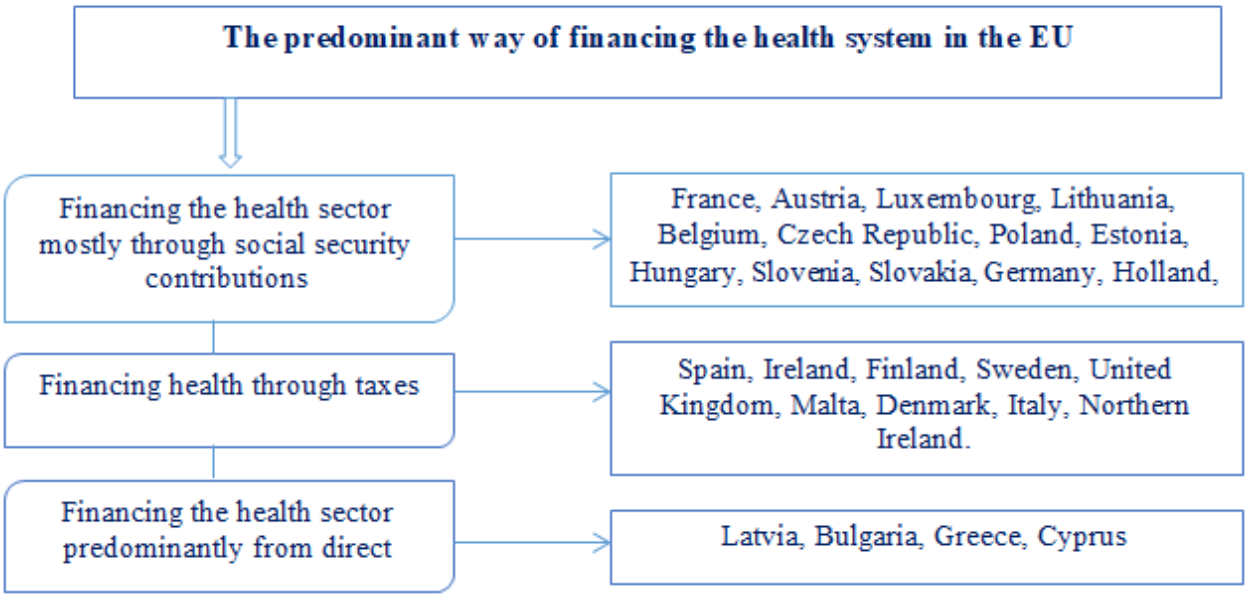

Figure 2. Classification of countries according to the method of financing the health system

Source: developed by the authors

a) The participation rate of the institution and the employee is political dependence of the executive and the economic potential (additional resources);
b) Insurance contributions are collected by CNAS, an institution independent of the government;
c) Health policies are established by the Ministry of Health and the Insurance Companies;
d) Insurance companies select the models for providing health services, payment models, conclude contracts with hospitals, polyclinics, medical offices.

The second model, known as the Bismarck model, is often defined as a regulated health insurance system. It is based on the principles of a mixed economy, combining a market for medical services with a developed system of state regulation and social guarantees. Compulsory health insurance programs cover all or almost all of the population, and the state co-finances the insurance funds. As in the budget model, the state covers more than 70% of the costs of medical services, but total public expenditure on medical services tends to be somewhat higher than in the budget model, already reaching 9-13% of GDP. The decisive role in the distribution of funds is played by non-profit or for-profit private insurance funds or companies, the role of the market in meeting the needs of the population in terms of medical services is high, and patients have considerable freedom in choosing insurance companies and providers of services. The form of management of health services within the social insurance model can be described as decentralized, as a result of the large number of actors on the insurance market.

Table 1.

The advantages and disadvantages of the Bismarck system

Advantages of the Bismarck system	Disadvantages of the Bismarck system
1. Health programs in accordance with policies in the field	1. High administrative costs
2. Personalized, stable transferred funds	2. Health services are for: - insured persons - disadvantaged groups
3. Allocate health services according to need	3. Cost control of health services with execution
4. Supports the rights of the insured	
5. Cash flows visible on the components of the system, and the provision of services performed have an efficient and timely model	
6. Reduce "good risks" with "bad risks"	

Source: developed by the authors

The model, known as the Beveridge model, is characterized by a significant role of the state. Tax revenues are the main source of financing. Health services are provided free of charge to the entire population. The share of total expenditure from public sources in GDP is usually 8-11%. Private insurance and co-payments play a complementary role.

The main way of financing is the state budget. Health service providers receive funding from the budget under the control of private management companies.

The role of the state is both to acquire and to provide services, ensuring that the majority (70% and above) of health care costs are covered. The management of the healthcare system is highly centralized. Most health services are provided by public hospitals and private doctors, but the market tends to play an ancillary role.

The state authorities strictly control most elements of the market of medical rights and services, establish the conditions of admission and access to the market, set the compensation lists and guarantee the control over the volume of medical services through the tariff and price policy. The quality of health services is controlled by professional medical organizations in the form of authorization of medical institutions and licensing of doctors. The level of co-payments under such a system is insignificant.

The Beveridge National Health System has the following characteristics:

1. Source of financing through taxes, general charges - public budget

2. Operation: - the government is the payer of health services - the budget (global income) is: divided, distributed according to destinations, according to criteria of social importance (according to education, health, defense, public order) - the amounts due to the Ministry of Health are distributed on administrative areas. The Beveridge National Health System has the following advantages and disadvantages are reflected in Table 2.

Table 2.

Advantages and Disadvantages of the Beveridge healthcare system

The advantages of the Beveridge system	Disadvantages of the Beveridge system
1. Health programs in accordance with policies in the field	1. Waiting lists for the staggered payment of therapeutic acts, for diseases and categories of patients
2. Payment of the service is made after the administration of the therapeutic act	2. The medical staff has no incentives and is not motivated
3. Risk groups have priority	3. Cost control of health services with execution

Source: developed by the authors

European countries where the Beveridge system works: Great Britain, Sweden, Norway, Iceland, Finland, Denmark, Greece, Italy, Portugal, Spain.

The centralized Semasko-type health insurance system still works in countries that had a centralized economic system in Central and Eastern Europe.

The characteristics of the Semasko system are expressed through the source of financing: taxes, general fees that form the state budget, and the control of the sale-purchase process is done at the territorial level through centralized programming and staged execution. The author reflects that access to medical services seems free, but it is erroneous (it is not paid by the patient). If we talk about the medical staff that they are not motivated, they do not obtain additional data through work and the competition is absent, so this means that the system is also ineffective. The author mentions that the quality of the therapeutic act is affected by financial insufficiency and lack of motivation. Bârliba, I. (2008), Georgeta Sinitchi, (2008), emphasizes, "The health system in Romania is the modified revision of the Bismarck model, having influences of the model of Semasko and Beveridge"[1, p.9]. After the accession of the Republic of Moldova to the EU, it is necessary to implement a solidarity mechanism, according to which health cannot be abandoned to market mechanisms. The predominant way of financing the health system in the Republic of Moldova is reflected by the financing of the majority health sector through social insurance contributions. The basic idea of the health system in the Republic of Moldova is the creation of a basic package of medical services, established by a framework contract concluded between the medical units and CNAM (German model, BISMARK. but it must be refined, having also components of other systems of financing in our country, a system of financing the medical act composed of public and private resources will be created, which will be based on equal opportunities for medical services and ensuring social equity in the issue of payments for services provided.

In the case of the Republic of Moldova, the main private resources must be private health insurance and co-payments. Studying the funding sources of the health care system allowed the identification of the expenses of this system. Therefore, the main share of the amount of financial resources, intended to finance the sub-programs in the health sector, annually, belongs to the means transferred from the state budget, which constitutes 58% (2022), followed by the compulsory medical assistance insurance premiums in percentage size and those in fixed amount (40%). The budgets of the administrative-territorial units contribute 2-3% of the sector's financial resources. Currently, the per capita expenditures in health do not exceed 230 euros, while in neighboring countries they are 3-4 times higher, and the average in the EU is 15 times higher. The sources of financing the health care system require radical changes, this has also been proven by the pandemic period. The systems were not ready to reflect correct algorithms of coherent healthcare. The negative was the loss of wills, and its impact on life expectancy and quality.

Currently, the health care system is represented by the general program Public health and medical services, which includes 5 subprograms, reflected in figure 3.

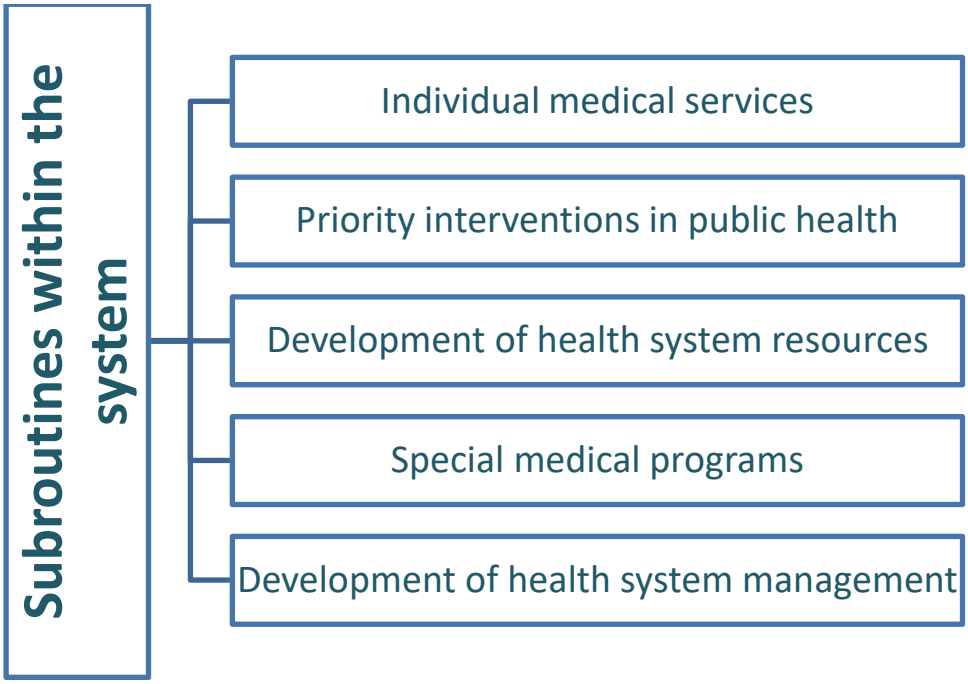

Figure 3. The subprograms identified within the healthcare system in the Republic of Moldova
Source: developed by the author, [10].www.cnam.md

The health care system is manifested as a system of state and public, socio-economic and medical measures aimed at preventing and treating diseases, improving the external environment, improving people's living and working conditions, preserving and strengthening the health of society and of each of its members to further reduce morbidity, disability and mortality. At the same time, the current state of health care, in the conditions of the spread of epidemic diseases, is characterized by the insufficient supply of resources, the low efficiency of health care institutions, the inadequate quality of health care against the background of the high supply of the population with medical personnel and beds of hospital.

The growing interest in the economic problems of medical care and their characteristics in recent years is explained by the fact that health is becoming an increasingly valuable factor in the life and well-being of society, and the prevention and treatment of diseases is becoming more and more expensive. In this sense, the ongoing reform of public health (medical assistance) aims to introduce economic methods of managing medical assistance in the Republic of Moldova under the conditions of the existence of different forms of ownership. The task of the contemporary economy of public health is to formulate such a system of knowledge that focuses on the full satisfaction of this need at an acceptable level of funds allocated by society for the development of health protection and the medical care system.

Health insurance is a way, by which many of the countries with medium or high incomes cover a significant proportion of their expenses in the health care sector. Based on the analysis of international practice, it was determined that there are two major types of health insurance: social insurance, respectively, private insurance.

In the case of the Republic of Moldova, the main private resources must be private health insurance and co-payments. In the Republic of Moldova, the form of private medical financing is at an early stage, but this does not mean that it should not be developed. The purpose of the formation of medical insurance allocations is oriented towards increasing the quality of medical services. The funds of the mandatory medical assistance insurance are reflected in fg.3.

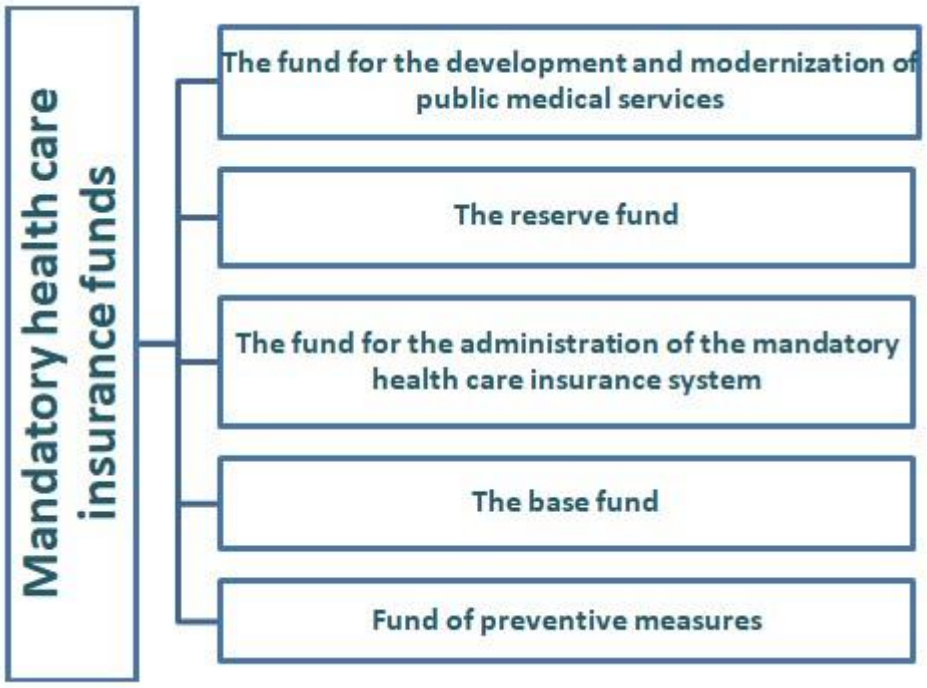

Figure 4. Funds of the mandatory medical assistance insurance in the Republic of Moldova. Source: developed by the author based on CNAM information, 2023,[10],www.cnam.md (visited 22.05.2023)

The authors are of the opinion that no matter how important the factors dependent on the hospital environment, the way of organization and the quality of medical services are, we cannot deny the importance of prophylactic factors and the permanent care of citizens until the moment of illness. This modality is paramount in the context of health.

Results The funding models presented also require the elucidation of advantages and disadvantages. In this sense, they were studied by the authors to evaluate which financing system is more effective for the healthcare system in the Republic of Moldova. «Most health systems in Europe use a mix of revenues for the sustainable financing of services. Even if the difficulty of the choice does not lie in choosing one type of financing or another, but rather in identifying an optimal mix, adapted to the socio-economic particularities, it is important to know the advantages and disadvantages of different systems of financing health expenses»**[**2,p.118].In conclusion, analyzing the financing aspects of the health systems in the experience of developed countries, we will specify, basically, the health systems are influenced by Europeanization and, in general, by the internationalization of economic, social and political life.

Health systems are defined by the dominant mode of financing, and those used in Europe are the following: the Bismarck system, the Beveridge-type national health system, the Semasko-type centralized health insurance system, the private health insurance system. In our country, a system of financing the medical act composed of public and private resources was created, in order to be based on equal opportunities for medical services and to ensure equity in the issue of payments for the services rendered. The authors mention that each state in Europe has developed its own financing mechanisms. And in this context, we conclude that all systems rely on a combination of funding sources, but most of them are controlled by the state (directly or indirectly). “Under the current conditions, a mixed Bismark-Semașko health care budget-insurance model operates in the Republic of Moldova, which requires certain additions and optimizations” [9,p.94].

Conclude:

1. Health systems in the European Union are financed by public contributions and direct contributions. The main objective of the systems is extended by methods: to distribute the costs of

health services between sick and healthy people, totally moderate the costs according to the resources available to each state.

2. No health system is exclusive to the state, and Primary Health Care combines private liberal medicine with public medicine in most European Union countries.

3. The countries of the European Union have a consensus, a mechanism of solidarity according to which health cannot be abandoned to market mechanisms.

4, In the case of the Republic of Moldova, the main private resources must be private health insurance and co-payments. In our country, a system of financing the medical act composed of public and private resources will be created, which will be based on equal opportunities for medical services and ensuring equity in the issue of payments for services provided.

5. The most important factor of the sustainability of the systems is the coverage of the population with free medical services and the absence of duplication of expenses, the efficiency of spending resources and the accessibility of medical services.

6. In the contemporary conditions of rapid changes in health care management, the financing mechanism of the health care system requires a redefinition, which in the author's opinion reflects the set of actions to ensure, distribute and control financial resources for a long-term perspective, based on contributions, taxes and co-payments, which will contribute to the achievement of the strategic objectives of the medical service providers. These ways of financing the health care system are used by most European countries and are accepted by the author as positive.

7. No country can meet all health care needs from public funds without private insurance and/or co-payments.

8. In modern conditions, the economy of the health care system, aims to perform economic analyses, planning, and forecasting of medical assistance. The analysis of each health program involves the disclosure of the economic content and its purpose, the determination of the effectiveness - the costs and results of the medical service system (the cost of medical care, the prevention of economic damage caused by morbidity, accidents, disabilities, mortality, etc.).

9. The relationship between the economy and health requires a developed health system, by becoming an organic part of the country's economy, providing direct intangible benefits and satisfying the most important needs of the population and their families.

10. “The optimal variant of the resilience of the medical financing system in the Republic of Moldova is argued to be: the completion of the Bismark system with elements of the Semashko system” **[**9,p .94].

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BUDGET DEFICITS AND LABOUR MARKET DYNAMICS: AN INVESTIGATION

Monica Florica DUTCAȘ [11]

Abstract:

The paper addresses **the concept of budget deficits and labour market dynamics** to delve the complicated relationship between them. The research seeks to elucidate how **government budget deficits, driven by fiscal policies, reverberate through the labour market landscape.** It examines their multifaceted impact on **employment levels, wage growth and labour force participation rates**. A focal point of this work is to examine how **government spending, financed by budget deficits, influences job creation or job losses in different economic sectors**. It aims to distinguish between **sectors most sensitive to deficits** and those where **fiscal deficits can have an incentive or dampening effect on employment opportunities.** Research aims to assess **the effectiveness of specific employment policies** aimed at mitigating the negative repercussions of budget deficits on the labour market.

Keywords: budget deficits, labour market, employment, government spending, employment policies

JEL classification: *E24, H62, J68*

Introduction

The argument for choosing the theme consist in the need for stability and predictability that continues to be present in Romania's economy in a context quite troubled by multiple crises. How can the repercussions of budget deficits on the Romanian labour market be managed? This is one of the components of the set of questions regarding the sustainability of economic policies and the evolution of the national economy, a topical topic in a heated debate both in the academic environment and in that of public policy makers.

The assessment of the budget deficit involves the analysis of the structure of government expenditures and revenues, as well as the impact on macroeconomic indicators specific to an economy. Deficit management is a central concern for fiscal policy, and decisions taken in this regard can influence the direction and extent of the country's economic development.

The concept of budget deficit is essential within the economy and public finances, having significant implications for macroeconomic stability because traditionally, the budget deficit is financed by loans, which leads to an increase in government debt. Excessive public debt can negatively affect both the government's ability to respond to unexpected financial challenges and economic stability, raising concerns about fiscal and monetary sustainability.

An impact of budget and macroeconomic deficits may be felt in the labour market, with possible effects on unemployment and employment levels. The state budget can influence employment policy and investments in programs to stimulate the labour market.

[11] *PhD Student, Centre for Financial and Monetary Research "Victor Slăvescu", Romanian Academy, Bucharest, Romania. Email: monica.dutcas@finders.ro . ORCID: 0000-0003-1326-6636 .*

Labour market dynamics are reflected by changes and developments taking place in the labour market over a given period of time. Analysis of labour market dynamics involves studying influences on labour supply and demand, adapting employees' skills to technological and economic changes, and assessing the impact of macroeconomic factors on employment. It is also necessary to analyse trends in wage developments, changes in employment structure, and the effects of government policies on the labour market.

A scientific approach investigates factors such as employment, unemployment, mobility and other aspects of the relationship between employers and employees drawing on empirical research, economic statistics and economic models to understand the complex dynamics of industrial relations and to develop effective strategies for managing the labour market in the context of a constantly changing economy.

Description of the problem

As the literature shows, in-depth investigation of the complicated relationship between budget deficits, economic policies and the labour market requires a two-way approach, as shown in Figure no. 1.

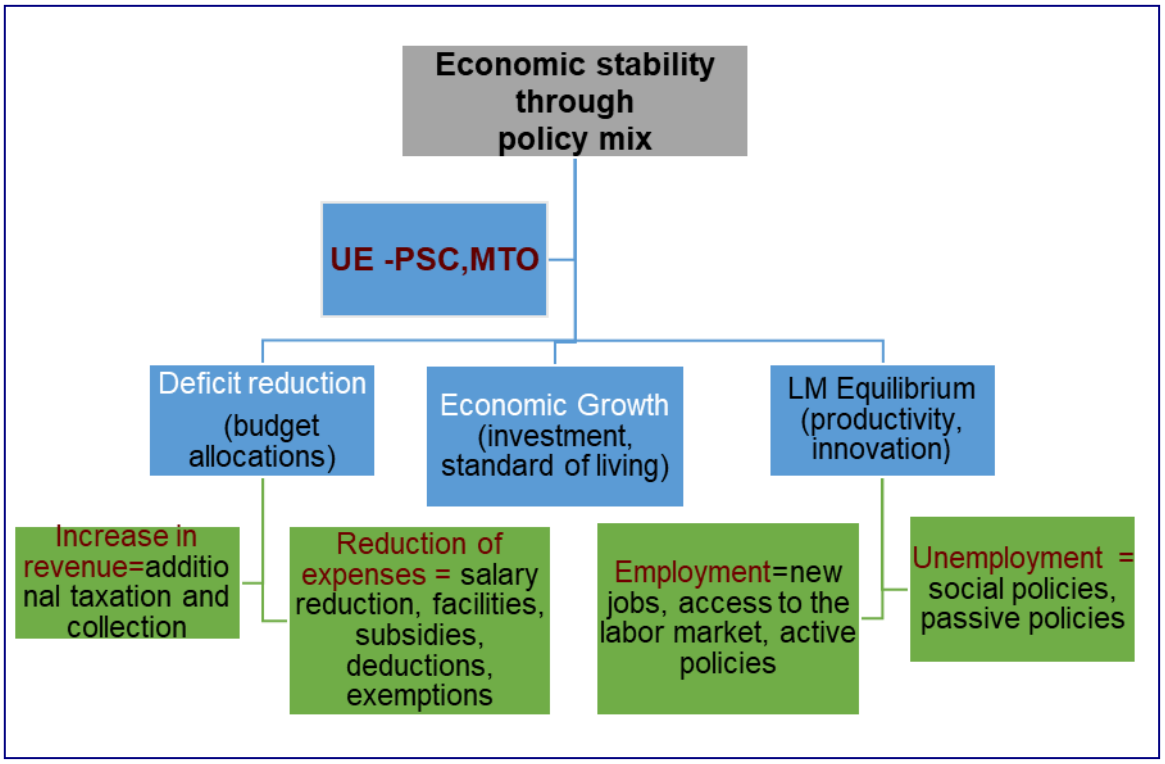

Figure 1 Analytical framework of the investigation

Source: author

The 2 meanings contained in figure 1:

1. Budget deficit and impact on the labour market:

    1.1. Economic policies and employment

Fiscal measures taken to manage the deficit may include tax cuts or increases and public spending. These, in turn, can influence employment levels and job distribution in key sectors of the economy, as well as labour market flexibility.

    1.2. Effects on investment in human capital

Budget deficits can affect budget allocations to education and training. A reduction in investment in human capital may lead to a decrease in the qualifications available on the labour market, which may affect the competitiveness of the workforce and adaptability to technological change.

2. Labour market dynamics and implications for budget deficits

2.1 Innovation and productivity

Changes in demand for skills and technology can affect the overall productivity of the economy. An increase in productivity can lead to higher tax revenues, thereby reducing the budget deficit, but it can also affect certain segments of the workforce that do not adapt quickly to technological change.

2.2 Demographic change and social security: An ageing population can put pressure on social security systems such as pensions and healthcare. These changes may contribute to increased government spending, causing the budget deficit to increase.

A theoretical and empirical perspective on some of these aspects in Romania is presented in the content of this article

Methodology and data

The methodology used in carrying out the study consisted of combining several types of analysis:

• theoretical, logical analysis on the concepts of economic growth, resources, capital, wages, public budget, budget deficit, macroeconomic imbalance, economic shocks, etc. from the specialized literature, the result being a literature magazine, in a specific structure.

• statistical analysis and interpretation of the economic significance of statistical indicators specific to the national public budget, the system of national accounts (SNA), documents and analyses on the perspective of the national economy in the European and global context, the National Recovery and Resilience Plan of Romania (PNRR) approved by the EU Council, the opinions of the Fiscal Council, etc. in order to synthesize several proposals for measures.

The statistical data used are from primary sources or compilations made either by international organizations (ILO Department of Statistics (ILOSTAT), Organization for Economic Cooperation and Development (OECD), Statistical Office of the European Union (Eurostat), World Bank (WB), International Monetary Fund (IMF), National Institute of Statistics (INS), National Bank of Romania (NBR)) or own. The institutional responsibilities in developing and reporting to the European Commission the Notification of government deficit and debt under the Excessive Deficit Procedure were established by the Cooperation Protocol on the development of the National System for Government Finance Statistics, concluded between the Ministry of Finance, the National Institute of Statistics (with the role of coordinator at national level), the National Bank of Romania and the National Prognosis Commission, so some data has been recalculated as required.

Results

A brief literature review is useful because it provides an overview of existing studies and the different conclusions they have drawn, highlighting the importance of empirical analysis to better understand the evolution of economic factors, the relationship between imbalances (budgetary and labour market), and mutual impact.

Relevant theories – short literature review

In recent years, especially after the COVID_19 pandemic and under the influence of the multiple crises that followed, probably a large number of opinions, reports, studies have been written addressing the concepts included in the research of this topic, but, in general, the academic environment agrees that the field is still very fertile and topical.

To explain the steady state or long-term growth of an economy, most often measured by percentage increase in national income or by a measure of living standards, quality of life, well-being of the population or a composite index such as HDI (Human Development Index), we have at our disposal

a number of theories of economic growth or factors of economic growth. The same schools of thought also opine on the effects of the budget deficit on economic growth and development.

The classical theory of economics, which had roots in the works of economists such as Turgot, A.P.J. (1766), A. Smith (1776), and Mill, J. St. (1848), initiated significant ideas about the factors of economic growth, namely what we call traditional factors of economic growth. Many recent works revalue their established texts because the principles enunciated seem to remain topical (Turgot – inequality in the division of property, Smith – personal interests, capital – form of wealth and power, Rousseau, Sen – distribution justice, Keynes – macroeconomic issues).

Since the beginning of the classical economy, capital has been identified as having the role of bringing profit. Turgot, even before Adam Smith, identifies 5 methods of using this in this regard: "i) acquisition of land..., ii) placement in agricultural activities, iii) placement in manufacturing activities, iv) placement in commercial activities; (v) the granting of loans at interest to those who wish them.' Turgot, A.P.J. (1766, pp. 103-104).

Mill, J.S. (1848) summarizes the works of his predecessors and the few principles underlying classical theory: i) the existence of perfect competition; ii) labour market equilibrium, which denies the possibility of unemployment; iii) price flexibility (implicitly wages) does not produce inflation; iv) saving (interest rate on savings) supports investment; v) imbalances of any kind are self-regulated without state intervention (without public policies); vi) Economic freedom is vital for the development of production and economic growth. The future of the working class is conditioned by a relationship of equity and morality between employees and employers at the current level of progress and equality between social classes.

William Petty (1662; 1690), pioneer of scientific knowledge in economics, captures qualitative but especially quantitative relationships between two factors of production, labour and land, capital being from his point of view an accumulated labour. Moreover, he is also concerned with the importance of labour for economic growth and speaks out against non-productive activities, the value of goods being given by the labour time used to produce them. Petty, W. refers to fair taxation solutions, necessary to increase national wealth, distributed proportionately, but to a sufficient extent for the state to be able to carry out a series of public expenditures such as those for education, infrastructure and helping the needy, arguing that public works can control and reduce unemployment (proving to be Keynes's precursor), thus laying the foundations for a fiscal policy. Let the tax never be so great, if it is proportional to all, then no one suffers the loss of any wealth by it," Petty argues (1662).

Some classical economists are convinced of the importance and benefits of freedom, including freedom of labour, calling it "the first form of property, sacred and imprescriptible" (Turgot, AP.J. 1875). Turgot A.RJ presents in a letter to King Louis XVI a government program with 3 objectives, which is surprisingly current even for our society and economy.

"No bankruptcy, neither accepted nor disguised by forced cuts;

No tax increases: the reason lies in the situation of the people and, moreover, in the soul of Your Majesty;

No loans, because any loan always reduces the size of free income, as it leads, after a while, either to bankruptcy or to increased taxes. Loans are made only in peacetime to liquidate old debts or to repay other loans made on more onerous terms.

For these three objectives to be met, there is only one means, which is to reduce expenditure below revenue...

We wonder where exactly we need to cut, and every authorising officer argues that almost all private expenditure is indispensable. They can provide very solid reasons; But since there is no one who can do the impossible, all these reasons must give way to the absolute necessity of saving..." (Turgot, AP.J. 1874)

Ricardo (1817), cuts between value and wealth, emphasizing that value is the result of labour and wealth alone, while wealth sums up the values of use. David Ricardo, assuming full employment of resources, argues that the budget deficit increases current consumption as individuals transfer taxes to future generations. To keep their consumption patterns stable, taxpayers will reduce consumption

and increase their savings to offset the cost of this future tax increase. An increase in savings will lead to lower consumption and prevent interest rates from rising. This will tend to offset the macroeconomic effects of increased government spending. Thus, government deficit expenditure is equivalent to current tax expenditure, which is known as "Ricardian equivalence."

Ricardo's theory postulates that deficits are not determined by any macroeconomic factors, nor do they precipitate any long-term macroeconomic consequences (Seater, 1993).

Barro (1979) completed David Ricardo's model by adding requirements so that this rate (tax/debt ratio) does not produce the stated effects. His hypotheses refined the initial model and implied: an intergenerational altruism, families passing from generation to generation their accumulated wealth in the form of inheritance; markets are perfect; the government consumption pattern should not change. This theorem starts from the assumption that the government consumption model assumes only good, justified and correctly allocated spending, and the current account deficit and the budget are not interdependent. Most critics of this theory have argued that the assumptions are unrealistic about the functioning of markets, the ability of individuals to save or borrow, and their willingness to save in order to pay higher future taxes. Barro, later (Barro, 1989) remarks on Ricardian equivalence that it inadvertently assumes full employment, which is contrary to standard Keynesian theory.

J.M. Keynes, interested in linking the use of available resources to economic growth, as well as employment and unemployment, questions full employment. Unemployment and liquidity constraints are fundamental attributes of Keynesian theory.

Keynesian doctrine, although based on criticism of the "invisible hand" and other classical theories, supports the principles of a free-market economy and capitalism, with the conviction that state intervention in the economy is a preferable solution to previous approaches (laissez-faire) because:

- there is a permanent solvent demand not satisfied by the growing aggregate supply, which has undesirable effects on factors of production, including labour;

- the supply-demand balance can be restored only to a full use of available resources, because this would mean a long and expensive process, but also in conditions of saving to the detriment of consumption; The saving-consumption-investment ratio can be decisive for economic growth.

With regard to budget deficits, Keynes considered that in times of economic crisis the accumulation of budget deficits was justified. His argument was that through increased public spending, the government can stimulate growth and employment, which will eventually lead to an increase in tax revenues and a return to budget balance in the future. This concept is known as a "fiscal multiplier," which describes how government spending can have a greater impact on output and employment than its direct value.

The main criticisms of this Keynesian theory are for its assumptions about not achieving market failures in environments where government policy interacts with factors that generate market failures (Lucas 1973; Yotsuzuka 1987)

Diamond (1965) provided the first theoretical insights into the neoclassical paradigm of budget deficit, showing that persistent budget deficits exclude the accumulation of private capital by decreasing the capital/labour ratio. It could also be the case that budget deficits arise from current account deficits, in what has come to be known as the double divergence hypothesis (Kim and Roubini 2008). Bernheim (1989) shows that in the model of neoclassical theory, budget deficits increase lifetime consumption, reduce the saving rate, raise interest rates, and exclude private investment.

Minsky, H. (2008) An alternative analysis to Keynes through the two-price system (for current output and assets) and lender of last resort. It disapproves of state aid because it encourages unemployment and supports inflation. Minsky used Kalecki's equation for the proposed reform agenda, which concerns the Big State, a balanced budget, an employment strategy and tax reform.

Empirical studies tend to focus on the effects of deficits on some macroeconomic variables, with less focus on the causes of the deficit. Maltritz and Wüste (2015) used panel data methods to analyse the determinants of the primary budget balance in a group of 27 EU countries. While they were mostly interested in discovering the importance of fscale rules, fscale councils, governance, and the

impact of electoral pressures, they also controlled for other macroeconomic variables that included debt, GDP growth, and the unemployment rate.

They find that higher debt improves budget balance and reduces deficits. They also find that deficit spending is higher for higher unemployment rates and in election years. Moreover, they show that the existence of fiscal rules significantly reduces deficits. However, they do not find significant effects of GDP growth, bond yields, and political stance on the budget balance.

Roubini and Sachs (1989a, b) used time series and descriptive analyses to examine trends and developments in government size and budget deficits in OECD economies. They show that the increase in budget deficits in the early 1970s was associated with a slowdown in production growth. In addition, they also showed that much of the change in budget deficits can be explained by cycles, factors, including unemployment, and countries' political and economic characteristics. They concluded that reducing budget deficits would require building political consensus, at least among the ruling government coalitions.

In Romania, Georgescu, F. (2018), "Capital in post-communist Romania" Bases the work from a theoretical point of view on Pareto's optimum and general equilibrium, An analysis and interpretation of Romanian statistics considering the relationship between capital and labour factors, expression of the relationship effectiveness – equity. He argues that, in Romania:

- the state has benefited capital and weakened the bargaining power of labour

- instead of "making work more flexible" there was precariousness of work and consolidation of capital power

- labour income is highly polarised

- Since 2005, social disparities have widened significantly.

- the evolution of the wage-to-GDP ratio is declining

- Tax policy is an essential lever to ensure a sustainable balance between remuneration of labour and capital, in particular through progressive taxation of overall income.

- points out that the level of tax revenues and total budget revenues is very low in Romania.

EU fiscal rules, including the Stability and Growth Pact, set limits on budget deficits and public debt levels for member states. Compliance with these rules is a central concern of economic policies.

Under the Maastricht Treaty of the European Union, Member States are bound by budgetary discipline by fulfilling two criteria: a *deficit of no more than 3% of GDP* and a debt not exceeding 60% of GDP. These benchmarks are based on concepts defined in the methodology of the European System of National and Regional Accounts in the Community (ESA) 2010 edition.

Analysis and interpretation of economic indicators

For reasons of economy of the published work, a series of statistical data that were the basis for obtaining the results of the investigation are presented in Annex 1 for budget deficits and Annex 2 for labour market.

Budget deficits underline the importance of prudent management of public finances and careful assessment of the consequences of fiscal policy on the economy.

In Romania, progress towards fiscal consolidation has been made since 2013 and has been found, in particular, in the favourable adjustment of the conventional balance sheet, a situation that is maintained until the end of 2018. However, an important contribution to this favourable adjustment was the reduction in investment expenditure.

Also, in 2018 and 2019 there were unfavourable situations, amid the simultaneous implementation of legislative changes[12], with incidences on the increase in expenditures, and fiscal relaxation[13], with effects on the reduction of tax revenues, a situation that progressively accentuated the deficit.

The excessive deterioration of the conventional balance sheet, reaching -4.64% of GDP, in 2019, led to the opening of an excessive deficit procedure for Romania, whose actions were suspended, along with other fiscal rules, in 2020 under the impact of the economic crisis generated by the health crisis caused by the COVID-19 pandemic. The general escape clause remained active in 2021 as fiscal sustainability risks could not be removed due to the adverse evolution of the pandemic and its socio-economic consequences. The EC recommendation aimed to ensure that Member States avoid introducing measures with a permanent negative impact on budget balances. Throughout 2021, uncertainty prevailed regarding the evolution of the pandemic, so that the measures were adapted to the specific situation of the country and, by extending the alert states, some temporary actions became continuous.

The difficulties of the third sub-period 2020-2022 put a great pressure on the resources needed for the public budget, requiring reconsiderations of national fiscal policy.

Romania has adopted budgetary measures to strengthen the capacity of its health system, contain the pandemic and provide social assistance to citizens and businesses, especially to the most affected sectors, which are included in the 2020 Convergence Programme. In 2021, attention was focused on the National Recovery and Resilience Program under the umbrella of the Recovery and Resilience Facility, It is relevant that measures to combat the negative economic effects generated by the COVID-19 pandemic continue, generating an estimated cost of 3.81% of GDP. At the same time, a gradual recovery of fiscal consolidation is underway, taking the first steps to return to the budget deficit target of 3% of MT expected for 2024, which will allow exit from the Excessive Deficit Procedure. Moreover, for Romania, the country-specific recommendations according to SE, in 2021, targeted only the fiscal-budgetary area and a gradual adjustment of the budget deficit was foreseen in ESA 2010 standards, respectively: 8% in 2021, 6.2% in 2022, 4.4% in 2023 and 2.9% in 2024 (% of GDP). The budget plan for 2022 was built on the basis of fiscal policy oriented towards fiscal measures for economic recovery, but also preparation for achieving the objectives of transition to a green and digital economy.

The evolution of general consolidated budget expenditures in the period 2007-2022 varied around 82.7% of the expenditures of the unconsolidated general budget, reflecting the existence of significant transfers between component budgets.

The size of transfers between budgets in case of expenditure, on average approx. 17.3% annually, for the period 2007 - 2022, means, on the one hand, deficits among the component budgets of the general budget that require transfers, but also the need to identify new revenue resources, a situation reflected in the size of the budget deficit at BGC level, registered during the analysed period. After 2020, we observe a gradual trend of reducing transfers between budgets, amid the improvement of the economic situation, as a result of reducing the effects of the COVID-19 crisis. The budgetary consolidation process, the observance of the fiscal consolidation schedule, the implementation of the public administration reform and the other reforms of the NRRPs are of great importance in the conditions of risks and vulnerabilities of the economy generated by the international context (war in Ukraine, energy crisis, etc.). In 2022, the challenges faced by the Romanian economy increased with the outbreak of the Russian-Ukrainian conflict. This conflict triggered right at Romania's eastern border aggravated problems that had begun to manifest in the economy since 2021, the accelerated increase in prices, problems in supply chains, the energy crisis, etc. even if the economic activity was carried out in normal conditions in all fields of activity

[12] Law nr. Government Emergency Ordinance no. 153/2017 of 28 June 2017 on the remuneration of staff paid from public funds and GEO no. 70/2017 amending and supplementing Law no. 227/2015 regarding the Fiscal Code.

[13] Changes in legal rates (from 16% to 10% for personal income taxation; reduction of social contributions by 2 percentage points, from 39.25% to 37.25%).

The main labour market indicators are presented in the first 3 tables of Annex 2.

The employment rate for the population 20-64 years indicates an increase of 7.3 percentage points in Romania in 2009-2020 at 70.8%, above the target level of 70%. In the EU, the indicator rose by 4.3 percentage points between 2009 and 2020 to 72.5%, below the target level of 75%.

Romania is better positioned compared to the EU average in terms of unemployment rate, 4.8% in 2020 in Romania, well below that recorded in the European Union (7.4%).

The extracted statistics do not accurately reflect, but the structural component of the unemployment rate in Romania was permanently below the EU level, an expression of a higher degree of flexibility on the internal labour market.

From the category of convergence indicators with EU policies, we selected the ratio between women and men in terms of labour market participation rate.

Romania ranks below the EU average in terms of the ratio of women / men on the labour market participation rate indicator.

In terms of indicators in the field of education, it is the decrease of the school dropout rate for the population aged 18-24 by 4.1 percentage points between 2009 and 2019 to 9.9% in the EU.

In Romania, the school graduation rate adjusted by only one percentage point between 2009 and 2020 to 15.6%, well above the target of 11.3% of the Europe 2020 strategy.

On the other hand, the share of the population aged 30-34 with tertiary education increased in Romania at a slower pace compared to that in the EU between 2009 and 2020 (9.6 percentage points vs. 9.9 percentage points), as can be seen in the graph below.

Romania's population has declined due to aging and emigration, and the working-age population (20-64 years) will decrease by about 7.5 percent by 2025 compared to 2019 levels, with a further decrease of 3 percent between 2025 and 2030. At the same time, labour force participation rates among women and young people are among the lowest in the EU.

The combination of a rapidly growing economy, one of the highest emigration rates in the EU and a lagging education system has made skills shortages the main obstacle to private sector development.

Weaknesses in the education system, unfavourable attitudes towards lifelong learning, as well as ineffective vocational training policies and active labour market policies combine with brain drain to cause skills shortages and mismatches, which reduces innovation capacity as well as growth and earnings potential (see SDR update for Romania, 2023). A large proportion of people with higher education are either over-trained for their occupation or work in a sector that does not correspond to their studies Romania has the lowest score in the EU in terms of human capital index (HCI): 0.58, which means that the future productivity of children born today in Romania will be only 58 percent of what it could have been if they had received full education and healthcare. In addition, Romania has the lowest participation rate in lifelong learning in the EU, due to cultural and systemic barriers, while the country's workforce has lower levels of digital skills and soft skills compared to EU standards. At sectoral level, 51 percent of industrial companies suffer from skills shortages, compared to 40 percent of companies in agriculture and services. Greener jobs, which will parallel the ecological transition to achieve Romania's climate goals, require more higher skills, which are already lacking in Romania – a factor that could deepen skills shortages and hamper the green and digital transition, unless education systems and social protection policies are fundamentally rethought (for more details, see CCDR Romania and other recent analytical work).

The investigation highlights priorities for Romanian labour market policy:

- reform in education, necessary to reduce the school dropout rate and increase the share of the population with higher education in the age segment 30-34 years;
- R&D funding.

Conclusions

In Romania, during the analysed period, solving the budget deficit problem was tried through different solutions, but it was a constant of the government, at least in the following aspects:

- Impact of the COVID-19 pandemic: Like many countries, Romania has faced economic challenges and an increased budget deficit due to the COVID-19 pandemic. The government implemented various measures to support businesses, individuals and health services during the crisis, which led to higher spending.

- Structural deficit: Romania faced structural budget deficit problems even before the pandemic. These problems stemmed from factors such as high public spending, inefficient state-owned enterprises and tax evasion. Addressing these structural deficits has remained a long-term challenge.

- Public debt level: The government was concerned about the increase in public debt levels, which was exacerbated by the need to borrow to cover budget deficits. Managing and servicing this debt while preventing further escalation was a priority.

- EU accession and fiscal rules: Romania is a member of the European Union (EU) and must adhere to EU fiscal rules, including the Stability and Growth Pact. Meeting these requirements was important to maintain fiscal discipline and avoid sanctions.

- Social spending: Romania has increased social spending to meet various challenges, including healthcare and education. Balancing this social spending with the need for fiscal responsibility was a policy dilemma.

- Economic growth: Economic growth in Romania was relatively strong in the years leading up to 2020, which contributed to increased government revenues. However, the pandemic has disrupted this growth trajectory, making budget management more difficult.

- Efforts to address deficits: The Romanian Government has undertaken efforts to address budget deficits, including fiscal consolidation measures and reform of state-owned enterprises. These measures aimed to reduce the structural deficit and improve fiscal sustainability. The overall objective of medium-term fiscal policy is to gradually reduce the deficit without jeopardising the outlook for economic stability.

Stability is necessary and depends on the size of imbalances in the national budget, which require new, courageous but realistic approaches.

Taking a balanced approach to fiscal policy may involve adjusting taxes and expenditure in a way that stimulates growth and maintains employment. The measures need to be adapted to the country's economic specificities and the stage of the economic cycle. The budgetary consolidation process, the observance of the fiscal consolidation schedule, the implementation of the public administration reform and the other reforms of the NRRPs are of great importance in the conditions of risks and vulnerabilities of the economy generated by the international context (war in Ukraine, energy crisis, etc.)

Promoting investment in education, training and skills development can help prepare the workforce for current and future market demands. It can facilitate adaptation to technological change and support a more skilled and competitive workforce.

Careful integration of fiscal and labour market policies is essential for the balanced management of the economy in the European Union and Romania. Addressing these issues in a coherent manner can contribute to fiscal stability, growth and the overall well-being of society

EU fiscal rules, including the Stability and Growth Pact, set limits on budget deficits and debt levels for member states. Compliance with these rules is a central political concern.

Future budgets must integrate the pressures coming from education and public health systems, the only ones that through their results can contribute to a human capital formation adequate to the sustainability of the labour market.

Scientific research cannot be underestimated as an allocation from the public budget because it is extremely valuable in managing the major threats coming from climate problems, wars, the disruptions produced by technologies in people's way of life and finally in the balance of the labour market.

Recalibrating the economic policy mix to include labour market policies would bring more confidence to fiscal consolidation without unrealistic expectations.

Future directions

A future research direction can be to compare the experience of countries with different approaches, based on practical examples and case studies, such as the flexicurity model in Sweden, the dual vocational training system in Germany, collective bargaining in Denmark, active employment policies in the Netherlands, extended social protection in Norway. Countries that have adopted innovative fiscal and social policies to manage deficits and promote employment can offer valuable lessons, examples of good practice, successes which, together with lessons of failure, will contribute with more knowledge and preparedness for the challenges that economic imbalances pose to each European Member State.

As valuable as future research, it can be an analysis of historical cases of efforts to reduce the budget deficit and their results in certain EU countries.

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APPENDIX NO I STATISTICS OF DEFICITS

Romania

Table Romania.1: Tax Revenue

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Ranking 2020	Revenue 2020 (billion euros)
A. Structure by type of tax							as % of GDP								
Indirect taxes	11,4	10,3	11,9	13,2	13,3	12,8	12,8	13,4	11,4	10,4	10,5	10,7	10,5	26	22,8
VAT	7,5	6,3	7,6	8,7	8,3	8,1	7,6	8,1	6,4	6,2	6,3	6,2	6,1	24	13,4
Taxes and duties on imports excluding VAT	0,2	0,1	0,3	0,4	0,5	0,4	0,3	0,4	0,4	0,3	0,3	0,2	0,2	13	0,4
Taxes on products, except VAT and import duties	3,1	3,4	3,5	3,5	3,8	3,6	3,9	4,0	3,8	3,3	3,3	3,4	3,3	15	7,3
Other taxes on production	0,5	0,5	0,6	0,6	0,7	0,7	1,0	0,9	0,8	0,6	0,6	0,9	0,8	23	1,7
Direct taxes	6,4	5,9	5,8	6,1	5,8	5,9	6,2	6,6	6,4	6,1	4,9	4,8	4,7	27	10,3
Personal income taxes	3,2	3,3	3,2	3,3	3,4	3,4	3,5	3,7	3,7	3,6	2,4	2,3	2,4	27	5,3
Corporate income taxes	2,9	2,3	2,1	2,3	1,9	2,0	2,1	2,3	2,2	2,0	2,1	2,1	1,9	22	4,1
Other	0,3	0,4	0,5	0,5	0,5	0,5	0,5	0,6	0,6	0,5	0,4	0,5	0,4	17	0,9
Social contributions	9,0	9,0	8,7	9,1	8,8	8,6	8,5	8,1	8,0	8,4	10,6	10,5	11,1	19	24,3
Employers'	5,8	5,6	5,5	5,6	5,5	5,6	5,5	5,0	4,9	5,3	1,2	1,0	1,0	25	2,1
Households'	3,2	3,3	3,2	3,5	3,2	3,0	3,0	3,1	3,1	3,2	9,4	9,6	10,2	2	22,2
Less: capital transfers (1)	:	:	:	:	:	:	:	:	:	:	:	:	:		
Total	**26,8**	**25,2**	**26,4**	**28,3**	**27,9**	**27,4**	**27,5**	**28,1**	**25,9**	**24,9**	**26,0**	**26,0**	**26,3**	**26**	**57,5**
B. Structure by level of government							as % of total taxation								
Central government	63,0	60,9	63,2	64,0	63,6	64,0	64,5	66,7	64,9	61,9	57,3	58,1	56,7	17	32,6
State government (2)	:	:	:	:	:	:	:	:	:	:	:	:	:		
Local government	3,2	3,6	4,0	3,8	3,6	3,7	3,6	3,4	3,6	3,6	3,2	3,1	3,0	19	1,7
Social security funds	33,2	35,2	32,5	31,9	32,5	32,0	31,7	29,5	31,1	34,1	39,1	38,5	40,0	6	23,0
EU institutions	0,5	0,4	0,3	0,3	0,4	0,3	0,3	0,3	0,4	0,3	0,3	0,3	0,3	25	0,2
C. Structure by economic function							as % of GDP								
Consumption	10,7	9,7	11,3	12,5	12,7	12,2	11,9	12,6	10,8	9,9	10,1	10,2	10,0	23	21,9
Labour	11,0	11,1	11,0	11,2	11,1	11,0	10,7	10,3	10,0	10,7	12,2	12,0	13,0	24	28,3
of which on income from employment	11,0	11,0	10,8	11,0	10,9	10,8	10,5	10,1	9,8	10,6	12,1	11,9	12,8	24	28,0
Paid by employers	5,8	5,6	5,5	5,6	5,5	5,6	5,5	5,0	4,9	5,3	1,2	1,0	1,0	25	2,1
Paid by employees	5,2	5,4	5,3	5,3	5,4	5,2	5,1	5,1	4,9	5,3	10,9	11,0	11,9	6	25,9
Paid by non-employed	0,1	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,1	0,1	0,1	0,1	23	0,3
Capital	5,1	4,4	4,1	4,6	4,1	4,2	4,8	5,1	5,1	4,3	3,7	3,9	3,3	25	7,3
Income of corporations	2,9	2,3	2,1	2,3	1,9	2,0	2,1	2,3	2,2	2,0	2,1	2,1	1,9	22	4,1
Income of households	0,9	0,8	0,6	0,7	0,6	0,6	0,9	1,1	1,4	1,2	0,7	0,8	0,6	17	1,2
Income of self-employed	0,4	0,4	0,4	0,7	0,5	0,5	0,5	0,5	0,4	0,3	0,1	0,2	0,1	25	0,3
Stock of capital	1,0	0,9	1,0	1,0	1,0	1,0	1,3	1,2	1,1	0,8	0,7	0,8	0,7	24	1,6
D. Environmental taxes							as % of GDP								
Environmental taxes	1,7	1,8	2,1	2,0	2,0	2,1	2,4	2,5	2,4	1,9	2,0	2,1	1,9	23	4,2
Energy	1,3	1,5	1,8	1,7	1,7	1,8	2,1	2,2	2,2	1,8	1,8	2,0	1,8	16	3,9
of which transport fuel taxes	1,1	1,3	1,5	1,4	1,4	1,4	1,7	1,7	1,7	1,4	1,4	1,4	:		
Transport	0,3	0,3	0,3	0,2	0,3	0,3	0,3	0,3	0,2	0,1	0,1	0,1	0,1	23	0,3
Pollution and resources	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,00	0,00	0,00	24	0,0
E. Property taxes							as % of GDP								
Taxes on property	0,8	0,8	0,8	0,8	0,9	0,9	0,9	0,9	0,8	0,7	0,6	0,7	0,6	23	1,3
Recurrent taxes on immovable property	0,6	0,6	0,7	0,7	0,6	0,6	0,6	0,6	0,6	0,6	0,5	0,5	0,5	14	1,1
Other taxes on property	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,1	0,1	0,1	0,1	23	0,2
F. Implicit tax rates							%								
Consumption	15,1	14,0	16,1	18,0	18,1	18,0	17,7	18,7	15,8	14,5	14,8	15,0	15,0	25	
Labour	30,2	32,1	30,0	33,1	33,4	33,8	32,3	31,4	27,9	28,5	31,6	30,8	31,1	20	
G. Payable tax credits							as % of GDP								
Total payable tax credits	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0		0,0
Tax expenditure component	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0		0,0
Transfer component	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0		0,0
Total tax revenue adjusted for payable tax credits	*26,8*	*25,2*	*26,4*	*28,3*	*27,9*	*27,4*	*27,5*	*28,1*	*25,9*	*24,9*	*26,0*	*26,0*	*26,3*		*57,5*

(1) Representing taxes assessed but unlikely to be collected.

(2) This level refers to the *Länder* in Austria and Germany, the *gewesten and gemeenschappen / régions et communautés* in Belgium, and the *comunidades autónomas* in Spain.

Source: European Commission, DG Taxation and Customs Union, based on Eurostat data

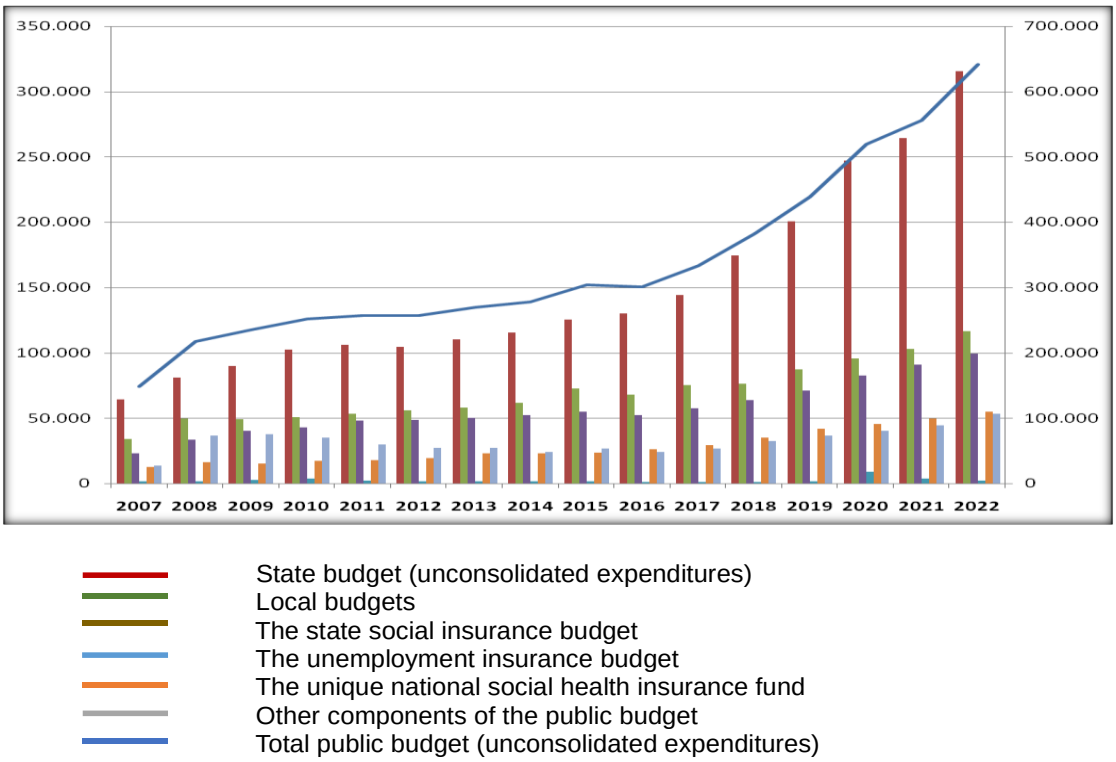


Figure 1 Total expenditures of the general budget for the period 2007-2022

Source: retrieval and recalculation according to Chapter I Financial state /2021, (unpublished work), Financial Minister Data

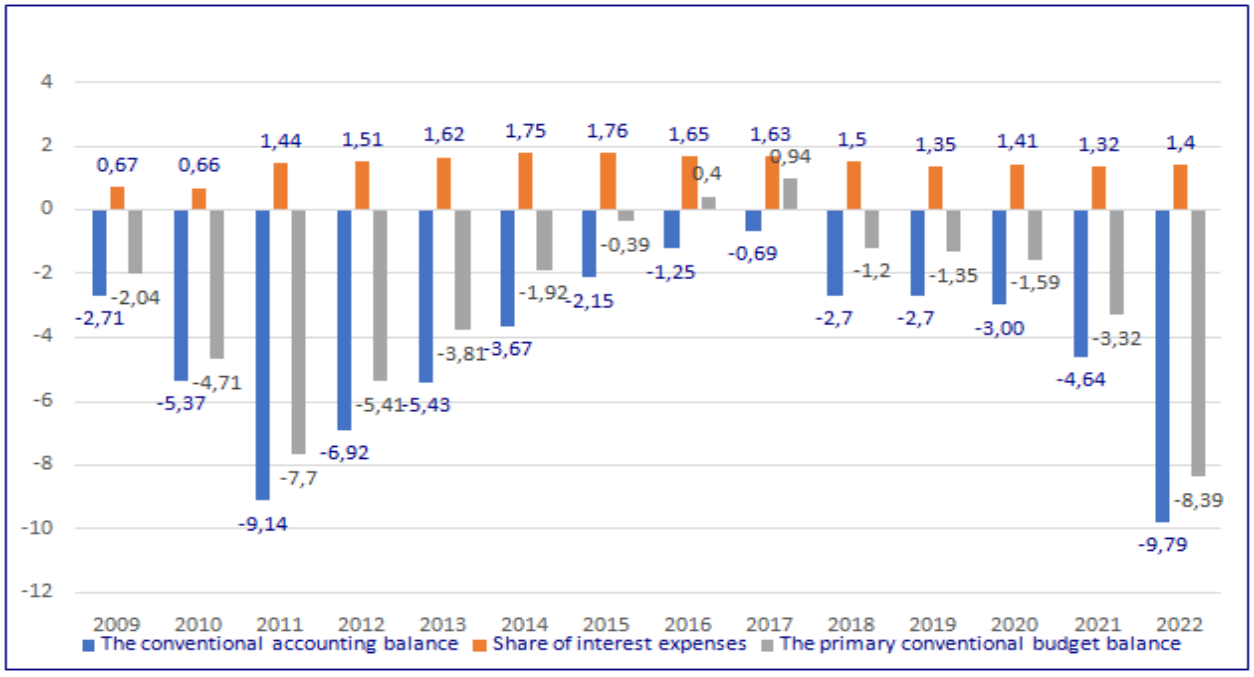


Figure 2 Conventional budget balances in Romania, 2009 – 2022 (% of GDP)

Source: retrieval and recalculation according to Chapter I Financial status/2022, (unpublished work), Financial Minister Data

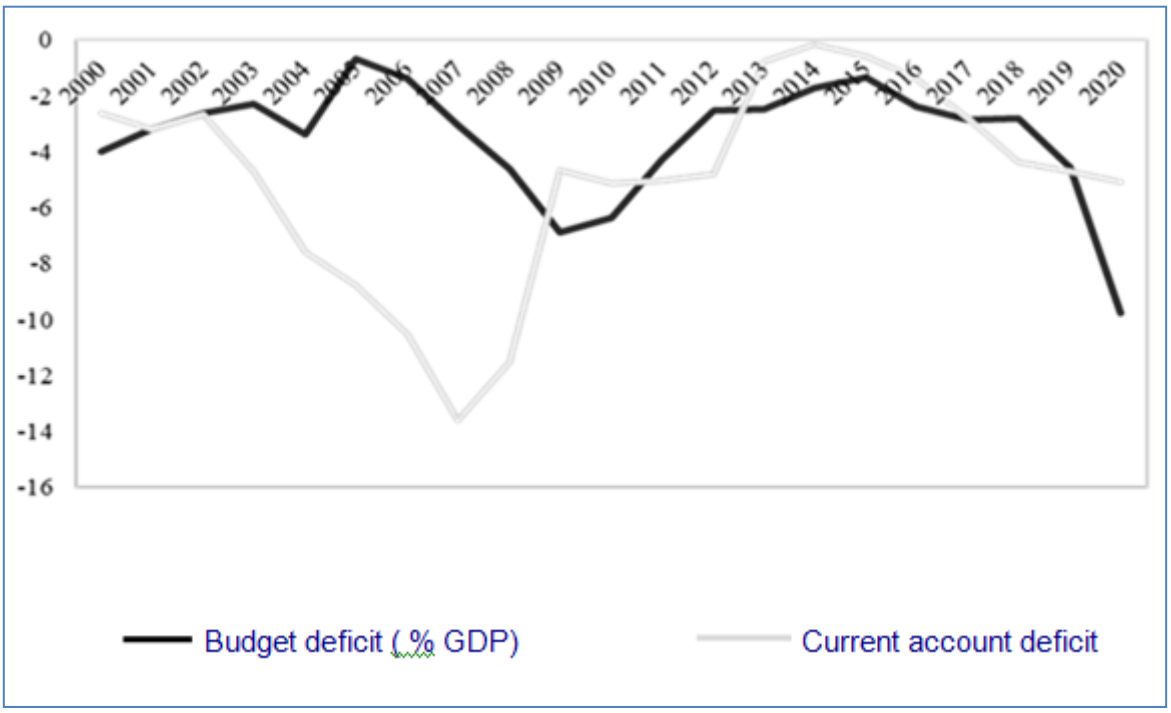


Figure 3 The evolution of the budget deficit and the current account deficit in Romania, according to the IMF

Source: (IMF), April 2023

Comparative Statistics RO_EU

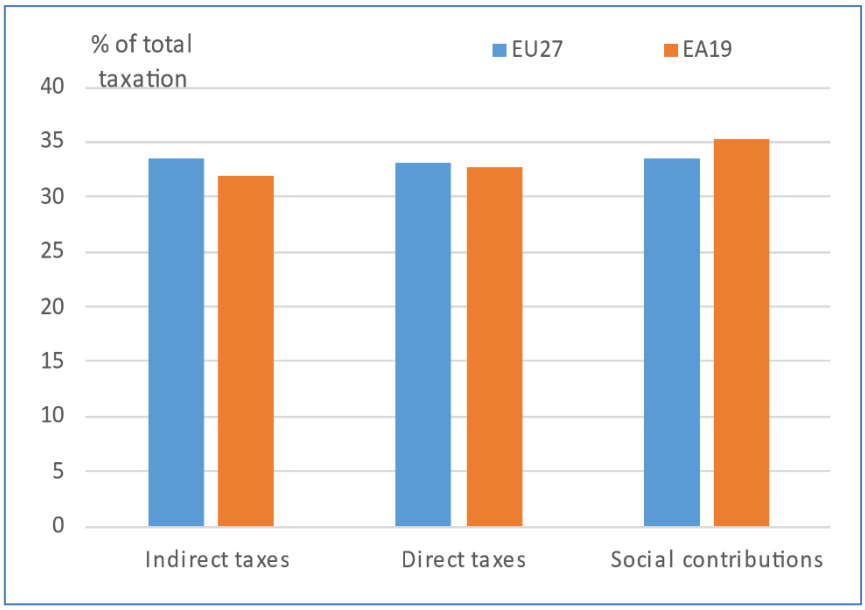
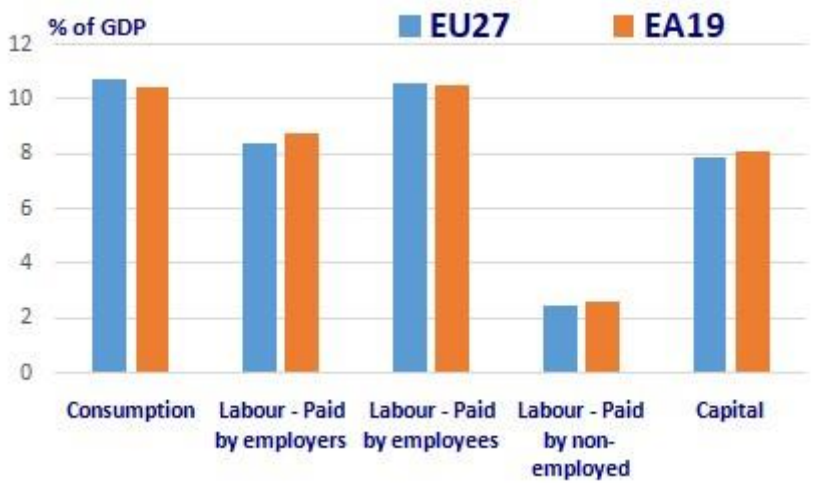


Figure 4: Tax revenues by main taxes, 2019 (in % of total taxation (above graph) and in % of GDP (down graph))



Source: Eurostat data

APPENDIX NO. 2 LABOUR MARKET STATISTICS

Table 1. **Main indicators of labour market, by gender and urban/rural area, Romania, 2022**

- % -

Indicators of labour market	Total	Gender		Urban/rural area	
		Men	Women	Urban	Rural
Employment rate of population aged 20-64 years	68,5	77,7	59,1	74,0	61,8
Unemployment rate	5,6	6,0	5,0	3,2	8,9
Long-term unemployment rate	2,2	2,3	2,0	1,5	3,1
Long-term unemployment rate for young people	12,6	12,6	12,6	9,8	14,0
Long-term unemployment incidence	38,5	38,3	38,7	45,3	35,1
Long-term unemployment incidence for young people	55,2	58,3	50,5	55,0	55,3
Underemployed persons (% in active population)	1,3	1,8	0,7	0,3	2,7
Potential additional labour force (% in active population)	2,5	1,9	3,3	1,3	4,0
Early schools leavers for young people (18-24 years)	15,6	16,2	15,0	7,6	22,5
Weight of persons aged 30-34 years with superior level of education	26,3	23,0	29,9	37,6	9,3
Young people aged 20-24 having at least medium education level	82,3	81,7	82,9	91,4	74,6
Long-life learning	5,4	5,6	5,2	7,1	3,3
Rate of young people neither in employment nor in education or training (15-	17,5	14,3	20,9	11,1	23,1

Source: National Institute of Statistics, Romania, data base Tempo

Table 2 **Population by labour status, by gender and urban/rural area, in the 2009-2022 period, Romania**

Gender Urban/rural area Period	Economically active persons			Economically inactive persons
	Total	Employed	Unemployed	
	- thousand persons -			
TOTAL				
2009	8259956	7565833	694123	12143907
2010	8038762	7314300	724462	12231978
2011	7963841	7239029	724812	12209517
2012	7994516	7299914	694602	12083573
2013	7994775	7275649	719126	12007015
2014	8069530	7376341	693189	11854235
2015	8136632	7453311	683321	11722805
2016	8082779	7501642	581137	11695207
2017	8208491	7708008	500483	11450541
2018	8174350	7745174	429176	11357848

2019	8194540	7794048	400492	11211300
2020	8187964	7690666	497298	11126410
2021	8214682	7755487	459195	10860506
2022	8270813	7806452	464360	10661973
MEN				
2009	4822162	4380417	441745	5111828
2010	4663598	4218235	445363	5204941
2011	4583525	4146400	437125	5235503
2012	4619321	4196591	422730	5154409
2013	4636367	4194760	441607	5119898
2014	4685100	4260387	424713	5043382
2015	4750213	4316373	433840	4958982
2016	4707928	4335139	372789	4951600
2017	4743067	4419299	323768	4849366
2018	4757037	4480955	276082	4788026
2019	4774846	4521203	253643	4703922
2020	4778415	4475424	302991	4665784
2021	4807057	4519761	287296	4507940
2022	4780945	4492654	288291	4453493
WOMEN				
2009	3437794	3185416	252378	7032079
2010	3375165	3096066	279099	7027037
2011	3380316	3092629	287687	6974013
2012	3375196	3103324	271872	6929164
2013	3358408	3080889	277519	6887117
2014	3384430	3115954	268476	6810853
2015	3386420	3136938	249482	6763823
2016	3374851	3166503	208348	6743607
2017	3465424	3288709	176715	6601175
2018	3417313	3264219	153094	6569822
2019	3419694	3272845	146849	6507378
2020	3409548	3215242	194306	6460625
2021	3407625	3235726	171899	6352565
2022	3489868	3313799	176070	6208479
URBAN				
2009	5052580	4663385	389195	5941284
2010	4993365	4546365	447000	5938739
2011	5015371	4578785	436586	5874830
2012	4998749	4576706	422043	5839725
2013	4987693	4550011	437682	5792589
2014	5042697	4630948	411749	5691040
2015	4960112	4604957	355155	5732639
2016	4916092	4634050	282042	5704228
2017	4938379	4708991	229388	5617569
2018	4904821	4715041	189780	5599899
2019	4910901	4740050	170851	5534886
2020	4878324	4658053	220271	5525160
2021	4746343	4584021	162322	5493449
2022	4776862	4623522	153340	5412717
RURAL				
2009	3207376	2902448	304928	6202623
2010	3045397	2767935	277462	6293238
2011	2948471	2660245	288226	6334687
2012	2995768	2723209	272559	6243848
2013	3007082	2725638	281444	6214426
2014	3026832	2745392	281440	6163195
2015	3176521	2848354	328167	5990166
2016	3166687	2867592	299095	5990979
2017	3270112	2999017	271095	5832972

2018	3269529	3030133	239396	5757949
2019	3283639	3053998	229641	5676413
2020	3309640	3032613	277027	5601250
2021	3468338	3171465	296873	5367056
2022	3493951	3182931	311020	5249256

Source: National Institute of Statistics, Romania, data base Tempo

Table 3 Relevant **Labour Market Indicators, in the 2009-2022 period, in Romania**

Gender Urban/rural area Period	Activity rate [1)]	Employment rate [2)]	Unemployment rate [3)]
	- percentages -		
TOTAL			
2009	48,1	44,0	8,4
2010	47,1	42,9	9,0
2011	46,9	42,6	9,1
2012	47,3	43,2	8,7
2013	47,4	43,1	9,0
2014	47,9	43,8	8,6
2015	48,5	44,4	8,4
2016	48,4	44,9	7,2
2017	49,4	46,4	6,1
2018	49,6	47,0	5,3
2019	50,0	47,6	4,9
2020	50,2	47,2	6,1
2021	51,1	48,2	5,6
2022	51,8	48,9	5,6

Source: National Institute of Statistics, Romania, data base Tempo

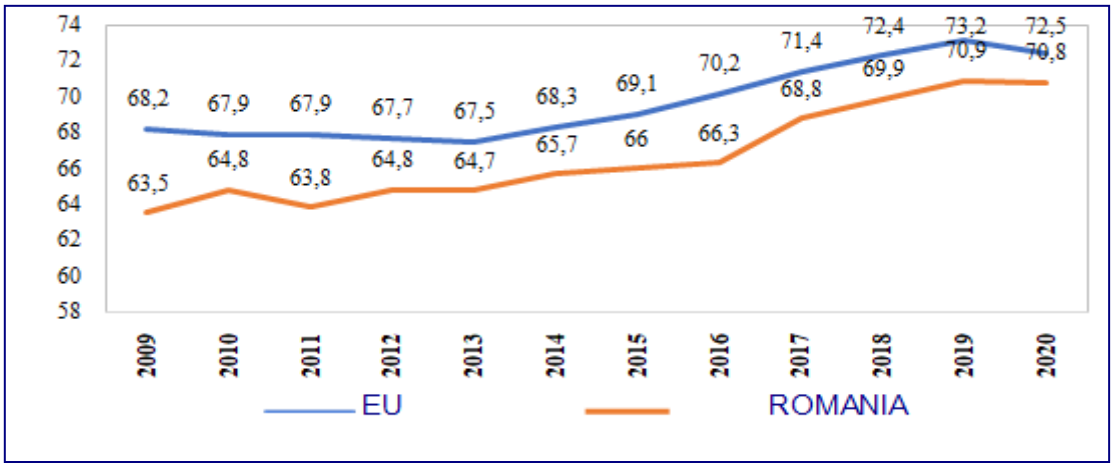


Figure 1 Employment rate for the population aged 20-64 (%), in the period 2009-2022,

Source: Eurostat data base

EU ROMANIA

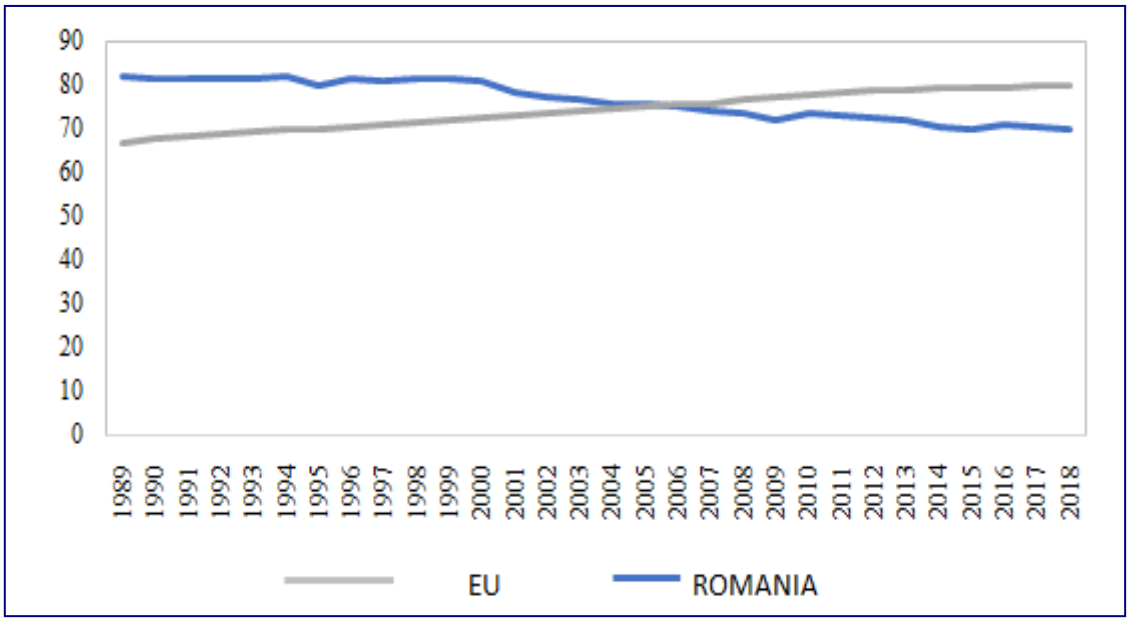


Figure 2 Labour market participation rate, by gender (%)

Source: Eurostat data base

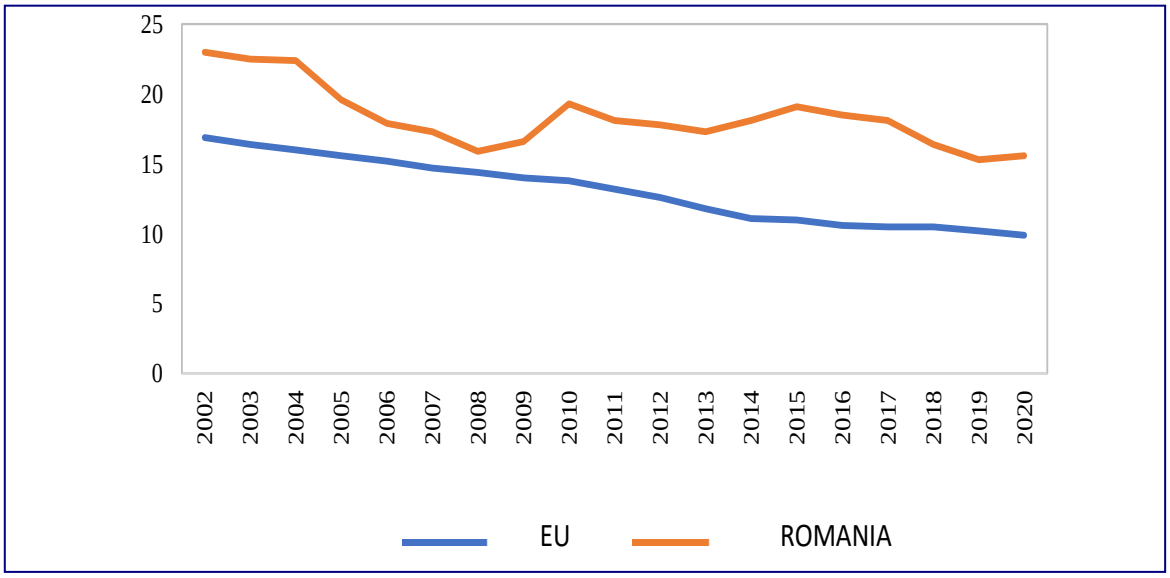


Figure 3 School dropout rate 18-24 years (%)

Source: Eurostat database

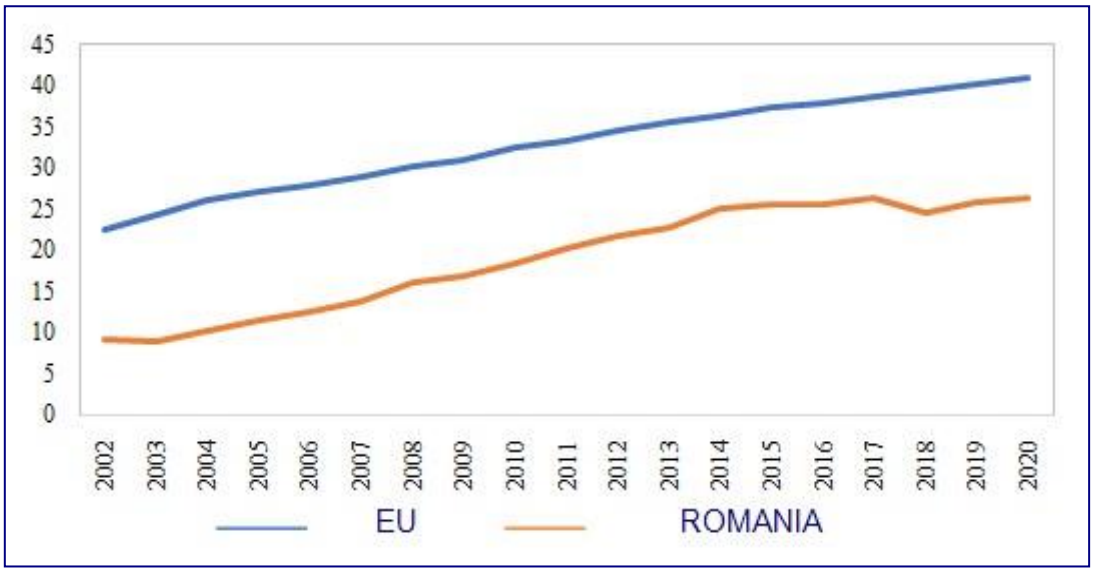


Figure 4. Share of the population 30-34 years old with higher education (%)

Source: Eurostat database

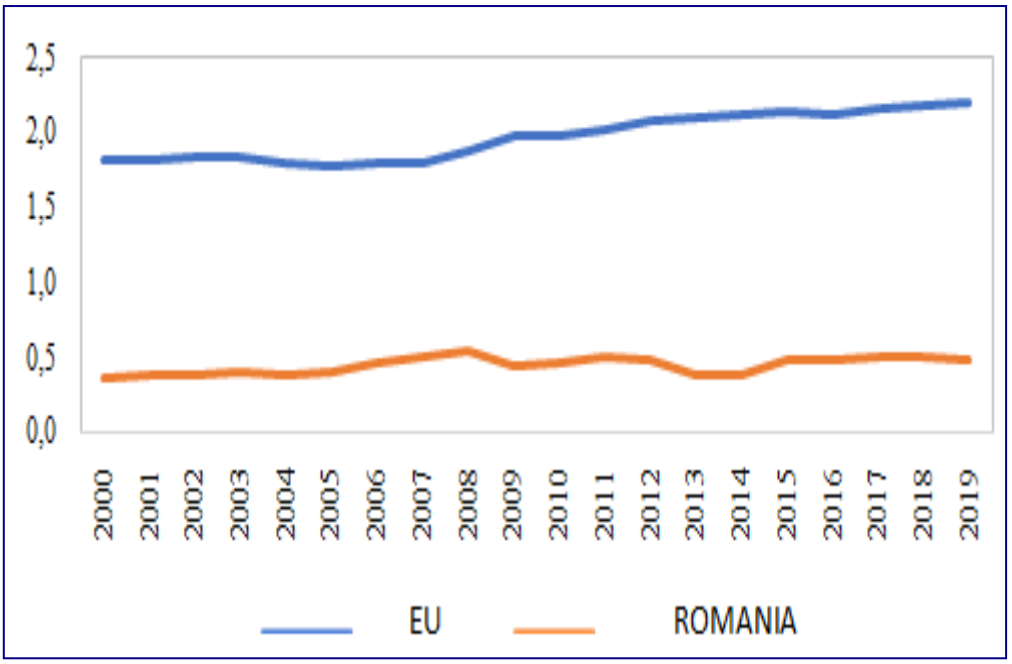


Figure 5. Research and development expenditure (% GDP)

Source: Eurostat database

DEVELOPMENTS AND FISCAL PERSPECTIVES MANIFESTED AT THE NATIONAL LEVEL

Ionel LEONIDA[14]

Cosmin-Octavian CEPOI[15]

Abstract

The paper presents synthetically the fiscal evolution at the national level in the period 2019Q1-2023Q2, based on some indicators of fiscal revenues, budget expenditures and derivatives from them, from which to extract benchmarks regarding the fiscal status of the reference period, to present possible prospects for reconfiguration fiscal-budgetary, taking into account the trends manifested at the international and European level. In the analyzed interval, the fiscal policy had to adapt in order to quickly respond to the atypical economic conditions of the health crisis period, undergoing changes compared to the pre-existing situation, more significant being the increase in the budget deficit and the public debt, being the most affected indicators in the periods of crisis (see also post-economic and financial crisis effects from 2008 - 2010). Externally, the pandemic episode signaled the need to accelerate ongoing fiscal reforms, but, above all, the fact that this moment can be favorable for substantial changes in fiscal-budgetary policies to adjust the fiscal vulnerabilities highlighted by the state of crisis, as well as of increasing the homogeneity of fiscal-budgetary systems, chosen within the EU.

Keywords: *fiscal policy, fiscal stance, fiscal perspectives*

JEL Classification: *E62, H21, O23*

Introduction

The post-crisis periods represent favorable moments for deeper evaluations of the general, European context, but also of macroeconomic adjustment policies, with main responsibilities in ensuring macroeconomic stability at country and regional level. Relatively similar evaluations appeared both after the financial and economic crisis of 2008-2010, as well as during the period and post-crisis of the health, social and economy generated by the COVID_19 pandemic, bring certain criticisms regarding the impasse of unification through the relatively poor quality of common policies, but also of globalization through the emergence of de-globalization, aspects that favor and encourage analysts and researchers to make arguments and support the fact that the post-crisis moment can be one of paradigm shift in terms of the mentioned processes (globalization, European integration), in the sense of emphasizing approaching the consolidation of macro-stabilization policies at the national level and continuing the consolidation process towards the regions, unions or global level.

The manifestation of the pandemic crisis and its negative effects on the health of the population, on the economic and social environment, required considerable financial efforts of the governments supported, for the most part, through the fiscal-budgetary policies of each country, financial efforts

[14] *PhD, Centre for Financial and Monetary Research "Victor Slăvescu", Romanian Academy, Bucharest, Romania. E-mail: leonidaionel@yahoo.com .ORCID: 0009-0000-1999-0145.*

[15] *PhD, Centre for Financial and Monetary Research "Victor Slăvescu", Romanian Academy, Bucharest, Romania. E-mail: cepoi.cosmin.ccfm@gmail.com .ORCID: 0000-0002-5529-4339.*

that were transferred to the size of the public debt and have turned into future costs that the fiscal-budgetary policy must manage and cover by identifying new tax bases and/or expanding the existing ones, by adjusting some tax rates or resetting the tax regimes taxation, through a possible review of government spending strategies (size, structure) or through a mix of such measures.

In support of the (re)design and adjustment of many national fiscal-budget systems come a series of institutional reforms such as the Base Erosion and Profit Shifting (BEPS) plan of the Organization for Economic Co-operation and Development (OECD) and the fiscal plans of the European Union (EU27) stemming from the experiences of fiscal-budgetary policies in periods of crisis, but also from the need to limit fiscal practices of manipulating tax bases that affect fiscal revenues, resource allocation, capital concentration and, last but not least, the perpetuation and development of havens fiscal.

These institutional reforms must also be supported by internal efforts regarding the orientation of fiscal policies both in relation to these objectives, but also to internal ones, which are the responsibility of fiscal policies.

Our approach in this paper is in this direction, of the general analysis of the fiscal policy in Romania in a regional context, with the possibility of identifying some aspects that can be the object of formulating proposals for revision/improvement. The analysis aims to present the evolution and synthetic analysis of the main fiscal-budgetary indicators: revenues, expenses, deficit and public debt, the identification of fiscal perspectives at the national level, by comparison with the average of the EU 27 and the Euro Zone (EU19) and with countries in the region such as : Bulgaria (BG), Czech Republic (CH), Poland (PL) and Hungary (HU), by reporting fiscal indicators to Gross Domestic Product (GDP), in the period 2019Q1 – 2023Q1.

General evolution of total revenues

The general evolution of total incomes at the level of the analyzed groups/countries is relatively stationary during the analyzed period - with disproportionate weights between countries. Romania collects the least total revenues in relation to GDP among all the countries in the region included in the analysis, according to the representation in figure no. 1.

In their structure, revenues from indirect taxation and social contributions are predominant, a situation that also manifests itself in the countries of the region. Important factors influencing the size of revenues are the relatively divergent tax rates in the region (Romania and Bulgaria have relatively close rates), the size of the tax bases, as well as the capacity and efficiency of the tax administration. Regarding tax administration, under the conditions of relatively similar quotas, Bulgaria permanently collects higher revenues than Romania between 3-6 pp, and in relation to the average collection at the European level, Romania collects less revenues, with approx. 15 – 20pp.

A certain seasonality can be distinguished in the evolution of revenues in Romania, with the registration of higher weights in the first two quarters of each analyzed year. A possible explanation may be the deadline for submitting financial statements/statements from the previous year and paying related taxes during the first two quarters of the following year.

Compared to the situation in the region, the statistical data reveal that Romania's economy operated and operates with an increasingly lax fiscal regime, with budget revenues at the lower limit, as a share of GDP. The tax rates and the results of the collection of the taxes/contributions owed are also involved here.

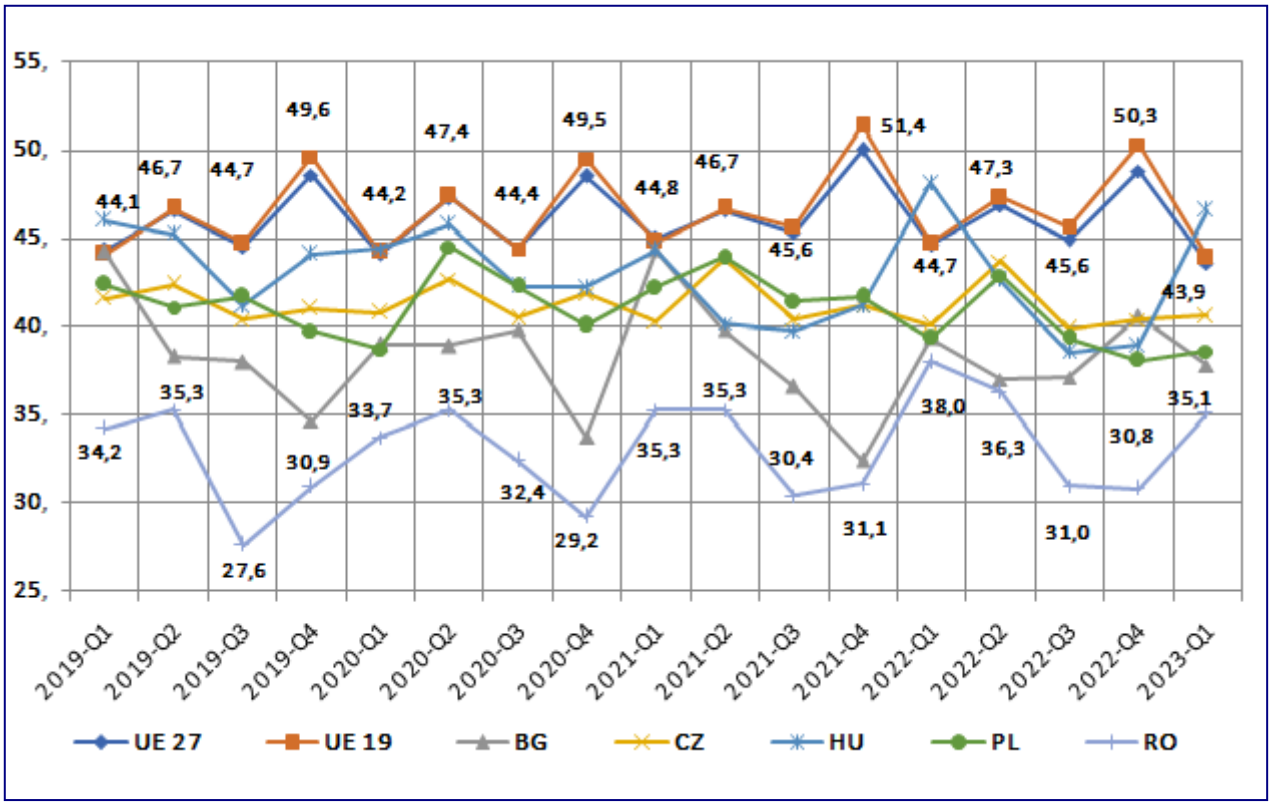


Figure no. 1. Evolution of the share of total revenues in GDP in the EU27, EU19 (average) and in the countries of the region (Romania, Bulgaria, Poland, the Czech Republic and Hungary), during the period 2019Q1 – 2023Q1

Source: Graphic representation made by authors based on data available at https://ec.europa.eu/eurostat/databrowser/view/gov_10q_ggnfa__custom_10065412/default/table?lang=en

The evolution and trajectory of the total income indicator in Romania, as a share of GDP, are largely similar to the trend recorded at the European level, suggesting weak mechanisms at the European level, but also at the national level, to counteract the incidence of economic shocks produced outside the EU area or even inside it.

A regional tax competition harmful to tax revenues is manifested, especially with Bulgaria, which, unlike Romania, although it has relatively similar rates of taxation/charging, collects higher total revenues, and the receipts from VAT (20% share Bulgaria, and 19% Romania), exceed the EU average, an aspect that signals a certain inefficiency in the administration process in Romania.

The general evolution of total expenses

The share of total government expenditure - at the level of the EU27, EU19 groups and at the regional level is disproportionate, being a significant difference over the entire analyzed period of approx. 5-6 pp, at the beginning of the period, with increasing tendencies towards its end.

From the evolution presented in figure 2, a general trend of increasing government spending in the analyzed groups and countries can be observed, slightly cyclical, with significant increases in the

period 2020-2021, a situation that corresponds to the crisis and post-crisis period, in which, as a rule , government spending increases.

At the level of the region, Hungary and the Czech Republic register higher shares of total government expenditure compared to Bulgaria and Romania, with approx. 3-5 pp, while Poland is distinguished by small variations in the share of government spending in the analyzed interval.

In Romania, the evolution of total government spending is largely synchronized with the evolutions recorded at the level of the analyzed country groups, with broad cyclical evolutions during the crisis period and with a period of relative recovery after it. The share of total government expenditures recorded in Romania is lower than the situations recorded in most of the analyzed countries and groups, a situation correlated with the lowest level of total revenues.

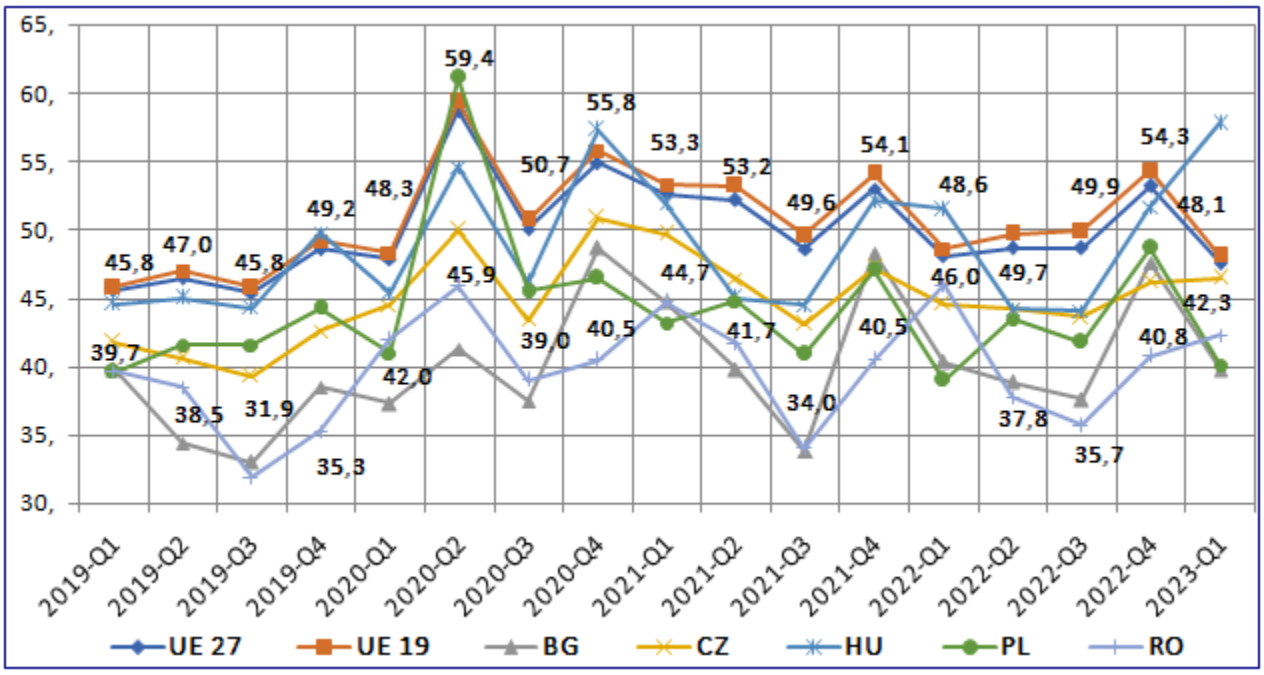


Figure no. 2. Evolution of the share of government expenditure in GDP, in the EU27, EU19 (average) and in the countries of the region (Romania, Bulgaria, Poland, the Czech Republic and Hungary), during the period 2019Q1 – 2023Q1

Source: Graphic representation made by authors based on data available at *https://ec.europa.eu/eurostat/databrowser/view/gov_10q_ggnfa__custom_10065431/default/table?lang=en*

A summary analysis of the functional structure of expenses indicates that Romania allocates higher expenses to the countries in the region and even to some of the EU27 in the administrative, social and economic fields (investments, granting of subsidies and facilities). Also, tendencies to increase spending on defense and public order are recorded and anticipated, in general in the countries of the region, more intense in the countries on the eastern border of the North Atlantic Treaty Organization (NATO), such as Romania and Poland, as following the military conflict in Eastern Europe and the increase in expenses required by the status of NATO member countries.

Romania has lower allocations than countries in the region and the EU in areas such as education and health (human capital).

The analysis of the structure and size of expenses by reference to GDP in Romania, in relation to the situations of the countries in the region, but also in a certain wider European context, reflects a

budgetary system oriented towards non-productive expenses, of an administrative and social nature, adjusted seasonally according to of short-term objectives or expressly requested by the European authorities, with little emphasis on education, citizens' health and investments, expenses that produce multiplier effects in the economy.

The general evolution of the budget deficit

After a period of relative consolidation of the budget deficit until 2019, its evolution acquires accentuated growth tendencies against the background of the health crisis that began in 2020, at the level of all analyzed groups and countries.

However, a consolidation trend is noticeable in most of the analyzed groups and countries, which started in the 1st quarter of 2023, against the background of the effects of some fiscal-budgetary measures implemented by most of the countries for the recovery of public finances, severely affected by the pandemic crisis.

The trend is that of the general level, but with significant asymmetries between countries at the level of the recorded values, standing out for instability in the variation of the budget deficit in Bulgaria, Poland and Hungary, with variations of over 10pp.

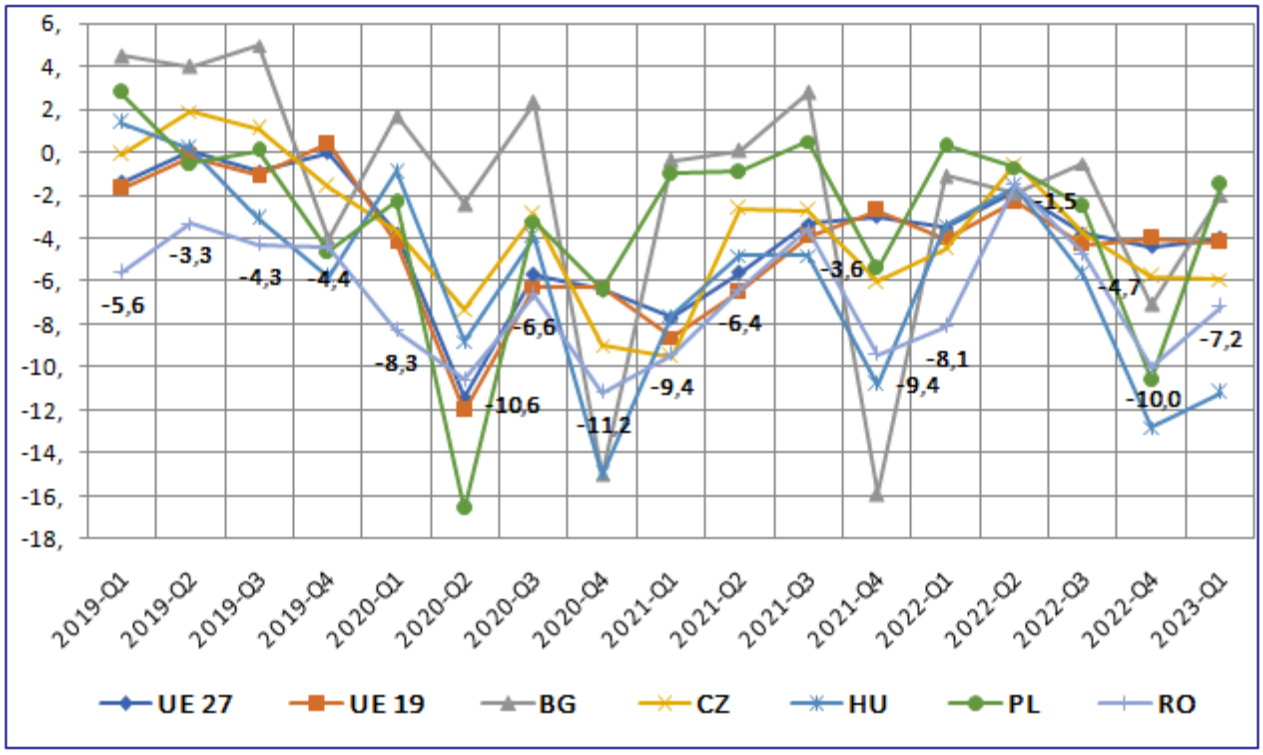


Figure no. 3. Evolution of the share of the budget deficit in GDP, in the EU27, EU19 (average) and in the countries of the region (Romania, Bulgaria, Poland, the Czech Republic and Hungary), during the period 2019Q1 – 2023Q1

Source: Graphic representation made by authors based on data available at
https://ec.europa.eu/eurostat/databrowser/view/gov_10q_ggnfa__custom_10065402/default/table?lang=en

The situation in Romania reflects a discretionary tendency of the fiscal-budgetary policy, against the background of the implementation of fiscal relaxation measures and simultaneous increase in

expenses, which amplified the size of the deficit during the health crisis. Also, the excessive volatility of the deficit in the analyzed period reflects a high sensitivity of fiscal policy to economic dynamics.

At a general level, there is a reduced efficiency of the European fiscal framework in terms of fiscal discipline and consolidation among member countries.

The evolution of public debt

The general evolution of the public debt, presented in figure no. 4, is relatively fluctuating during the analyzed period, with growth trends in the period 2020Q2 – 2021Q4 and recovery, starting in 2022.

At the regional level, after the period of growth, most countries show a debt reduction trend, with the exception of Romania and the Czech Republic, which are still on upward trends.

The increase in public debt recorded by Romania, in the analyzed interval, is over 26 pp in 2023Q1, compared to 2019Q1.

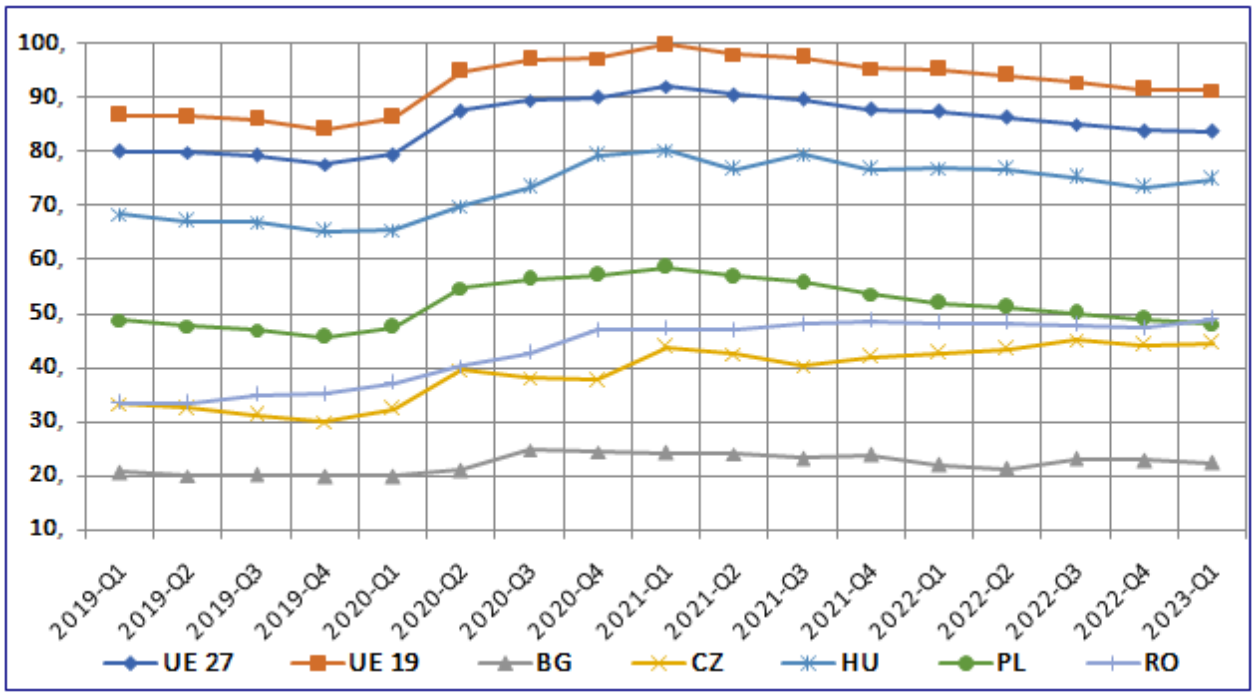


Figure no. 4. Evolution of the share of public debt in GDP, in the EU27, EU19 (average) and in the countries of the region (Romania, Bulgaria, Poland, the Czech Republic and Hungary), during the period 2019Q1 – 2023Q1

Source: Graphic representation made by authors based on data available at
https://ec.europa.eu/eurostat/databrowser/view/gov_10q_ggdebt/default/table?lang=en&category=gov.gov_gfs10.gov_10q

The general insufficiency of financial resources and the need for additional expenses to overcome the health crisis (economic and social) created pressure on the deficit and, implicitly, on the public debt. Also, during this period of crisis, the cost of borrowing increased significantly.

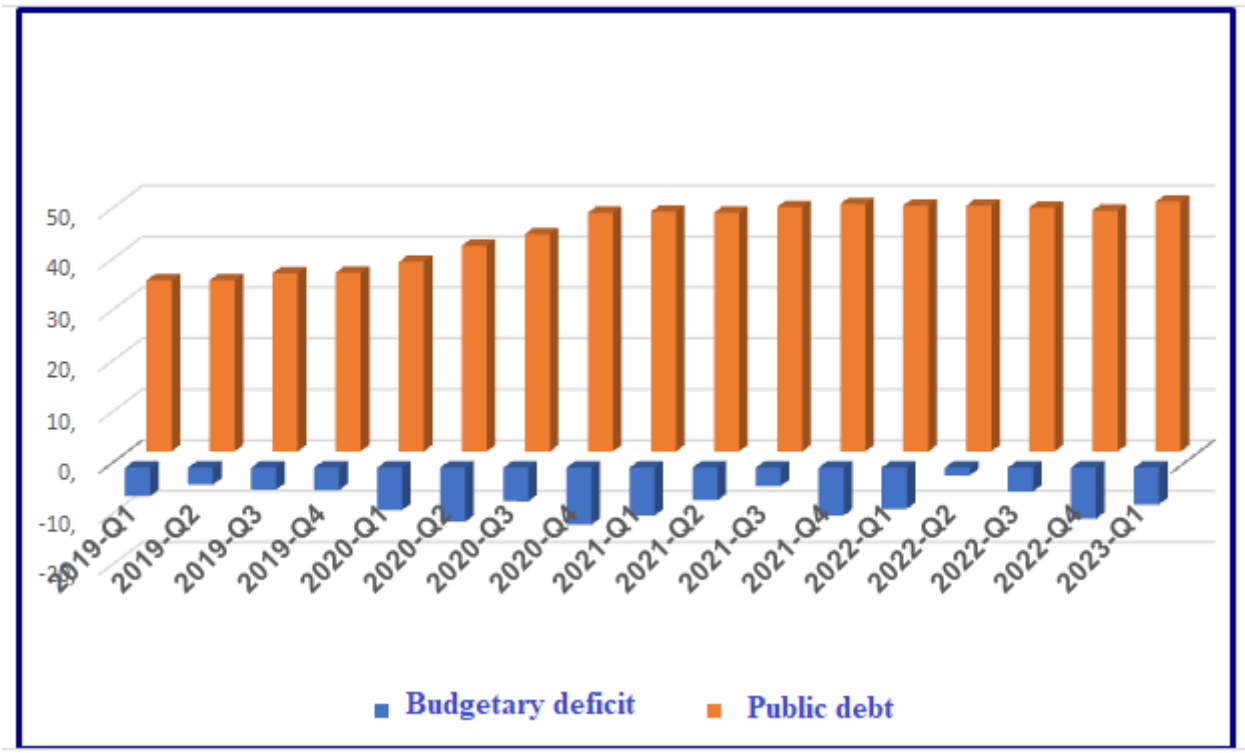


Figure no. 5. The link (synchronized) between the evolution of the budget deficit and the public debt, related to GDP, in Romania, in the period 2019Q1 – 2023Q1

Source: Graphic representation made by the authors based on the data in Figures 3 and 4.

The perpetuation and especially the increase of the budget deficit induces pressure on indebtedness, a situation faithfully reflected in figure no. 5, where the graphic evolution of the two indicators illustrates the direct link between the increase in the budget deficit and the increase in the public debt, as well as the one between the moderation / reduction of the budget deficit and the moderation of the increase in the public debt.

Conclusions and perspectives

The revenue dimension reflects a tax system that generates lower revenue by up to approx. 10 pp compared to the countries in the region and up to 20 pp compared to the EU27/EU19 average.

The size and structure of expenses reflect a budgetary system oriented towards non-productive expenses, of an administrative nature, and less towards productive expenses, to support human capital.

The persistence and size of the budget deficit generates pressure on indebtedness, and the provisions and constraints of the European fiscal framework failed to induce a certain fiscal-budgetary discipline and maintain the consolidation process started in 2013.

The implementation of some measures of a fiscal-budgetary nature was often carried out ad hoc, without substantiation and analysis, without taking into account the opinions of the institution with the role of monitoring the fiscal-budgetary process, regarding their budgetary impact.

There is an increased sensitivity of the tax bases to wide economic fluctuations, of the nature of crises, accentuated by the lack of automatic stabilization mechanisms in the structure of the fiscal system.

The general fiscal-budgetary perspective must aim for a closer balance between revenues and expenses.

On the income side, there are possibilities that can be the subject of some scenarios, namely:

- revision of some tax rates, especially in the area of incomes, but also of properties and assets;
- the possibility of implementing a tax regime with progressive rates;
- increase in administrative capacity and performance, which translates into an increase in the level of revenue collection.

On the expenditure side, there are possibilities that can be the subject of some scenarios, respectively:

- a possible review of the budget expenditure structure, by restricting or even eliminating some fiscal facilities;
- orientation of expenses towards areas with potential for fiscal multiplication;
- the possibility of gradually reducing the state's administrative expenses.

These possible adjustments on the two components can lead to the reduction of the budget deficit and, as a consequence, to the moderation of the growth rate of the public debt.

Also, a concern already under the attention of the authorities, which aims to consolidate some tax bases, especially in the sphere of income of legal entities, can be accelerated, especially in the context of the BEPS plan, which comes to support these efforts, through internal measures that will facilitate the subsequent easy implementation of the measures initiated by the OECD, to which Romania has joined.

We note that there are a number of possibilities for strengthening public finances at the national level, in which, in our opinion, a simultaneous and medium and long-term approach on multiple plans (simultaneous adjustments in terms of revenues, expenditures and fiscal administration), can prove more effective, the main argument being that they can be discrete adjustments, without inducing strong shocks on some components of public finances, and their cumulative effects can materialize in positive results, and consequently, in tempering the budget deficit and public debt.

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THE SHADOW ECONOMY IN ROMANIA IN THE PERIOD 2007-2022. CAUSES, CONSEQUENCES, CHALLENGES

Nicoleta MIHĂILĂ[16]

Abstract

In 2022, the underground economy of Romania was over 29% of the GDP, which places our country in the first positions among the member states of the European Union, as it happened in the last two decades. It is well known that its reduction would mean a significant source brought to the state budget, which would implicitly determine the reduction of Romania's current budget deficit. In this sense, in this paper, we have in view the analysis of some of the causes/sources and implications of the underground economy, its evolution in the last 15 years, as well as the presentation of some measures (which, for the authorities, can become real challenges in their implementation) so that to reduce it. We use an empirical and descriptive methodology, by referring to statistical data and bibliographic references from national and international specialized literature.

Keywords: tax evasion, tax legislation, tax revenues, taxes, tax administration

JEL Classification: E62, G38, H26

The shadow economy was and still is an intensely debated topic in the specialized literature. This has come to represent a significant share in the GDP of the states, with dire consequences for the budgetary exercise, especially under the conditions of budgetary restrictions or against the background of an economic recession. The European Union loses over 1.000 billion euros annually due to tax evasion; in Romania, since 2005 tax evasion had a share of approximately 50% of the general consolidated budget. Also, in 2008, the underground economy represented 21% of GDP, in 2013, it represented 28,4% of Romania's GDP, and in 2022, about 29% of GDP.

Therefore, the structure of the paper is as follows: the notion and determinants of the shadow economy, its evolution in Romania and EU member states, in the period 2007-2022, and proposed/implemented measures to reduce the underground economy.

1. Shadow economy - concept and determinants

There are several definitions associated with the underground economy. In a broad sense, this refers to the economic activity that is not registered in the national accounts or is carried out outside the law; it is also known as informal, unnoticed, hidden, black, invisible, unofficial, parallel, illegal, gray, shadow economy.

In general, the underground economy operates based on illegal mechanisms through which the obligation to pay the tax is ignored, the taxpayer pays lower taxes than those he is legally obliged to pay, by not informing the relevant authorities of revenue collection to the state budget of correct and complete information.

In fact, the underground economy represents a legal economic activity, but deliberately hidden from the public authorities with the aim of not complying with the legal rules regarding the minimum wage in payment, the maximum number of hours worked, labor protection rules or health, evading the declaration and implicit payment of taxes and duties (profit tax, VAT, excise duties, customs duties, etc.), social contributions, etc.

[16] *PhD, Centre for Financial and Monetary Research "Victor Slăvescu", Romanian Academy, Bucharest, Romania, e-mail: nicoleta.mihaila@icfm.ro . ORCID: 0009-0009-4791-8656 .*

According to the OECD manual on measuring the unobserved economy, we have the following: *underground production*: productive and legal activities but which are deliberately hidden from the authorities to avoid paying taxes or complying with regulations, *illegal production* (prohibited by law), *informal production* sector- activities within the household sector or in other units that are unregistered, household production for own final consumption.

Regarding the main determinants of the underground economy, these are: poor institutional quality, ineffective governance of institutions, complex and burdensome tax and regulatory systems, lack of a strong legal system and corruption. Concretely, in the development of Romania's underground economy, *the independent work rate, the unemployment rate, the part-time employment rate and the efficiency of the government*, respectively, are essential.

Also, according to the study elaborated by Friedrich Schneider and Alban Asllani, in 2022*, Taxation of the underground economy in the EU*, lack of trust in civil servants, the lower quality of business environment legislation, fiscal policy, as well as government support for entrepreneurs, along with increased social contributions, corruption, political instability, relatively high tax rates and uncertainty regarding regulatory policies, have an influence on the size of this phenomenon. It should also be remembered the influence of fiscal policies, namely the high tax rates, the audit deficiency, the insufficient accounting services.

As example, countries in Eastern or Central and Southern Europe, as Bulgaria, Cyprus, the Czech Republic, Romania, Latvia, Lithuania and Poland, have larger underground economies than the "old" Western European Union countries, like Austria, Germany, France and the Netherlands.

Therefore, we have an increase in the size of the underground economy from west to east, as well as from north to south of Europe. On average, southern European countries have considerably larger underground economies than those in central Europe.

According to the study, the first determinant of the underground economy are *indirect taxes, as well as the income tax of individuals*. The second most important factor is *the level of self-employment in relation to the general level of employment*. Dell'Anno et al. (2007), Schneider and Buehn (2013) suggested that the higher the level of self-employment, the higher the participation rate in the underground economy tends to be. Other important factors with relatively higher average impact (in %) on the underground economy are the *country's unemployment rate, fiscal morale and level of business freedom*, which is used as a proxy to indicate the level of bureaucracies and strict laws/regulations in conducting economic activities in the formal sector.

According to the study mentioned above, if we analyze the underground economy in the EU countries, we find that the impact of the determining factors differs between Germany, Austria and Denmark, on the one hand, and Italy, Romania and Greece, on the other hand (Table 1). While in Germany, Austria and Denmark, factors like the tax burden (direct and indirect) are the major causes of the underground economy, for Italy, Greece and Romania, the level of independent work, unemployment and fiscal morale, as well as indirect taxes, are the most important determinants of the shadow economy.

Table 1. Average relative impact (in %) of the determining factors of the underground economy in Romania

	Average size of shadow economy	Personal income tax	Indirect taxes	Tax morale	unemployment	Self-employment	GDP growth	Business freedom
Austria	8.8	18.5	27.4	11.6	12.1	20.5	0.8	9.1
Denmark	16.3	34.6	33.5	4.0	9.5	9.9	0.3	8.2
Germany	15.7	16.6	24.2	8.3	24.3	16.9	0.6	9.1
Greece	27.0	5.8	21.8	10.4	18.0	37.6	0.7	5.7
Italy	26.9	15.6	18.9	9.0	18.6	31.0	0.1	6.8
Romania	33.2	4.2	24.5	14.2	13.1	37.7	1.1	5.2

Source: Schneider, F., Asllani, A., 2022, Taxation of the Informal Economy in the EU

Tax policies are important determinants of the level of the underground economy in a country. *High tax rates, audit deficiency, insufficient accounting services*, etc. are just some of the main factors that facilitate the size of the underground economy (Azuma and Grossman, 2002; Kelmanson et al., 2019). In this context, the main drivers of the underground economy are the *burden of direct and indirect taxation*, both real and perceived. An increasing burden of taxation provides a strong incentive to work in the underground economy. Additionally, increasing the burden of fiscal regulation is assumed to provide a strong incentive to enter the underground economy (Friedman et al., 2000; Schneider and Buehn, 2012; 2018).

In addition, *"fiscal morality"* (citizens' attitudes toward the state), which describes individuals' willingness (at least in part) to leave their official occupations and enter the underground economy, is also a significantly important driver. It is assumed that a declining tax morale tends to increase the size of the underground economy. Furthermore, Schneider (2014) and Sarac and Basar (2014) argue that *there are administrative, social and political causes of informality*. Regarding *administrative causes*, the organization of tax authorities, technical structures and audit mechanisms are considered the main causes of informality. In terms of *social causes*, tax ethics and tax morale, taxpayer psychology and historical causes may cause agents to go through shadow economic activities. In some cases, causes as elections, government reforms, corruption, etc., are considered the main *political causes of informality*.

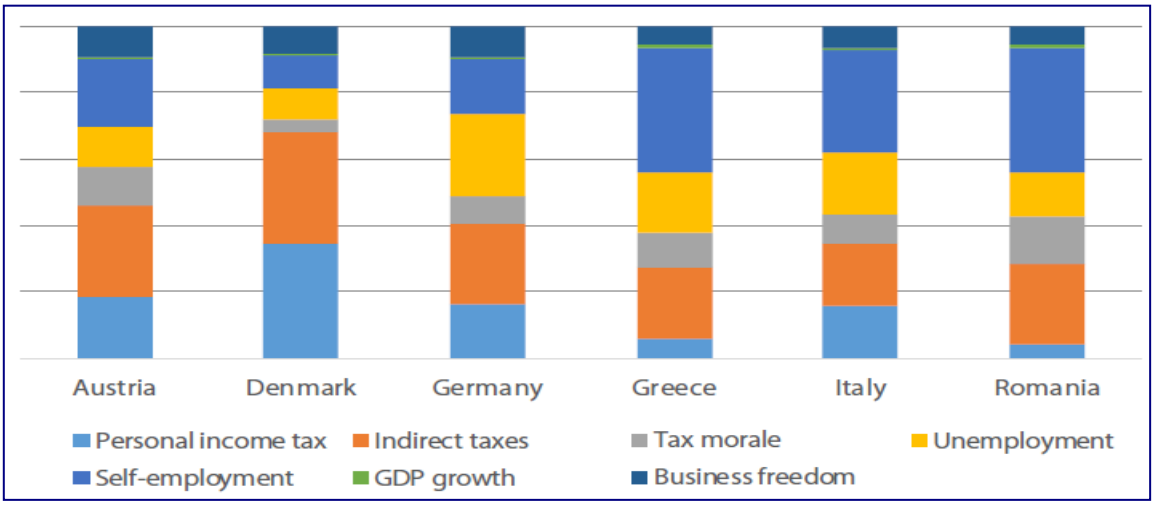

Figura 1 . Average relative impact (in %) of the determining factors of the underground economy in six EU states

Source: Schneider, F., Asllani, A., 2022, Taxation of the Informal Economy in the EU

We observe that the Romanian underground economy is mainly determined by the level of *independent work* in the country, *indirect taxes, low fiscal morale* and, respectively, *the unemployment rate*. Other factors, respectively *regulatory burden, personal income tax and GDP growth* are also significant but contribute less to explaining the existence of the hidden economy. Unlike most other EU countries, *Romania's high degree of self-employment* is a major cause of the underground economy, its average relative impact being of 37.7%, compared to the other factors.

Therefore, we find that the following key assumptions of the determinants and their causality have a strong influence on the size of the shadow economy and its development in EU countries:

- An increase in the tax burden increases the underground economy;

- The more regulated the country, the greater the incentives to work in the underground economy;

- The lower the quality of state institutions, the greater the incentives to work in the underground economy;

- The lower the fiscal morale, the greater the incentives to work in the shadow economy;

- The higher the unemployment, the more people engage in underground economy activities;

- The higher the level of self-employment, the higher the participation in the underground economy;

- The lower the GDP per capita in a country, the greater the incentive to work in the underground economy;

- The higher the level of freedom, the smaller the size of the hidden economy.

Next, we detail the main causes of the underground economy.

a) ***The burden of taxes and duties (Tax wedge)*** - The tax burden in general and the tax burden on labor, in particular (especially that of social security contributions) - determining factor for the size of the hidden economy. The tax wedge is the difference between the employer's total costs and the employee's net salary

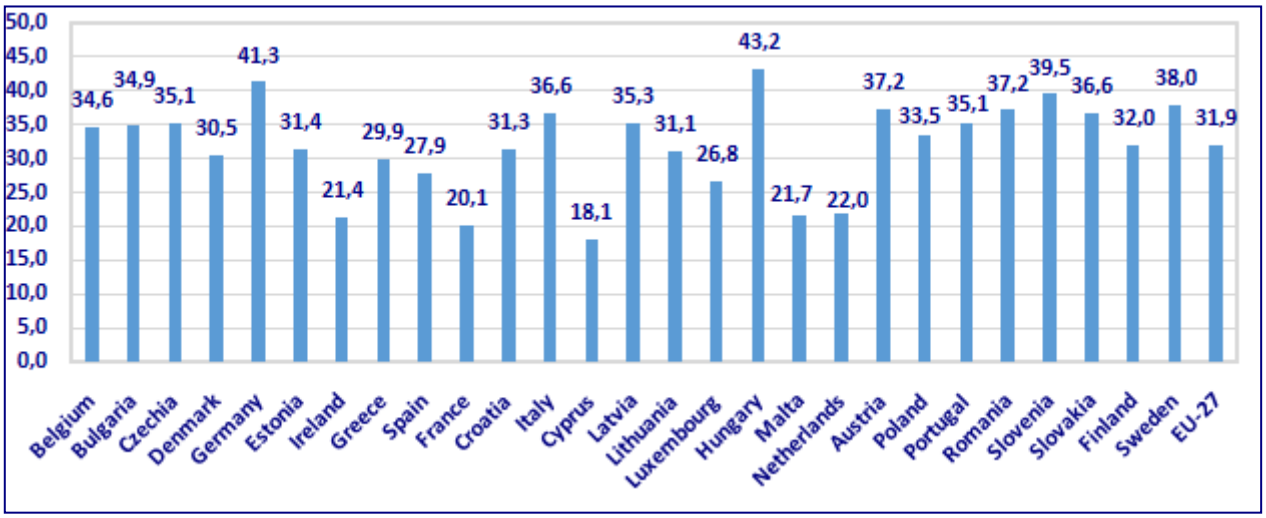

Figure 2. The tax wedge for an employee with a low income (50% of the average salary), without children, 2022

Source: European Commission, DG Economic and Financial Affairs, Tax and Benefits

According to *Figure 2*, the tax wedge for Romania, for an employee with a low income, is 37,2, while the EU 27 average is 31,9. We are surpassed by countries as Hungary, Slovenia, Sweden, and Germany, but we surpass countries like Belgium, Austria, Italy, Poland, the Czech Republic, Denmark.

In terms of *reducing the fiscal burden* (both direct and indirect taxation), Romania's policies have mainly focused on VAT changes. Successive rounds of VAT reductions have been implemented since 2013, which first included a targeted reduction in VAT on bread and bakery products from 24% to 9%, then extended to meat products and then have been generalized to all food products since mid-2015.

This was followed by a general reduction in VAT from 24% to 20% starting with 2016. Social security contributions have also been reduced by 5% beginning with the last quarter of 2014.

The inability to collect taxes can determine other subsequent problems within the formal economy. Romanian residents are taxed at a flat rate of 10% on various types of income, including capital gains and interest, with the exception of dividend income, which is taxed at a flat rate of 8%.

Individuals may owe social security contributions for certain types of income, including investment income. The share of taxes in GDP in Romania continues to be around 26% - 27%, being well below the EU average of 41% and one of the lowest in the European Union.

b) The total cost of the employer to pay a net salary of 1 euro

The figure below shows how much employers have to spend to give 1 euro of real purchasing power (before VAT/sales tax) to an employee earning an average wage in each country.

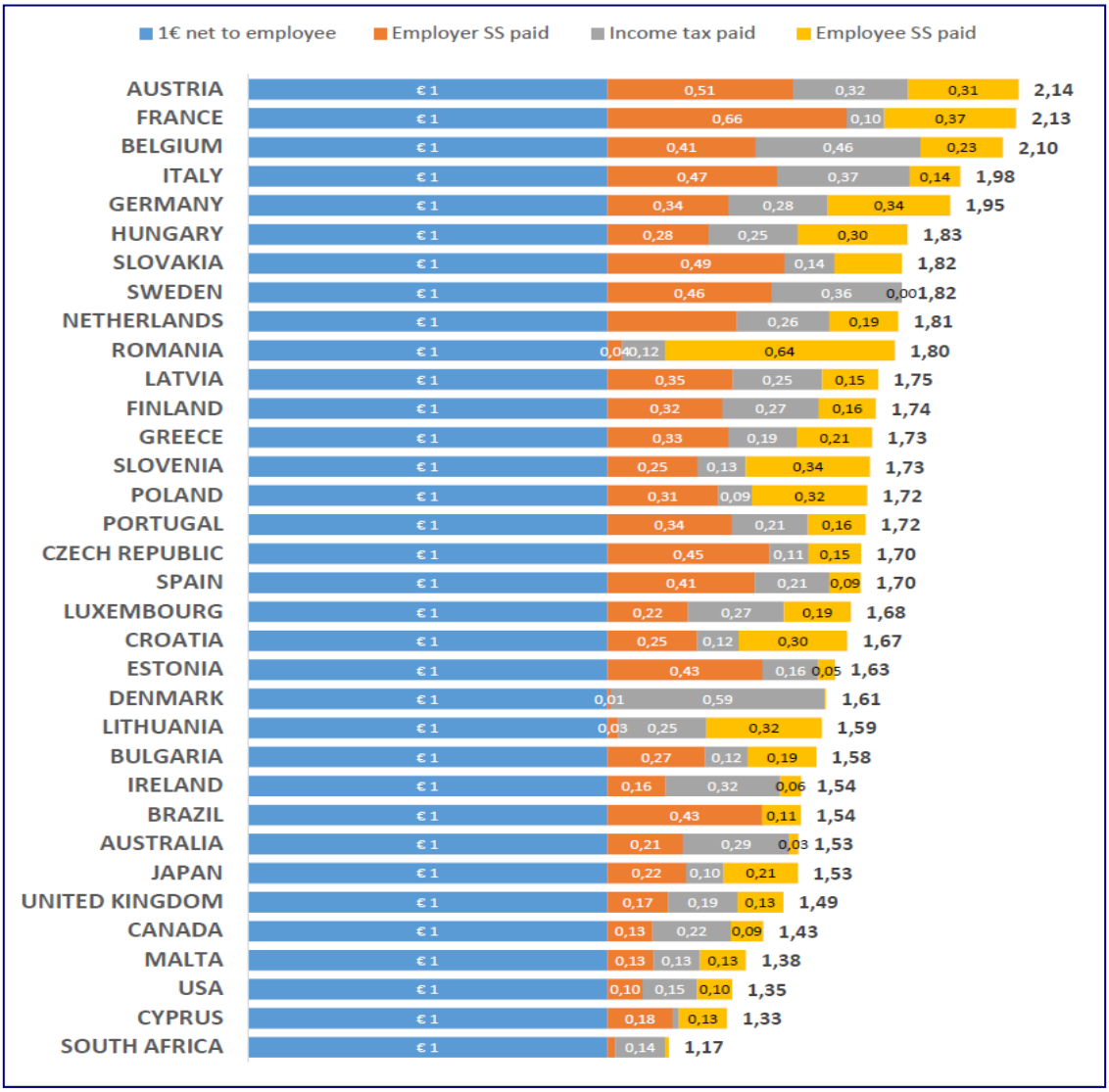

Figure 3. The employer's total cost to pay a net salary of 1 euro

Source: The Tax Burden of Typical Workers in the EU 28—2022 Institut Économique Molinari, Paris-Bruxelles

We note that in Romania the total cost of the employer to pay a net salary of 1 euro is 1.80 euro, being ranked on the leading places in the ranking; we are surpassed by countries like France, Austria, Germany, Italy, Hungary, but we surpass countries like Denmark, Spain, Czech Republic, Poland, Finland.

c) The share of tax revenues in GDP, compared to the member states of the European Union

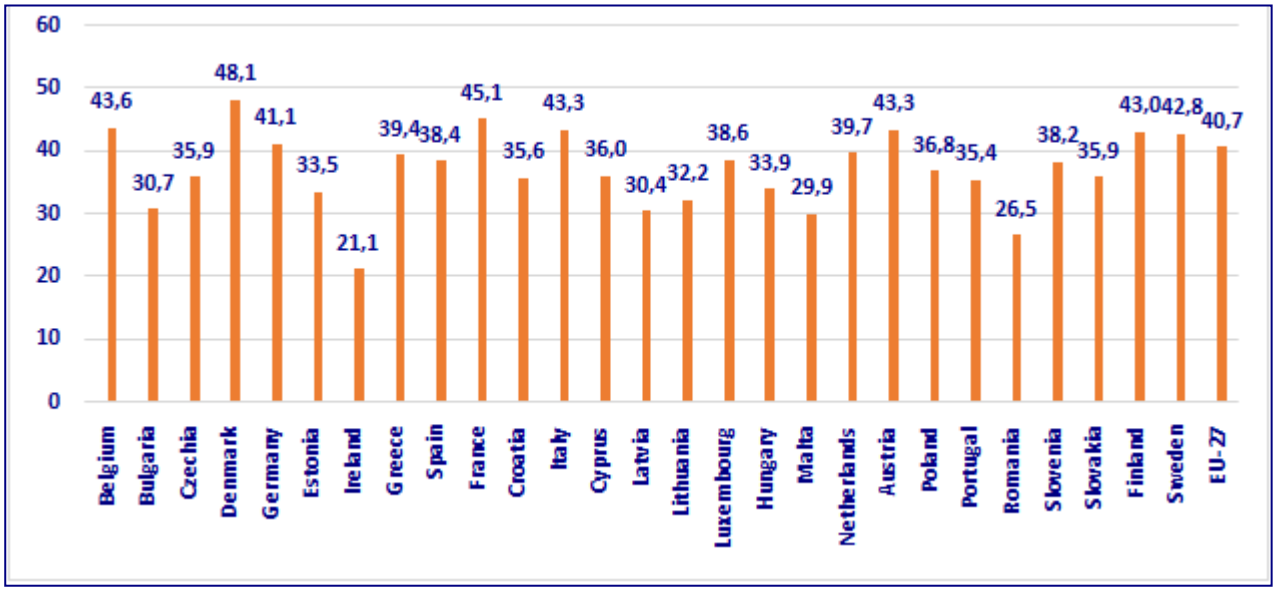

Figure 4. Share of tax revenues in GDP in 2021 (%)

Source: European Commission, DG Taxation and Customs Union, based on Eurostat data

As stated above, it is well known the particularly low level of tax revenues in Romania, of 26,5% GDP, in the EU 27 only Ireland has a lower level than our country`s; the EU 27 average is approximately 41% of GDP.

2. The evolution of the shadow economy in Romania and EU member states, in the period 2007-2022

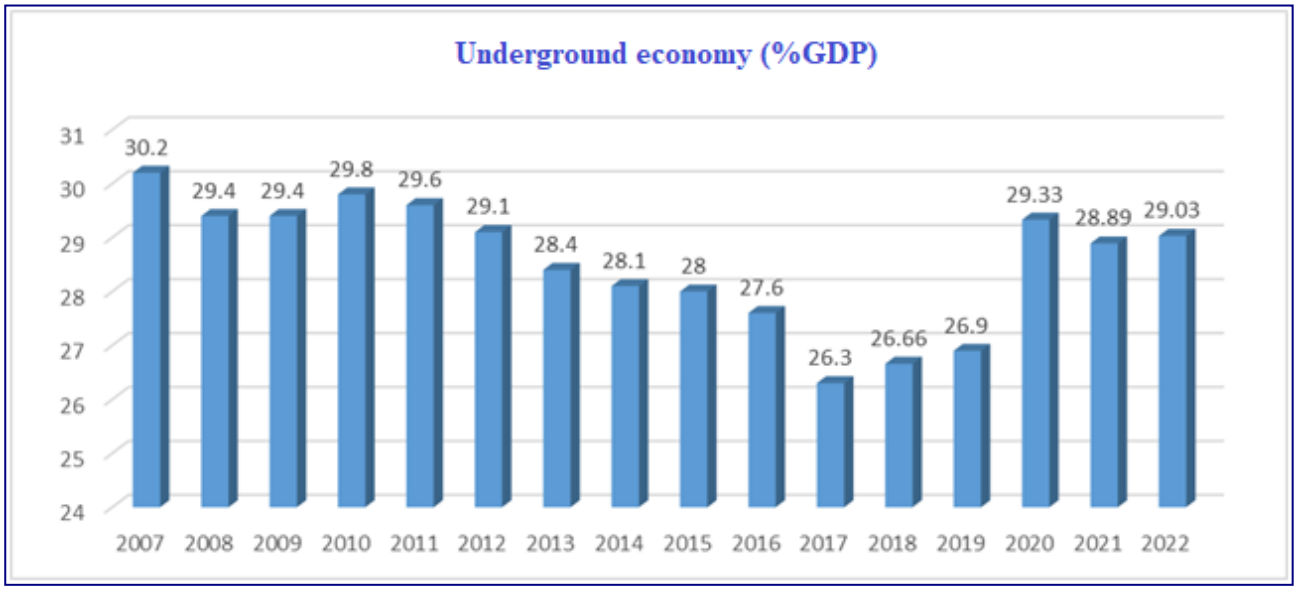

Figure 5. Shadow economy in Romania and EU member states, in the period 2007-2022, % GDB

Source: Schneider, F., Asllani, A., 2022, Taxation of the Informal Economy in the EU

In the last two decades, Romania's underground economy has been between 25% and 35% of GDP, the most important source of which is the "unofficial" work. If after the economic crisis of 2008-2009, the share of the informal economy in GDP decreased constantly, it increased significantly in the last three years, in the context of the beginning of the coronavirus pandemic and the war in Ukraine.

The most recent studies (Schneider, 2022) estimate that the level of the underground economy in Romania decreased significantly in the period 2003-2019. If in 2003, it reached 33,6% of GDP, in 2019 it reached 26,9%. In 2020, the informal economy grew to 29,3%, falling marginally a year later. For 2022, Schneider estimates that the level of the informal economy will remain slightly above 29% of GDP.

The main drivers behind this growth as of 2020 are thought to be macroeconomic indicators, like the unemployment rate and GDP per capita. Huge public spending on infrastructure, subsidies to businesses and special transfers to individuals, which have led to a considerable increase in GDP, combined with a decrease in unemployment, are expected to help reduce the size of the underground economy in most European countries and OECD in the coming years.

If we consider the *situation of the underground economy in the EU states*, in the period 2007-2022 (see *Table 2* in the Annex), in 2020, we observe a strong increase in the shadow economy from 14,98% (in 2019) to 16,48% (in 2020); The main reason for this increase can be attributed to the worldwide coronavirus pandemic and the subsequent severe recession. Also, the eastern or central and southern European countries, as Bulgaria, Cyprus, the Czech Republic, Latvia, Lithuania and Poland have higher shadow economies than the "old" western European Union countries, like Austria, Germany, France and the Netherlands. Hence, there is an increase in the size of the shadow economy from west to east.

We also note that the underground economy, in developed countries, decreased significantly in 2022, compared to 2007 (Austria, Belgium, Germany, Spain, Czech Republic), only a few states have a level higher than that of the base year, respectively Bulgaria (+ 0,4% pp), Hungary (+ 1,7 pp), France (+ 2,4 pp). Romania recorded a decrease of 1,2 pp, from 30,2% GDP in 2007, to 29% GDP in 2022.

If in Germany, Austria and Denmark, the tax burden (direct and indirect) is the main cause of the underground economy, in Romania, Italy and Greece, the determining factors are the high level of independent work, unemployment and the attitude towards taxes, as well as indirect taxes.

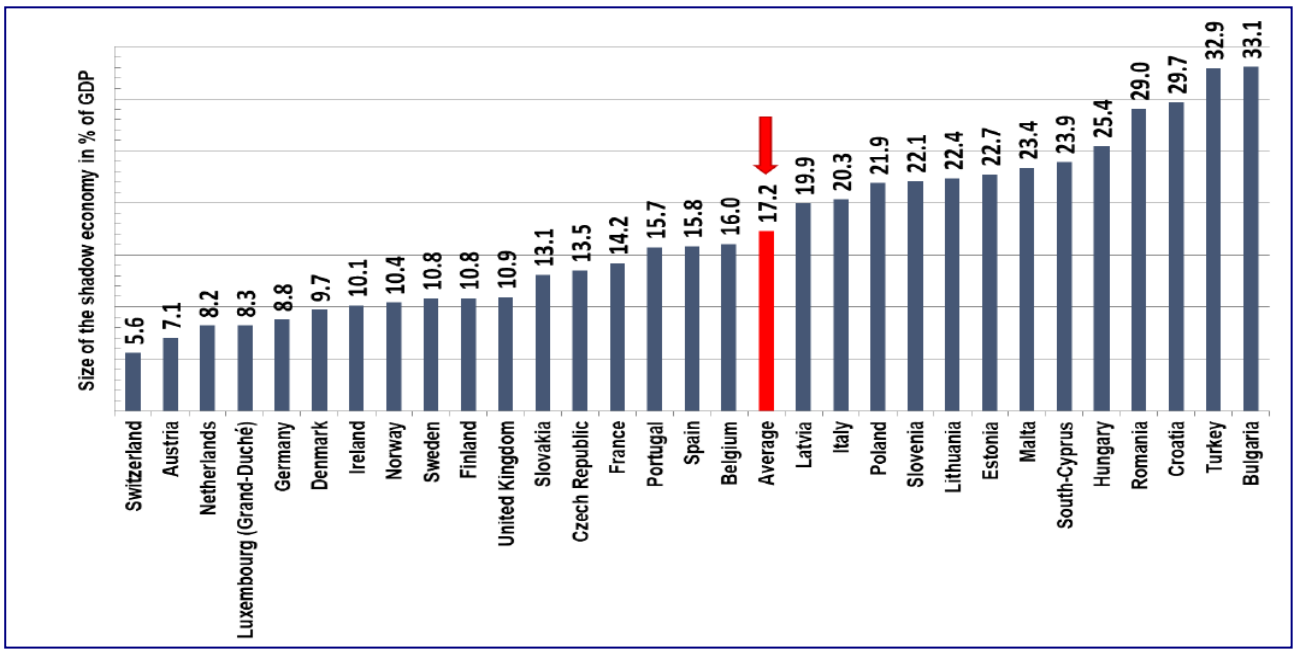

Figure 6. Share *of the underground economy in the EU states* (% in GDP, 2021)

Source: Medina, Schneider, 2021, The Evolution of Shadow Economies through the 21st Century

We note that Romania occupies the fourth position within the EU countries (29% GDP), after Bulgaria, Croatia, Turkey. The European average is 17,2% GDP; countries close to our level are Hungary (25,4%), Malta, Estonia, Lithuania (20%-24% GDP).

3. Measures to reduce the shadow economy

A comprehensive package of reforms is needed to successfully tackle the underground economy, carefully designed based on the most relevant determinants. Measures can range from regulatory and institutional reforms to fiscal policies and administration. The most relevant policies for emerging economies would include: reducing regulatory and administrative burdens, promoting transparency and improving government efficiency, as well as improving collection and boosting tax compliance. Therefore, we refer to:

• Accelerating the anti-corruption fight;

• Zero tolerance for tax evasion;

• Restructuring of ANAF;

•Reducing bureaucracy and tax compliance costs;

• Reforming the social contribution system - the principle of fair treatment of taxpayers regardless of the form of income they register;

• Total transparency of budget expenditures to stimulate voluntary compliance;

• Rethinking the social contract - social benefits must be rethought;

• Promotion of non-cash payments on a large scale.

◄ ***Reducing regulatory and administrative barriers***

a) *Increasing tax compliance by improving registration, auditing and collection*. Registration can be strengthened by facilitating the exchange of information between government agencies, for example firms and workers in most EU countries have a single common business ID for social security, unemployment and tax agencies (Oviedo, 2009). The tax base can be broadened by phasing out existing distortionary exemptions;

b*) Automation and computerization procedures*. Efforts to minimize contact between tax officials and taxpayers tend to reduce bureaucracy and corruption (USAID report, 2005). Simplifying tax and social benefits systems, if not necessarily tax rates, will reduce tax compliance costs;

c) *Promotion of electronic payments* (for example, in Italy). This can help increase revenue and reduce VAT fraud. In recent years, several countries have required businesses to record payments and money transfers through fiscal devices. According to Schneider and Kearney (2013), increasing electronic payments by an average of 10% annually for at least four consecutive years can reduce the size of the underground economy by up to 5%. Promoting electronic payments and limiting the use of cash would likely help shadow activities where one party to the transaction (usually a consumer) does not benefit from not reporting the transaction (and may not even know that he/she is contributing to the expansion of the transaction- the underground economy through cash payment). The promotion of electronic payments may have a more limited impact when both parties to the transaction benefit from non-reporting.

◄ ***Labor market reforms and human capital development-*** encouraging private sector job creation and promoting skills training would help bring firms and workers out of the shadow and promote more inclusive growth. Policy actions aimed at improving human capital will improve the job-seeking ability and earning potential of informal workers. Relevant labor market and education policies include:

a) Increasing hiring and firing flexibility (e.g. labor market reforms in Greece and Romania) in the case of overly restrictive labor laws, while enforcing these laws elsewhere to maintain a level playing field between businesses and encourage legal behavior;

b) Strengthen enforcement and monitoring (for example, the obligation imposed to register all new workers in the six EU countries part of this study);

c) Making the labor market more inclusive by developing and implementing customized employment and training measures for target groups that are mostly at risk of social exclusion (eg young people);

d) Creating a favorable employment environment for returning migrants by providing special training and recognition of practical skills acquired abroad (e.g. Denmark, Austria and Italy, etc.);

e) Creating more relevant professional and vocational education and training and encouraging cross-sectoral internal mobility (eg Greece);

f) Improving the efficiency of funds allocated for education, through better prioritization, screening and monitoring of educational projects.

4. Conclusions

The economic activity carried out outside the law or that is not registered in the national accounts is known as the underground economy and it is also used in the specialized literature as the informal, unnoticed, hidden, black, invisible, unofficial, parallel, illegal, gray, shadow economy.

In the last two decades, Romania's underground economy has been between 25% and 35% of GDP, the most important source of which is "unofficial" work. If after the economic crisis of 2008-2009, the share of the informal economy in GDP decreased constantly, it increased significantly in the last three years, in the context of the outbreak of the pandemic and the war in Ukraine

The main factors behind this increase were the level of self-employment in the country, indirect taxes, low tax morale and unemployment rate, respectively. Factors that contributed to the growth of the underground economy, but to a lesser extent, were the regulatory burden, personal income tax and GDP growth. Unlike in most other EU countries, the high degree of self-employment in Romania is a major cause of the shadow economy, the relative average impact of self-employment is 37.7% of the shadow economy.

Therefore, in order to reduce the underground economy, measures are needed, namely the acceleration of the anti-corruption fight; zero tolerance for tax evasion; the restructuring of ANAF; reducing bureaucracy and tax compliance costs; reforming the social contribution system - the principle of fair treatment of taxpayers regardless of the form of income they register; total transparency of budget expenditures to stimulate voluntary compliance; rethinking the social contract – social benefits must be rethought; promoting non-cash payments on a large scale, as well as labor market reforms and human capital development.

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*** European Commission, DG Taxation and Customs Union, based on Eurostat data

*** European Commission, DG Economic and Financial Affairs, Tax and Benefits

*** The Tax Burden of Typical Workers in the EU 28—2022 Institut Économique Molinari, Paris-Bruxelles

*** USAID's (2005) Research and Development Progress Report, Reducing the complexity of the welfare state, Washington D.C

Table 2 . The underground economy in EU member countries, in the period 2007-2022, % GDP

Country / Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Austria	9.4	8.1	8.5	8.2	7.9	7.6	7.5	7.8	8.2	7.8	7.1	6.7	6.1	7.2	6.9	6.6
Belgium	18.3	17.5	17.8	17.4	17.1	16.8	16.4	16.1	16.2	16.1	15.6	15.4	15.1	16.2	16.0	16.0
Bulgaria	32.7	32.1	32.5	32.6	32.3	31.9	31.2	31.0	30.6	30.2	29.6	30.8	30.1	32.9	32.4	33.1
Croatia	30.4	29.6	30.1	29.8	29.5	29.0	28.4	28.0	27.7	27.1	26.5	27.4	26.4	29.6	29.0	29.7
Czech Republic	17.0	16.6	16.9	16.7	16.4	16.0	15.5	15.3	15.1	14.9	14.1	13.6	13.1	14.2	13.9	13.5
Denmark	14.8	13.9	14.3	14.0	13.8	13.4	13.0	12.8	12.0	11.6	10.9	9.3	8.9	9.8	9.6	9.7
Estonia	29.5	29.0	29.6	29.3	28.6	28.2	27.6	27.1	26.2	25.4	24.6	23.2	22.1	23.6	23.1	22.7
Finland	14.5	13.8	14.2	14.0	13.7	13.3	13.0	12.9	12.4	12.0	11.5	11.0	10.6	11.4	10.9	10.8
France	11.8	11.1	11.6	11.3	11.0	10.8	9.9	10.8	12.3	12.6	12.8	12.5	12.4	13.6	13.1	14.2
Germany	13.9	13.5	14.3	13.5	12.7	12.5	12.1	11.6	11.2	10.8	10.4	9.7	8.5	10.4	10.0	8.8
Greece	25.1	24.3	25.0	25.4	24.3	24.0	23.6	23.3	22.4	22.0	21.5	20.8	19.2	20.9	20.3	20.93
Hungary	23.7	23.0	23.5	23.3	22.8	22.5	22.1	21.6	21.9	22.2	22.4	22.7	23.2	26.0	25.0	25.4
Ireland	12.7	12.2	13.1	13.0	12.8	12.7	12.2	11.8	11.3	10.8	10.4	9.7	8.9	9.9	9.4	10.1
Italy	22.3	21.4	22.0	21.8	21.2	21.6	21.1	20.8	20.6	20.2	19.8	19.5	18.7	20.4	20.2	20.3
Latvia	27.5	26.5	27.1	27.3	26.5	26.1	25.5	24.7	23.6	22.9	21.3	20.2	19.8	20.9	20.2	19.9
Lithuania	29.7	29.1	29.6	29.7	29.0	28.5	28.0	27.1	25.8	24.9	23.8	23.0	21.9	23.1	22.9	22.4
Luxembourg	9.4	8.5	8.8	8.4	8.2	8.2	8.0	8.1	8.3	8.4	8.2	7.9	7.4	8.6	8.4	8.3
Malta	26.4	25.8	25.9	26.0	25.8	25.3	24.3	24.0	24.3	24.0	23.6	23.2	22.0	23.5	23.1	23.4
Netherlands	10.1	9.6	10.2	10.0	9.8	9.5	9.1	9.2	9.0	8.8	8.4	7.5	7.0	8.1	7.8	8.2
Poland	26.0	25.3	25.9	25.4	25.0	24.4	23.8	23.5	23.3	23.0	22.2	21.7	20.7	22.5	22.0	21.9
Portugal	19.2	18.7	19.5	19.2	19.4	19.4	19.0	18.7	17.6	17.2	16.6	16.1	15.4	17.0	16.5	15.7
Romania	30.2	29.4	29.4	29.8	29.6	29.1	28.4	28.1	28.0	27.6	26.3	26.7	26.9	29.3	28.9	29.0
Slovenia	24.7	24.0	24.6	24.3	24.1	23.6	23.1	23.5	23.3	23.1	22.4	22.2	21.5	23.1	22.5	22.1
South-Cyprus	26.5	26.0	26.5	26.2	26.0	25.6	25.2	25.7	24.8	24.2	23.6	23.2	22.1	24.3	23.7	23.9
Spain	19.3	18.4	19.5	19.4	19.2	19.2	18.6	18.5	18.2	17.9	17.2	16.6	15.4	17.4	16.9	15.8
Slovakia	16.8	16.0	16.8	16.4	16.0	15.5	15.0	14.6	14.1	13.7	13.0	12.8	12.2	14.0	13.7	13.1

Source: Schneider, F., Asllani, A., 2022, Taxation of the Informal Economy in the EU

ARTIFICIAL INTELLIGENCE AND KEY RISK INDICATORS IN CYBER FRAUDS PREVENTION

Gabriel NIȚĂ[17]

Larisa GĂBUDEANU[18]

Cosmin Constantin CERNAEANU[19]

Gabriel Mărgărit RAICU[20]

Mircea Constantin ȘCHEAU[21]

Abstract:

Due to increasing economical impact due to the cyber fraud phenomenon, payment institutions allocate considerable resources to prevent this. An adequate implementation of risk indicators coupled with preventive mechanisms can lead to a decrease of losses. The protection mechanisms engineered through artificial intelligence could be a proper solution, but there are no specific legal requirements and frameworks for implementation and liability for such tools, aside from general cyber security, data protection and cyber-crime legal provisions. In this article we analyzed the impact of such preventive measures from multiple perspectives, including economical and legal. Our contribution entails a proposal for compliance evaluation of artificial intelligence tools for cyber fraud prevention, monitoring and adjustment thereof through analysis of the key risk indicator evolution over time.

Keywords: *risk management; risk-based prioritization; cyber fraud governance; damage prevention; financial protection*

JEL classification: *D81, K24, O31*

Introduction

According to a study by (World Economic Forum, 2022), cyber risk is one of the major global challenges. Financial institutions hold a significant amount of sensitive information (customers' personal and credit card details, bank account details, financial transactions) and financial assets, making them attractive targets for cyber criminals.

This form of operational risk refers to threats and vulnerabilities associated with cyber security and is characterized by a variety of manifestations: attacks on customer data, cyberattacks against financial institutions to gain access to and control over information systems, social engineering attacks, ransomware attacks etc.This types of cyberattacks can have significant financial consequences for both consumers and financial institutions, but can also lead to loss of customer

[17] *PhD Candidate, Babes-Bolyai University, Cluj, România. ORCID: 0009-0001-4940-7851.*
[18] *PhD Candidate, Babes-Bolyai University, Cluj, România. ORCID: 0000-0002-2562-5344.*
[19] *PhD Candidate, University of Craiova, România*
[20] *PhD Candidate, Constanta Maritime University, România, ORCID: 0000-0001-5956-7368.*
[21] *PhD, University of Craiova / Constanta Maritime University, România. Email: mircea.scheau@edu.ucv.ro / mircea.scheau@cmu-edu.eu . ORCID: 0000-0002-3847-5998.*

confidence and loss of reputation for banks.

For these reasons, the cyber fraud prevention process must focus on regulating and mitigating the cyber risks associated with this type of criminal behaviour. Risk indicators play a crucial role in fraud prevention at payment institutions. They help financial institutions identify and manage potential threats and risks associated with transactions and payments, helping to increase the sustainability of financial institutions by protecting their assets and reputation, customers, reducing costs and legal risks, and adapting to the evolving cyber security environment.

Current dynamics and trends in cyber fraud, however, make it difficult to prevent this criminal behaviour, as traditional security mechanisms are no longer sufficient and effective in protecting data and systems against new threats in the digital space. The existing legal framework and bodies responsible for cyber security often fail to keep pace with developments in cybercrime.

These new challenges require tailored and innovative responses, and the deployment of AI-enabled cyber defence systems may be an appropriate solution. The combination of traditional security technologies and the advanced capabilities of artificial intelligence technology can provide stronger protection against the increasingly complex and dynamic phenomenon of cyber fraud. Artificial intelligence capabilities compensate for the asymmetry between current cybersecurity mechanisms and the innovative methods used by cybercriminals to commit cyber fraud. Artificial intelligence technology helps to increase the detection rate of cyber fraud and is highly effective in identifying anomalies and irregular patterns.

The potential of artificial intelligence lies in identifying new or complex fraud schemes, monitoring transactions or analysing unique behavioural patterns in the user authentication process at a higher level than the current mechanisms implemented by financial institutions. Despite the benefits associated with the new technology, the excessive or predominant use of artificial intelligence tools in detecting, reducing or preventing fraudulent activities carries a number of risks arising from the lack of accuracy of the data processed and the technical imperfections of systems incorporating artificial intelligence, with negative consequences in providing erroneous decisions and increased exposure to cyberattacks.

The integration of artificial intelligence technology into operational risk management in the context of cyber fraud brings an advanced level of detection, prevention and protection against cyber threats, thus contributing to the increased efficiency and sustainability of financial institutions in the face of evolving cyber risks.

The lack of an adequate legal framework and the fragmented regulation or use of artificial intelligence systems in fraud prevention in the financial-banking sector complements the operational and technological risks. The current regulations do not expressly address artificial intelligence, applying provisions of several pieces of legislation adopted at european level (e.g. PSD2 Directive, NIS2 Directive, DORA Regulation, Cybersecurity Act, GDPR Regulation) or national level, thus making it necessary to update the regulatory framework in line with technological developments or to adopt specific legislation on artificial intelligence (e.g. proposed AIA Regulation and PSD3 initiative).

This interdisciplinary study analyses some of particularities, strengths and limitations of the artificial intelligence technology in the prevention of operational risks associated with cyber fraud in the financial-banking sector, as well as the impact of the existing regulatory framework and legislative proposals at European level, that affect the integration of artificial intelligence systems in policies and mechanisms for preventing this phenomenon in financial institutions.

The article is organized further as follows. section two presents the description of the problem from different angles, section three describes data and methodology, sections four introduce the results and proposals for adjusting the regulations and the final section presents the conclusions, the limits and future research directions.

Description of the Problem

The literature review highlights scientific concerns in analysing the potential and impact of artificial intelligence technology in preventing cyber threats. In this sense, we consider it eloquent the map in figure 1 that we managed to build using tools and databases in which we analyzed the prominence of keywords, objectives, hypotheses of interest for the present study and the relations between them.

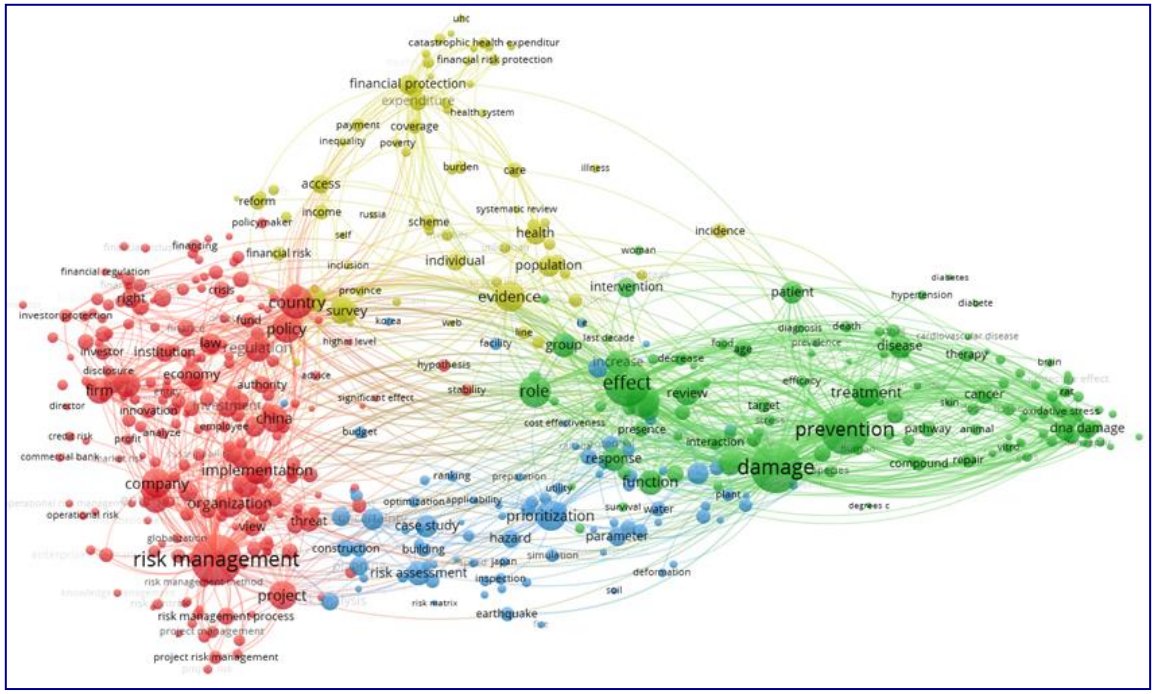

Figure 1 – Map of relevant articles reported to the keywords

Source: Authors'processing using the Web of Science database

Researchers (Ahsan et al., 2022; Zang et al., 2022; Zeng, 2022; Tao et al., 2021; Sarker et al., 2020; Pupillo et al., 2019; Wirkuttis and Klein, 2017; Azhar, 2016) have generally focused on the interactions between artificial intelligence technology and cybersecurity, highlighting the new technology's contributions to substantially improving traditional cybersecurity practices. The relationship between artificial intelligence technology and cyber security is ambivalent: on the one hand, artificial intelligence systems are increasingly used to help detect, prevent and respond to cyber threats; on the other hand, cyber security can be the cornerstone of ensuring safety and trust in artificial intelligence systems. Recent studies (Kaur et al., 2023; Capuano, 2022; Naik et al., 2022; Mathew, 2021; Wiafe et al., 2020) have highlighted the significant contribution of cybersecurity systems enabled by artificial intelligence technology especially in relation to the prevention and detection of cybersecurity incidents: unauthorised access, malware, cyber fraud, phishing, DDos attacks, cryptojacking, zero-day attack, privilege escalation and others.

Artificial intelligence technology is also having a major impact on the effective implementation of cyber governance in the financial and banking sector, revolutionising the way financial risks are managed. The authors (Bozic, 2023; Josyula et al., 2023; Berrada et al., 2022; Lindqvist and Khailtash, 2022; Fares et al., 2022; Fritz-Morgenthal et al., 2022; Milojević and Redzepagic, 2021; Leo et al., 2019; Soni, 2019; Aziz and Dowling, 2018) generally demonstrate the potential of the new technology to support financial institutions in analysing credit risk, financial transactions, protecting personal data or managing operational risks associated with cyber fraud. Considerable research (Mytnyk et al., 2023; Rutskiy et al., 2023; Btoush et al., 2023; Aziz and Andriansyah, 2023; Chang et al., 2022; Bao et al., 2022; Raj and Choudhary, 2022; Priya and Saratha, 2021; Erdoğan et al., 2020; Ryman-Tubb et al., 2018) has been conducted on the contribution of artificial intelligence technology

to fraud prevention at financial institutions by preventing and detecting suspicious or fraudulent transactions. The relationship in our own vision between artificial intelligence and financial risk management is presented in figure 2.

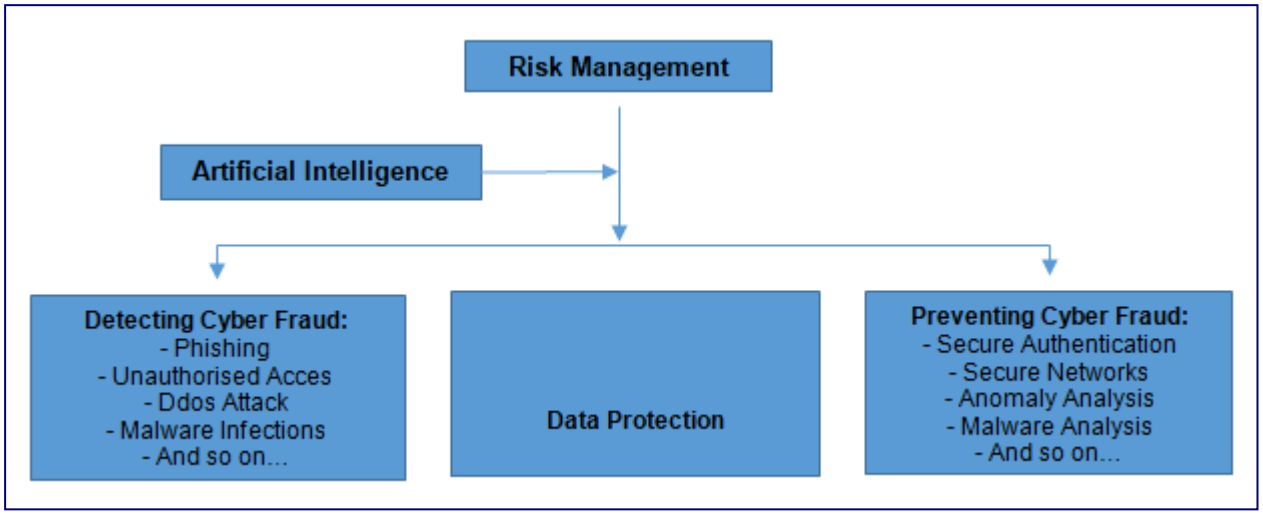

Figure 2 – Artificial Intelligence and Financial Risk Mnagement

Source: Authors' processing

It is important that in the implementation of artificial intelligence in risk management at the level of financial institutions, attention should also be paid to the aspects of ensuring digital operational resilience provided for in specific legal instruments, with some authors assessing compliance with the provisions of the GDPR (Mantelero, 2019; Jackson, 2019; Wachter et al., 2017), the Cybersecurity Act (Casarosa, 2022; Calliess and Baumgarten, 2020), the proposed AIA Regulation (Floridi L., 2022; Smuha et al., 2021) and the DORA Regulation (Alibrandi et al., 2023; Krüger and Brauchle, 2021; Pavlidis G., 2021).

The literature has also addressed the major issues, gaps and limitations in the use of artificial intelligence techniques to prevent cyber threats and therefore cyber fraud. With the ability to process large amounts of data and make decisions without human oversight, intelligence systems still pose significant risks related to data privacy and vulnerability to cyber-attacks, further exacerbating cybersecurity threats (Hendrycks et al., 2022; Kaminski, 2023; Scherer, 2016). Artificial intelligence technology can also be exploited by cyber actors for criminal purposes (Choras and Wozniak, 2022; Blauth et al., 2022; Ciancaglini et al., 2020; Comiter, 2019; Brundage et al., 2018), contributing to the sophistication and diversification of the tools used by cyber actors to commit cybercrime: AI-malware, AI-assisted hacking, custom social engineering attacks, passing cybersecurity filters.

Preventing risks associated with artificial intelligence involves multiple technical, legal and ethical approaches: transparency and explainability, data protection and privacy, artificial intelligence algorithm auditing and accountability, regulations and standards. The doctrinal approaches from this perspective alternate from the analysis of ethical frameworks for the governance of artificial intelligence (Fjeld et al., 2020; Jobin et al., 2019), the adoption of strict regulations based on risk assessment to the adequacy (de Almeida et al., 2021; Schuett, 2023) of regulatory frameworks protecting human rights (Mantelero, 2022; Yeung, 2019; Latonero, 2018; Raso. et al., 2018).

The results of the literature review indicated that the use of artificial intelligence systems in fraud prevention is increasing, but can still be seen as a new phenomenon requiring further research on the potential of the new technology in assessing and identifying risk indicators associated with cyber fraud and the impact of the new legal instruments adopted at European level (PSD3 proposal and DORA Regulation) to ensure digital operational resilience with regard to such instruments.

Methodology and Data

In order to be able to come up with proposals for improving the general framework regarding artificial intelligence and key risk indicators in cyber frauds prevention, we start from a few hypotheses within some objectives that we state in the following, the results to be centralized in the next chapter. Also, in this chapter we will present some concrete examples, through which to highlight the statements. However, we must mention, that the issues analyzed can be approached from different other angles, this aspect being mainly determined by the context and the goals that want to be achieved.

Objective 1 (O1) – Identifying the impact of artificial intelligence and related key risk indicators on cyber fraud prevention

Hypothesis 1. (H1.1). (Regarding O1) – Current dynamics and trends in cyber fraud create difficulties in preventing this criminal behaviour.

Key Risk Indicators (KRIs) is a tool for measuring a potential risks who can provide data and prioritize the response to various threats.

The risk profile of an organization can be established with the help of these changing measurement tools.

We can have a look now to the five KRIs for really understand the potential risk should be aware of: Scope of attack surface, Presence of malware, Unpatched or misconfigured systems, Third party risk and Financial Exposure.

Scope of attack surface - This first tool refers to the identification of the risk in the digital environment, scanning the attack surface is a first method in this sense, making an automatic inventory.

Presence of malware - Obtaining visibility in malware activity is critical to reducing your companies' cyber risk exposure.

Unpatched or misconfigured systems - A misconfigured system can be a significant indicator of risk.

Third party risk - By monitoring the group of suppliers, you collaborate with, you can identify and reduce this relational risk.

Financial Exposure - The management of an organization must allocate sufficient resources and a significant expertise in order to manage the cyber risk and to be aware of the impact of a possible ransomware attack.

According to **(**The National Institute of Standards and Technology, 2023), the Cyber Security Framework includes 5 important functions: Identification, Protection, Detection, Response and Recovery. Identification offers raise awareness of cyber security risk for people, assets, systems, capabilities and data. The protection function refers to the implementation of appropriate measures to limit the impact of a potential cyber security event. The Detect function means the timely identification of Cyber Security problems. The Response function refers to the appropriate activities taken in the event of a Cyber Security incident. The Recovery function helps in the timely recovery of affected operations following a Cyber Security incident.

Opportunities and barriers by using AI in cyber fraud detection - an insurance companies' case.

As risk management systems have failed to keep up with highly sophisticated security attacks, industries around the world have witnessed a rapid and sudden increase in the number of cyber-attacks and all this phenomenon started since the onset of the COVID-19 pandemic.

Opportunities- Claim Predictions- Artificial intelligence can be used to estimate insurance claims. Against phishing, the NLP application is used, which recommends the interaction of people with machines. Through NLP, large amounts of data can be scanned regarding e-mail conversations. It is possible to identify certain patterns regarding malicious behavior by recording all e-mails entered into the organization's network.

Barriers – Cyber risks – Artificial intelligence includes damage assessment, human resources, IT or legislative changes. AI systems being very fast can learn about regulations, laws or changes, decisions can also be made quickly. The major concern relates to when decisions can actually be made by AIs as well as their accountability. The use of AI to filter data can pose a real threat to customer privacy when it comes to media accounts, internet searches, or terms and conditions obtained directly from credit card companies. Time restrictions are required on the use of this confidential information.

Discrimination Based on Characteristics - Serious threats of bias are prohibited by the anti-discrimination rules by which statistics can disparage some protected attributes. There is an Equality legislation Act (United Kingdom Government, 2010) that prevents insurers from using certain algorithms that offer discrimination based on physical characteristics.

According to (Comming, 2023), The Financial Conduct Authority (FCA) sent a warning to companies in the financial sector regarding AI fraud activity**)**. The phenomenon has grown a lot in the last period both in sophistication and scope, cyber-attacks as well as identity fraud have become a real danger. The FCA also promotes the benefits of AI, but mentions the need for better cyber regulations. The risks of fraud, deepfake, have been highlighted by the FCA. The CEO of FCA, Nikhil Rathi, which mentioned the fact that the entire financial services sector could be disrupted by artificial intelligence "in ways and on an unprecedented scale". Must be taken important measures against the ever-growing frauds based on AI. He also said: ,,As AI continues to be adopted, investment in fraud prevention and operational and cyber resilience will need to accelerate simultaneously".

Cybercriminals are keeping their attacks under the radar with methods of taking money, without security teams finding out, through bitcoin payment requests, according to new research into scam activity.

The Benefits and Limitations of Using AI and Machine Learning for Fraud Detection

Fraud Detection Machine Learning

Fraud detection is the process by which fraudulent activities are identified and prevented within a company. In table 1 we present some examples of cybersecurity detection systems that operate in a different way and thus prove that the same problem can be solved - partially, because it is difficult to say that there is a universal detection system.

Traditional detection methods are inflexible and rigid, which makes it almost impossible to correctly adapt to new types of fraud. AI and ML have revolutionized the fraud detection process. Large amounts of data can be analyzed in real time, fraudulent activity being able to detect patterns and anomalies.

Table 1

Examples of cybersecurity detection system

Amazon Guard Duty	IBM Watson for Cybersecurity	Cylance Protect	Splunk User Behavior
It is a system based on artificial intelligence that detects cyber threats in real time and analyzes Amazon CloudWatch (AWS) logs.	It is another powerful AI-based threat detection system through which data is analyzed from multiple sources such as security alerts or logs. If traditional security systems can miss certain threats, IMB Watson for Cybersecurity can identify them.	This system uses ML to detect and prevent cyber threats. Its predictive type can block malicious processes before they are executed on the final point.	The specification of this system refers to identifying and responding to anomalous behavior in a network. Internal threats related to employees who access certain sensitive data are identified.

Source: Authors' processing

Another powerful application of AI and ML in fraud detection is the detection of anomalies, by identifying unusual patterns of behavior. If a customer suddenly makes large purchases from a new location, this could be a sign of fraud. Vision artificial is a powerful tool in fraud detection because it uses computer vision to analyze images and videos, counterfeit goods can be detected by watching surveillance footage to identify people.

Hypothesis 1.2 (H1.2). (Regarding O1) - The use of artificial intelligence in cyber fraud prevention will lead to a significant increase in fraud detection rates.

Artificial intelligence, especially machine learning (ML) can have a decisive, significant role in the discovery of information from data. ML automates the process of prioritizing relevant data, finding and contextualizing processes in the life cycle of information, these refer to detection of dark web forum posts that lead to a data breach. Processes can be improved by using ML, and specialists, security analysts can treat, remediate or identify new attacks, helping in this sense to quickly develop responses and an understanding better of cyber-attacks.

The most sophisticated algorithms are used to recognize patterns before they are infiltrated into the system, to identify the smallest behaviors, changes in ransomware attacks or to detect malware. AI has a superior predictive intelligence through which it processes natural language in order to manage data, by analyzing studies, news or published articles. Security teams understand better, in this sense, prevention strategies, cyber-attacks or anomalies, as cyber criminals are always in trend with trends. Threats specific to a certain industry or global threats are identified by the Cyber Security systems powered by AI.

Data fraud or account takeover is a risk due to the fact that robots are a substantial part of internet traffic, but organizations can be helped in this sense by AI and ML through a much better understanding of website traffic and through a differentiation between human users, good robots or bad robots.

Objective 2 (O2) - Analysis of the existing legal framework with impact on the use of artificial intelligence in fraud prevention and proposals for improvement of fraud detection legal provisions

Hypothesis 2.1 (H2.1). (Regarding O2) - The existing legal framework and bodies responsible for cyber security often do not keep pace with developments in cybercrime

The exponential increase in bank cyber fraud is explained by the inefficiency and insufficiency of traditional detection and prevention methods (mainly due to a low detection rate, lack of resilience and autonomy), requiring innovative and intelligent mechanisms adapted to the new cyber threat architectures. Clear policies and procedures are also needed, which unfortunately either do not exist or are not properly implemented. The size of the institutional architecture for cyber security involves several bodies in fraud prevention, which is why there is a fragmented approach in tackling the criminal phenomenon and leads to under-reporting of incidents by users due to mistrust and confusion in reporting to the competent authorities. For these reasons, a rethink of the institutional framework is needed.

As there is a pressing societal need to prevent such criminal conduct, priority should be given to strengthening the capacity of cybersecurity bodies by developing solutions incorporating new digital technologies or enhancing cooperation with private parties that have implemented such programmes.

Prevention is one of the most effective ways to combat bank cyber fraud, but this process needs to be adapted to cyber realities and artificial intelligence technology may be the right solution.

The combination of traditional security technologies and the advanced capabilities of artificial intelligence technology provide stronger protection against the increasingly complex and dynamic phenomenon of cyber fraud. According to (European Union Agency for Cybersecurity, 2020) report, *"AI Cybersecurity Challenges. Threat Landscape for Artificial Intelligence"*, artificial intelligence systems can be an advanced tool in cybersecurity by developing more effective security controls and facilitating law enforcement efforts to better respond to cybercrime, including analysis of the exponential growth of Big Data in the context of investigations as well as crime in the misuse of artificial intelligence.

The value and opportunities of artificial intelligence in cybersecurity has been highlighted and contained in a number of policy legal instruments. At European Union level, Directive (EU) 2022/2555 (or NIS 2 Directive) of the European Parliament and of the Council on measures for a high common level of cybersecurity across the Union, amending Regulation (EU) No 910/2014 and Directive (EU) 2018/1972, and repealing Directive (EU) 2016/1148, the EU Cyber Security Strategy for the Digital Decade and the EU Security Union Strategy, highlight that artificial intelligence or machine learning systems are useful to strengthen the capabilities and security of networks and information systems against cyberattacks. In the same vein, the UK's National Cyber Security Strategy (2022), Germany's Cyber Security Strategy (2021) and Italy's National Cyber Security Strategy for 2022-2026 (2022) highlight the usefulness of integrating artificial intelligence techniques into cyber defence systems.

Artificial intelligence models can help automate cybersecurity, ensuring predictability and ensuring an effective response to cyber threats. Systems enabled by artificial intelligence technology are used for automated malware analysis, intrusion detection (by automatically identifying user access), spam detection, mobile (android) malware detection, botnet detection, advanced ("next-gen") antivirus software development, security breach prediction, authentication and password protection, phishing detection, network traffic monitoring (to identify anomalies), identification of vulnerable areas, data encryption.

According with (European Union Agency for Cybersecurity, 2021), while artificial intelligence helps substantially improve cybersecurity practices, at the same time, facilitates new forms of attacks and further exacerbate security threats.

Regarding the GDPR, we can say that GDPR has certain limitations: it is not global, it contains specific rules for certain types of automated individual decision-making, but not for collective decisions, the vague provisions of the GDPR will facilitate the process of "de-identification" (anonymisation, pseudonymisation), it leaves Member States free to adopt or supplement provisions at national level, which leads to conflicting interpretations, does not provide the right to explain all algorithmic decisions, but only those that have a legal or significant effect.

It should be noted that not all artificial intelligence applications use personal data and therefore some uses may not have privacy implications, in which case the provisions of Regulation (EU) 2018/1807 of the European Parliament and of the Council on on a framework for the free flow of non-personal data in the European Union become applicable.

It is debatable to what extent artificial intelligence can ensure the integrity, confidentiality and availability of computer data and how it can contribute to ensuring a sufficient level of cyber security, given that this technology can represent a vulnerability (incorrect algorithm, technical flaws that can be exploited by cyber criminals) or threat (algorithm can develop cyberattacks).

To prevent vulnerabilities, the Proposal for a Regulation of the European Parliament and of the Council laying down harmonised rules on artificial intelligence (Artificial Intelligence Act/AIA) and amending certain Union legislation (COM/2021/206 final) of 21.04.2021 complements the need to specify cyber security requirements for artificial intelligence based on a certification scheme under the proposed European cyber security certification framework. The certification process ensures that specific artificial intelligence technologies comply with security standards not only in the area of product safety but also in the area of cyber security.

The forthcoming AIA proposes a risk-based approach to artificial intelligence systems (unacceptable risk, high risk, limited risk, minimal risk), rather than a rights-based approach as in the GDPR. The European Commission proposes that national competent market surveillance authorities oversee the new rules, while the creation of a European Artificial Intelligence Council will facilitate their implementation and stimulate the development of artificial intelligence standards.

The proposed Artificial Intelligence Regulation overlaps in relation to the certification process with Regulation (EU) 2019/881 of the European Parliament and of the Council on ENISA (the European Union Agency for Cybersecurity) and on information and communications technology cybersecurity certification and repealing Regulation (EU) No 526/2013 (Cybersecurity Act). Although the AIA suggests a possible path towards mutual recognition of certifications, a closer analysis of the provisions and a comparison of the underlying features of the certification mechanisms shows that

the different approaches taken in the two acts may undermine the objective of certification mechanisms as trust-building and transparency tools.

Similarly, the proposal for a Regulation on Artificial Intelligence overlaps in relation to the conformity assessment procedure with the Proposal for a Regulation of the European Parliament and of the Council on horizontal cybersecurity requirements for products with digital elements and amending Regulation (EU) 2019/1020, COM(2022) 454 final (Cyber Resilience Act). This legal instrument strengthens cybersecurity rules to ensure more secure hardware and software products, and its provisions are extended to artificial intelligence applications.

The proposed new EU regulatory framework for artificial intelligence has been the subject of criticism and debate in the technological and legal community. Some critics, like (Tadeo, 2021) argue that the proposed Regulation could limit innovation and progress of new technology by placing strict rules and requirements on developers and users. The proposed Regulation focuses on compliance assessment and less on fundamental rights impact assessment on perspective of (Smuha et al., 2021) and is out of sync with the provisions of other EU legislation (such as the GDPR legislation - it does not provide for data subjects' rights and the authorities where complaints can be lodged). Also (Smuha et al., 2021) states that the provisions of the future Regulation only offer providers the possibility to assess risks, there are no provisions for sanctions in case of non-compliance and no authorities to supervise this process, while compliance of artificial intelligence products with private standards presents risks (Ebers et al., 2021).

Hypothesis 2.2 (H2.2). (Regarding O2) - The importance of the legal framework developed by PSD3 and DORA on the use of artificial intelligence in the prevention of cyber fraud

The (European Banking Authority, 2022) report, *"Risk Assessment of the European Banking System"*, highlights that 83% of banks across Europe are already exploring artificial intelligence applications, while 12% are testing such tools. In view of the large-scale integration of artificial intelligence techniques in the financial-banking sector, coupled with the risks associated with the new technology, through a series of publicly available technical reports, financial regulators (Cakzolan, 2021; The Organization for Economic Cooperation and Development, 2021; Financial Stability Institute, 2021;, European Central Bank, 2021; European Banking Federation, 2021), have highlighted the need to adopt a specific regulatory framework in this area.

For these reasons, also the (European Commission, 2021) highlights in its report *"Study on the relevance and impact of artificial intelligence for company law and corporate governance"* that the financial sector is one of the segments of the European market where clear rules are needed to regulate artificial intelligence. The capabilities of artificial intelligence tools would ensure higher levels of digital operational resilience of the EU financial system and reduce the number and average cost of incidents.

So far, only a few regulatory provisions at European level seem to be relevant to the adoption of artificial intelligence applications in the financial-banking sector, namely: Directive (EU) 2015/2366 on payment services in the internal market, amending Directives 2002/65/EC, 2009/110/EC and 2013/36/EU and Regulation (EU) No 1093/2010, and repealing Directive 2007/64/EC (or PSD2); Regulation (EU) 2022/2554 on digital operational resilience for the financial sector and amending Regulations (EC) No 1060/2009, (EU) No 648/2012, (EU) No 600/2014, (EU) No 909/2014 and (EU) 2016/1011 (or DORA); Proposal for a Directive on payment services and electronic money services in the Internal Market amending Directive 98/26/EC and repealing Directives 2015/2366/EU and 2009/110/EC, COM (2023) 366 final (or PSD3); Proposal for a Regulation on payment services in the internal market and amending Regulation (EU) No 1093/2010, COM (2023) 367 final (or PSR); and Regulation (EU) 2023/1114 on markets in crypto-assets, and amending Regulations (EU) No 1093/2010 and (EU) No 1095/2010 and Directives 2013/36/EU and (EU) 2019/1937 (or MiCA).

The DORA Regulation was prompted by the absence of detailed and comprehensive rules on digital operational resilience for financial entities, given their high reliance on ICT services (including artificial intelligence applications) and their vulnerabilities to cyberattacks. The adoption of the Regulation as a regulatory instrument ensures, on the one hand, the creation of a common legal framework for Member States and, on the other hand, the avoidance of fragmented approaches at national level in order to ensure the digital operational resilience of the financial sector in the

European Union. Although it does not expressly address artificial intelligence applications used by financial entities in the prevention of operational risks associated with cyber fraud, the definition of ICT risks in Article 3(5) is comprehensive and may be appropriate to include risks related to new technology.

In order to ensure consistency in relation to the ICT risk management requirements applicable to the financial sector, the Regulation covers the majority of regulated financial entities at Union level implementing AI-assisted cyber fraud prevention tools, in addition to third party ICT providers. For financial entities, the comprehensive approach suggested by the DORA implies first of all ensuring full compliance of implemented technologies with the relevant regulatory framework: Art. 5 - governance and organisation, Art. 6-18 - ICT risk management framework, and Art. 24-27 - testing of ICT tools and systems. This requirement will be particularly important for the governance of artificial intelligence systems used by financial entities, given the absence of a set of rules specifically related to these tools in the context of preventing cyber fraud.

In accordance with Article 5, where artificial intelligence systems are being used, it is expected that financial institutions will amend existing governance processes or create specific artificial intelligence process to address risks which may arise from artificial intelligence decision making. This is particularly important where high risk AI systems are being used and/or where personal data is processed by artificial intelligence. Referring to the provisions of Articles 6-18, security policies and procedures implemented in accordance with de requirements of DORA should look also address artificial intelligence specific concerns and risks, alongside security requirements for the broader ICT network across the financial services business.Practically, the services provided using artificial intelligence tools in a financial services context will include a number of types of services considered by DORA as ICT services, such as data monitoring, data processing and decision support services.

The provisions of the DORA set out specific steps for the governing bodies of financial entities to guide and adapt the risk management framework associated with cyber fraud and to ensure compliance when using AI-assisted prevention tools. It should be noted, however, that in this case the legal framework proposed by the future AIA Regulation on the certification of high-risk artificial intelligence systems does not synchronise with the provisions of the DORA. The coexistence of multiple legal frameworks applicable to the certification process of artificial intelligence systems may lead to legal uncertainty. At doctrinal level, it is considered by (Latonero, 2018; Mantelero, 2018) that is premature to regulate the certification process of artificial intelligence systems, given a number of unknown risks, and the Human Rights Impact Assessment (HRIA) is proposed as a tool during the life cycle of artificial intelligence systems.

Criticisms of the framework introduced by the DORA mainly concern the fact that many financial entities already have to comply with many different regulations or ICT guidelines. In the 2019 edition of its regulatory summary, the (World Bank Group, 2019) identified twenty-eight pieces of legislation, standards, guidelines and supervisory documents that have been issued by EU standard-setting bodies on cybersecurity for the financial sector. Twenty-five of the existing twenty-eight documents have been introduced since 2016, demonstrating the EU's focus on this topic in recent years. To these are added a plethora of authorities with fraud prevention competences that only dilute the fight against cyber threats, thus reconfiguring the institutional framework.

The DORA also does not set out exactly which financial institutions will have to carry out these advanced tests, delegating this task to the competent authorities (EBA, ESMA and EIOPA).

PSD2 was the first European regulation in the financial services sector to specifically specify concrete requirements for cyber security and ICT risk management. Since the adoption of Directive (EU) 2015/2366, the market for retail payment services has undergone significant changes, largely related to the increasing use of cards and other digital means of payment, the declining use of cash and the growing presence of new players and services, including e-wallets and contactless payments. The COVID-19 pandemic and the transformations it has brought to consumption and payment practices have increased the importance of secure and efficient digital payments.

The European Commission, taking into account market developments, has announced in its Communication COM (2020) 592 final on an EU Retail Payments Strategy the launch of a comprehensive review of the application and impact of Directive (EU) 2015/2366. Thus, through a

study on the application and impact of Directive (EU) 2015/2366, the (European Commission, 2023), analysing the main trends affecting the payments market and the performance of the Directive in terms of relevance, effectiveness, efficiency, consistency and added value at EU level, identified four fundamental problems, despite the achievements of PSD2, as follows: consumers are at risk of fraud and lack confidence in payments, the open banking sector operates imperfectly, supervisors in EU Member States have inconsistent powers and obligations, there is an uneven playing field between banks and non-bank PSPs.

For these reasons, on 28.06.2023, the European Commission published the proposals for the third Payment Services Directive (PSD3) and the new Payment Services Regulation (PSR).

Compared to the PSD2 Directive, the PSD3 framework introduces certain authorisation requirements for payment institutions setting out specific rules on security controls and mitigating measures in the field of information and communication technology, aligned with the DORA provisions. Thus, the security control and mitigation measures (whether or not assisted by artificial intelligence technology) referred to in Article 3(3)(j) indicate how the natural or legal person being registered will ensure a high level of digital operational resilience in accordance with Chapter II of Regulation (EU) 2022/2554, in particular as regards technical security and data protection, including for the ICT software and systems used by the natural or legal person being registered or by the undertakings to which all or part of its activities are outsourced. To this end, in accordance with Article 3(5)(a), EBA will develop draft regulatory technical standards to specify: the information to be provided to the competent authorities in the application for authorisation of payment institutions.

Artificial intelligence technology it is used to detect suspicious or fraudulent transactions in real time. By analysing behavioural patterns and historical data, artificial intelligence can more effectively identify unusual or potentially dangerous activity and alert banks or payment service providers to prevent fraud. Correlatively, contributes to strengthening data security and privacy protection, which are essential under PSD3. AI technologies can be used to monitor and protect customers' financial and personal data, thus contributing to compliance with data protection regulations. Last but not least, the new technology helps banks and payment service providers better assess risks and comply more effectively with PSD3 requirements. Through data analytics, artificial intelligence helps to identify and manage cybersecurity risks and assist in appropriate reporting to regulators.

Results

According to (Weigand, 2023), when AI and automation are adopted by attackers, the speed of these types of attacks will be higher and the number of them will increased. In July of this year, 50,000 more attacks were detected in July than in May 2023. Traditional techniques (firewall, antivirus software or IDS) are no longer sufficient and effective in protecting systems against new threats in the digital space, state (Ahsan et al, 2022; Sarker et al., 2020; Wirkuttis and Klein, 2017; Li, 2018).

Due to fraud, which is an ever-increasing problem, companies lose billions of dollars annually. To reduce this phenomenon, artificial intelligence and automatic learning are often used, in order to substantially improve fraud detection capabilities. Fraud mechanisms for all Internet banking and card transactions present features that can help detect fraud, such as location of payment initiation, payment dates, account holder behavior during payment transactions or different characteristics of payments (unusually large payments, transfers to other jurisdictions), relevant historical data about electronic transactions from the systems and platforms involved in the payment or transaction process (algorithms can learn past fraudulent behavior or detect new types of fraud). Data quantity and accuracy are crucial to the effectiveness of e-fraud prevention intelligence tools. For detection of fraud, predictive modeling is one of the most powerful applications of AI and ML. The great advantage is the identification of fraud before it occurs.

Artificial intelligence and machine leaning will strongly influence the future of fraud detection, they will constantly improve, which will facilitate their prevention and detection. However, there are also real concerns about the use of AI and ML regarding confidentiality and bias. It is recommended to

collaborate with specialized companies and specialists to analyze massive amounts of data in real time by identifying anomalies and models that can lead to fraudulent activities.

As long as technology has started to play an increasingly important role in our lives, the threat of cybercrime can represent a significant challenge for governments, companies or even individuals. As conventional cyber security measures try to keep up and to control this phenomenon, the criminals becoming more prepared and more refined for this reason, the use of artificial intelligence began to open new technological developments and cyber security systems, aimed at combating cyber-crime.

Artificial intelligence capabilities compensate for the asymmetry between current cybersecurity mechanisms and the innovative methods used by cybercriminals to commit cyber fraud. The integration of artificial intelligence with traditional technical security measures is revolutionizing cyber fraud detection and prevention systems, with algorithms able to quickly and accurately processing large volumes of information to find suspicious transactions and patterns of fraudulent activity. Artificial intelligence models can help automate cybersecurity, ensuring predictability and ensuring an effective response to cyber threats. Artificial application can be found for intelligence purposes for automatic analysis of, intrusion detection (by automatically identifying user access), spam detection, mobile (android) malware detection, botnet detection, development of advanced ("next-gen") antivirus program), prediction of security breaches, authentication and password protection, phishing detection, network traffic monitoring (to identify anomalies), identification of vulnerable areas, data encryption. However, there are also limitations in the use of artificial intelligence technology in the process of cyber fraud prevention, mainly caused by the lack or insufficiency of data sets regarding the innovative schemes of cyber criminals, as well as by the legislative conditions in the matter of personal data processing.

The ability to process large amounts of data and make decisions without human oversight, artificial intelligence systems pose significant risks related to data privacy and vulnerability to cyberattacks. As artificial intelligence systems collect and process significant amounts of data, there is a risk of intentional manipulation through breaches of technical security measures or accidental leaks of data that can later be used to commit other cybercrimes (identity theft, computer fraud, etc.). The technical imperfections of artificial intelligence systems increase the risk of exposure to cyberattacks (adversarial attacks). In addition to these technical security challenges, there are ethical concerns around artificial intelligence decision-making and lack of regulation.

Table 2

Table on regulations concerning the use of artificial intelligence technology in cyber fraud prevention

Legislation	Scope	Regulatory act	Regulatory initiative	Recommendations
GDPR Regulation	Protection of personal data processed by artificial intelligence systems in the context of cyber fraud prevention	X		-introduction of the right to explainability of systems integrating artificial intelligence technology -introducing the right to contest algorithmic decisions -requiring institutions to regularly monitor the performance of artificial intelligence algorithms to identify any deviations or errors -setting up national supervisory bodies for the processing of personal data in the context of artificial intelligence
DORA Regulation	Digital operational resilience of AI-enabled cyber	X		-integration of provisions in a single European Cybersecurity legislation for a secure digital transformation and an

	fraud prevention systems			increased level of cyber resilience of financial sector -organisation of a data system used to train algorithms in the process of preventing cyber fraud in the financial-banking sector
AI Act	Classification and conformity assessment of artificial intelligence systems incident to the cyber fraud prevention process		X	-making risk assessment mandatory for financial institutions implementing high-risk AI-enabled systems (including those aimed at preventing cyber fraud) -the establishment of specific authorities to supervise this process -establishing legal compliance standards for artificial intelligence products, as private ones present risks -the supervisory powers over the provisions of the AIA should be vested in national artificial intelligence bodies rather than data protection agencies
PSD3 Directive	Strengthening the resilience of the payments sector		X	-stipulation of sanctions in case of non-implementation of appropriate cyber security measures by natural or legal persons -additional references on ensuring digital operational resilience to the entire cybersecurity certification framework in place at European level, not just DORA

Source: Authors' processing

To address these concerns, it is more than necessary to adopt specific requirements for cyber security, data privacy and ethical use of artificial intelligence technology. In this sense, as a personal contribution to improve the general framework, we present in table 2 a set of recommendations, whose necessity we try to explain in the following.

Referring to data privacy, Regulation (EU) 2016/679 of the European Parliament and of the Council on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (GDPR), while not expressly addressing artificial intelligence systems, contains a number of provisions relevant to the new technology. The GDPR introduces a set of definitions and principles that are not only unique, but also creates an ecosystem for new technologies, including artificial intelligence according to (Papakonstantinou and de Hert, 2022), and can be considered the first legal instrument on artificial intelligence according to (Nemitz, 2022). The GDPR has been driven by the development of new technologies (similar to the earlier adoption of Directive 95/46/EC on the protection of personal data, driven by Internet developments).

The GDPR regulations applicable to artificial intelligence concern the traditional data protection principles contained in Articles 5, 6 and 22: fairness, transparency, purpose limitation, data minimisation, accuracy, storage limitation, limitation of automated decisions. Given the nature, scope, context and purposes of the processing, where a type of processing, in particular that based on the use of artificial intelligence, is likely to result in a risk to the rights and freedoms of the natural person, Articles 35 and 36 of the GDPR require the data controller to assess the impact of the processing of personal data. This assessment ensures transparency and protection in the processing of personal data. Moreover, the provisions of Articles 42 and 43 require certification mechanisms in order to guarantee the protection of personal data in the processing by means of artificial intelligence applications.

In this article we refer to the DORA and PSD3 provisions. The DORA regulation and the PSD3 proposal are part of the Digital Finance Package, which includes a new digital finance strategy for the EU financial sector, integrating digital technologies or information and communication

technologies in the financial sector, taking a risk-based approach in the interest of consumers. While the PSD3 proposal places an obligation on electronic payment service providers to prevent cyber fraud, the DORA Regulation lays down uniform requirements for the security of networks and IT systems that support financial entities' fraud prevention operational processes.

DORA aims to introduce a harmonised and comprehensive digital operational resilience framework for European financial institutions, setting out explicit requirements for addressing and mitigating ICT and cyber risks, including those associated with artificial intelligence tools used in cyber fraud prevention.

The proposal for a Directive on payment and electronic money services in the internal market amending Directive 98/26/EC and repealing Directives (EU) 2015/2366 and 2009/110/EC (or PSD3) focuses on the authorisation and supervision of payment institutions, but also lays down obligations on payment institutions to prevent cyber fraud. It should be noted that the PSD3 provisions in the area of cyber fraud prevention are closely related to the provisions of the DORA Regulation.

As in the case of DORA, PSD3 does not expressly refer to artificial intelligence systems. We appreciate, however, that artificial intelligence technology can be a valuable resource in implementing and complying with the requirements of the Proposal PSD3 and in developing innovative security solutions and financial services.

It must be understood very clearly that the applicability of the concepts can affect the financial field, public and private, equally badly or well, up to the rolling phenomenon that can affect all other fields with only a small step, and that is why the analysis and adopting measures capable of responding to as many threats as possible.

Conclusions

The field of Artificial Intelligence research is not new, the first notions being publicly presented in 1956 and it has been defined as an important section of exploration for several companies involved in the development of innovative technology. For a long time it was seen as an exclusive domain, difficult to interpret and especially to implement. The evolution was not necessarily linear, exponential or sinusoidal, nor was it directly proportional to the technological evolution, because it depended to a large extent on the importance given by the mathematicians who managed to identify the interconnection formulas on levels. The development of capabilities allowed the significant increase in the processing of a large amount of data in shorter periods, making possible not only the delivery of results, but also their collection from different sources, which led to an efficiency of the processes. The resources were available in the 20th century to a limited number of entities, the dynamics of the private environment, reallocation and mixed projects providing accessibility for the general public, both at the investor, owner and user level.

Collecting data from different sources is a powerful tool for acquisition, but poisoning or maliciously affecting them can cause significant damage through contamination. Machine Learning, as a sequel to Artificial Intelligence, must be trained so that it can distinguish between malicious or fake sources and genuine sources. For this, the initially loaded data set must be sufficiently consistent and the subsequent surveillance managed by humans or by programs designed in this sense, must be particularly focused, so that it can prevent unwanted intrusions or diversions from the purpose for which it was built.

In our specific case, Artificial Intelligence can interpret Key Risk Indicators in Cyber Frauds Prevention, but this does not exclude in any case that criminal actors use the same Artificial Intelligence to build attack schemes and to develop strategies to deceive the indicators, to results or to penetrate systems whose purpose is to protect against malicious or fraudulent actions. One of the measures to prevent, treat and combat the potential negative effects, is to regulate the domain, by this understanding the elaboration and alignment at the international level of normative acts, procedures for implementing the norms and of course, punitive measures in case they are not respected the legal provisions. This desire is also justified by the fact that the virtual space, to which Artificial Intelligence belongs as much as the field of Cyber Fraud, has no borders and depends

asynchronously on the time factor. In order for all the measures that we have presented and that we support to have the intended effect, it is absolutely necessary to create at the international level the appropriate mechanisms for verification, control and rapid intervention of the competent institutions, which have prerogatives in combating the criminal phenomenon. In this context, the proposals that we have presented in the the article become all the more important, the more noticeable, at the time of the preparation of this study, is a phenomenon of chaotic promotion, development and exploitation of Artificial Intelligence.

It must be understood and accepted that almost any innovation can be used, both for positive and negative purposes, both as defense tools and as attack tools

Future Directions

The limits of the study are determined by a lack of sufficient knowledge of the actual situation, because algorithms and technologies capable of acquiring, analyzing and processing information are continuously being developed, their purpose defying declared a priori and defying necessarily presented to the common public.

The future direction of study aims to identify as many concepts as possible that are the basis of MLtraining and the development of AI in order to be able to make a comparison in order to establish common points, differences and potential directions of action, precisely to come in support general efforts to combat the criminal phenomenon.

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INTERNATIONAL EXPERIENCE OF ENVIRONMENTAL TAXES AND ITS IMPLICATIONS FOR THE REPUBLIC OF MOLDOVA

Angela TIMUȘ [22]

Corina CHIRONACHI [23]

Abstract:

There is a growing trend towards a green economy due to increasing environmental and climate risks. As a result, countries are forced to develop fiscal policies that take into account the climate agenda. This paper analyzes how different countries implement environmental taxes to guide the development and improvement of the environmental tax system in the Republic of Moldova. The paper examines the main categories of environmental taxes in different countries, analyzes the economic impact of environmental protection based on foreign experience, and explores potential approaches to environmental tax reform in the Republic of Moldova.

Keywords: *environmental taxation, green economy, tax instruments*

JEL classification: *H23, Q50, Q58*

Introduction

The global economy has faced many challenges in recent decades, including climate change, biodiversity loss, inappropriate use of natural resources, waste management issues, rising inequality, social fragmentation, and financial and political instability.To address these challenges, governments and international leaders are developing policies and strategies to promote the concept of a “green economy”. Adopting this development model requires the harmonious integration of economic, environmental, and social aspects. Tax policy is considered one of the most effective tools for regulating environmental processes. Legislation regulates the use of these tax policy instruments. This makes environmental taxes an indispensable attribute of national policy. Environmental tax restructuring, defined as a reform of the national tax system that shifts the tax burden from labor to activities that use resources unsustainably or pollute the environment, is a current issue and a new development paradigm in tax theory.

Denmark, Sweden, the Netherlands, the UK, Germany, and Austria are all countries that have successfully implemented green tax reforms. By using green taxes, these countries can stimulate green development, achieve environmental goals, generate revenue, and promote sustainable growth. The effectiveness of green taxation as a policy tool has been repeatedly demonstrated. Moldova can greatly benefit from the valuable foreign experience in enhancing its economic mechanisms to promote the rational use of natural resources, reduce waste, adopt environmentally friendly technologies, and increase the utilization of renewable energy sources.

In this paper, the environmental tax system in the Republic of Moldova is analyzed through the prism of EU environmental taxes to identify best practices and gaps and to ensure compliance with EU standards.

[22] *PhD, Associate Professor Academy of Economic Studies of Moldova, National Institute for Economic Research, Ion Creanga str., 45, Chișinău, Republic of Moldova*, *ince.timush@gmail.com, https://orcid.org/0000-0002-2556-3198*

[23] *PhD Student Academy of Economic Studies of Moldova, Banulescu-Bodoni str., 59, Chișinău, Republic of Moldova, corinachironachi@gmail.com, https://orcid.org/0000-0002-8201-3125*

Literature Review

The impact of human activities damages the environment through the overexploitation of natural resources. To achieve broader policy goals, such as changing producer or consumer behavior and overcoming market failures or pollution-related costs that polluters do not cover, governments must implement environmental policies and intervene in the market. **(Sterner, 2003)**. Market failures include unaccounted externalities, undersupply of public goods, noncompetitive markets, and asymmetric information **(Braathen, 2015)**.

Scientific approaches to environmental taxation began to take shape within the scientific community based on utility theory. The concept of an "environmental tax" is interpreted as a "Pigouvian tax," which is a tax imposed on an activity that produces negative externalities. Gossen's second law allowed A.S. Pigou to conclude that the market mechanism is insufficient to regulate the activity of firms and consumers because of the influence of externalities **(Pigou, 1920)**. This conclusion highlights the link between the social and private costs of producing goods, emphasizes the government's regulatory role in these relationships, and helps shape the theory of taxes and subsidies. According to this theory, corrective taxation is used to eliminate externalities, and subsidies are used to eliminate positive externalities. Both the tax and the subsidy must be commensurate with the marginal harm and benefit that third parties experience.

The theoretical approach of A. Pigou remains a widely used tool in environmental policy, and the assertion of the need to redistribute financial resources through the budgetary mechanism is a strength of this theory. In some countries, this mechanism is implemented through preferential taxation, grants, subsidies, credits, quota systems, or other means. Later, Pigou's ideas were developed in tax theory by implementing the principle of double tax advantage, called the "double tax dividend" **(Jaeger, 2013)**. The essence of this theory is to reduce environmental impacts by increasing the tax burden on polluting taxpayers, i.e., by transferring external costs to them and forcing them to reduce emissions to reduce the tax burden.

The OECD established the "polluter pays" principle in 1972, and it is a widely recognized idea in environmental taxation. The essence of this principle is that economic agents take responsibility for the environmental damage they cause **(OECD, 2008)**.

The OECD, the International Energy Agency, and the European Commission all accept the same definition of environmental taxes and charges **(OECD, 2010)**. This definition refers to mandatory taxes and charges levied on a tax base of particular environmental relevance. An environmental tax is a tax that has as its base a physical unit of reference, a proxy, and a proven negative impact on the environment. The tax base is considered the main criterion for the recognition of such environmental taxes to allow international comparisons.

The need for environmental taxes was confirmed in 1973 in the first Environmental Action Programme of the EU on environmental protection. The process of greening the tax systems of European countries began in the 1990s, based on the idea of double tax benefits. Thus, environmental taxes are used to implement the polluter pays principle and to protect the environment, and the revenue from these taxes can be used to reduce other taxes and encourage economic growth through the double tax dividend.

Finland implemented the first environmental taxes in 1990, which included carbon emissions taxes. Later, the Netherlands and Norway adopted this measure, and Italy introduced its environmental taxes in 1998. Sweden followed suit in 1991, using environmental taxes to regulate the consumption of oil, coal, natural gas, and other fuels and to tax industries using these energy sources. In 1997, Eurostat, together with the European Commission, the Directorate General for Taxation, the Customs Union, the Organization for Economic Cooperation and Development, and the International Energy Agency, drew up a list of items subject to environmental taxes, which has been updated over the years thanks to the practical experience of Eurostat experts. Thus, environmental taxes and charges were introduced in 1997 to use fiscal instruments to increase the effectiveness of

environmental policy. Today, environmental taxes play an important role in the tax systems of most EU countries.

Description of the Problem

In both developed and developing countries, fiscal policy plays a crucial role in promoting the sustainable use of natural resources and protecting the environment. Taxes can be an effective tool to ensure that the social costs associated with the production of goods and services are reflected. Countries' national and regional policies primarily determine the scope of environmental taxation.

Environmental taxes and charges are set at the level of each Member State based on taxes that focus on polluting emissions (such as water pollution taxes and noise emissions in the aviation industry) and taxes that apply to products (such as pesticides, oil, etc.). The purpose of introducing these taxes is to add revenue to the state budget, and they can also be used to finance environmental protection activities and reduce other taxes, especially labor taxes.

Moldova, like EU countries, has introduced environmental taxes as part of its efforts to address environmental problems. However, Moldova's environmental tax policy is still at an early stage of development. The Republic of Moldova faces several problems in the area of environmental taxation, including a low level of environmental tax revenues, a narrow interpretation of environmental taxes, and a low level of investment in environmental protection.

Analyzing the experience of EU countries in the area of green taxation can be helpful for the Republic of Moldova in addressing these problems. The EU has extensive experience in using environmental taxes to protect the environment and promote a more sustainable economy. An analysis of this experience can help Moldova identify best practices and implement them in its tax system to improve the effectiveness of environmental taxes and better protect the environment.

Methodology and Data

The research used the method of comparative analysis, which is necessary to conduct research between the environmental tax system in the EU countries and the Republic of Moldova, to observe similarities and differences, trends, and formulate conclusions; and the method of synthesis, which is used to generalize the elements under analysis and to propose recommendations.

The international organizations' databases or reports, like those of the UNDP and OECD, provided the data used in this study. The data were collected from the EUROSTAT platform. The Ministry of Finance's reports on state budget execution and the State Tax Service's classification of national public budget revenues provided statistical information for the Republic of Moldova. Later, the author compiled these data according to the Eurostat methodology used in EU countries to obtain comparable data and then presented them in the form of figures.

Results

The OECD assesses the impact of environmental policies on the economy using the Environmental Policy Stringency (EPS) Index. It measures the extent to which environmental policies impose an explicit or implicit price on polluting or environmentally harmful behavior. The index ranges from 0 (no environmental policy stringency) to 6 (the highest level of policy stringency). The index takes into account 14 instruments, including environmental charges for SOx, NOx, diesel, and CO2; CO2 trading schemes; renewable energy and energy efficiency certificates; feed-in tariffs for solar and wind energy; storage and refund schemes; emission limits for NOx, SOx, PMx, and sulfur content limits in diesel; and government spending on renewable energy research and development **(Kozluk, 2016)**. Figure 1 shows that over the past five years, OECD member countries have had a medium level of environmental policy rigidity. Thus, for the year 2020, the average indicator among the analyzed countries is 2.9. The country with the most rigid environmental policy was found to be France, and at the opposite pole was Brazil.

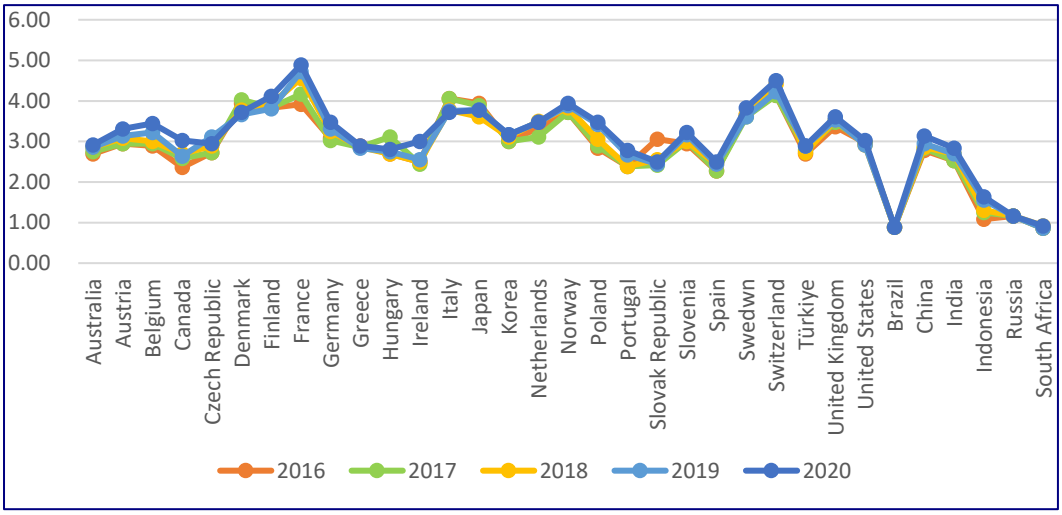

Figure 1 - Environmental Policy Stringency Index (EPS)

Source: Authors' construction, based on basic data from the OECD Database.

The Environmental Performance Index (EPI) ranks 180 countries worldwide according to their efforts to protect the environment, improve ecosystem vitality, and mitigate climate change. The EPI is calculated using 40 performance indicators. A comparative analysis of the Environmental Performance Index (EPI) by the Center for Environmental Policy and Law at Yale University shows that about one-third of the countries included in the study are pursuing a rational use of natural resources **(Wolf. et al., 2022)**, which contributes in various ways to reducing environmental and human health impacts (Figure 2). For example, in 2022, Denmark had the highest EPI of 77.9, followed by the UK with 77.7, and India at the other pole with 18.9.

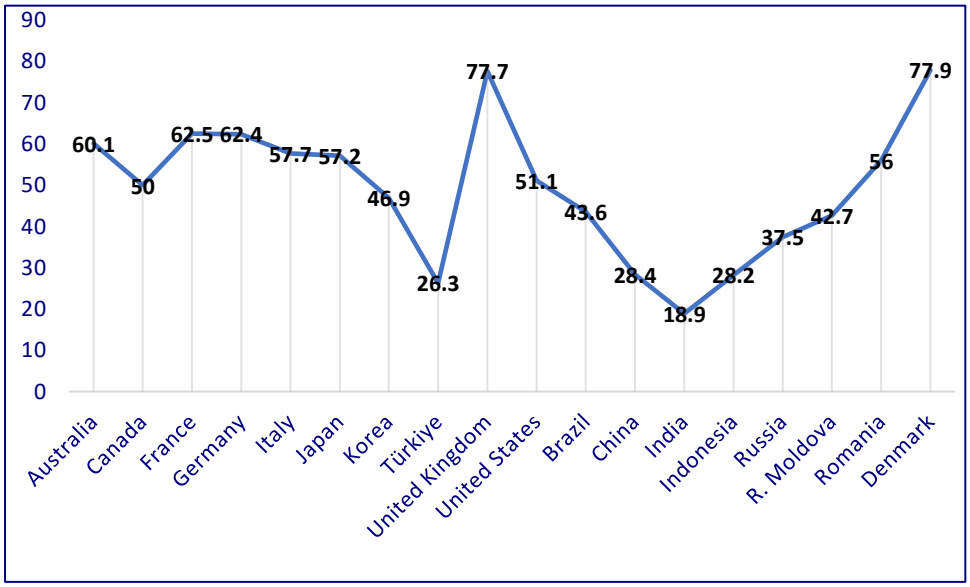

Figure 2 - Environmental Performance Index (EPI) for 2022

Source: Authors' construction, based on Wolf, M. J., et al. *(2022).*

A process of harmonization of environmental taxes and redistribution of the tax burden in favor of environmental taxes, including the use of the concept of double taxation relief, is underway to encourage environmental reforms.

Many countries have introduced taxes on environmentally harmful products and activities, while others have supplemented the structure of existing tax instruments to make environmental protection more effective. The introduction of natural resource payments, which allow the cost of natural resource use to be included in the cost of products, has been noted. Producers support the tax on emissions (discharges) of polluting substances from the company's profits. Ongoing costs related to

the maintenance and operation of environmental protection facilities (sewage treatment plants, ash collectors, filters, etc.) are also included in the production costs of enterprises **(Barde, 2004)**.

Environmental taxes and charges are often used as part of strategies and policies aimed at developing energy consumption from renewable sources, low-carbon production, and the use of alternative fuels to reduce emissions.

According to OECD statistics, total revenues from environmental taxes for 2021 are in the range of 0.15% to about 4% of GDP (Belize, Mexico, Ecuador, USA, Brazil, Denmark, Italy, Latvia, Netherlands, Slovakia, Croatia, etc.) and have been stable in recent years. Analysis of environmental tax revenues as a share of total tax revenues has shown that this share varies between 2% and 10% in countries such as Jamaica, Brazil, Bulgaria, and Slovenia. Environmental tax revenues per capita range from $33 to $1555.

The European Green Deal recognizes the fundamental role of green taxation in the transition to greener and more sustainable growth and the need to better align tax systems with the EU's climate change objectives. Well-designed tax reforms can stimulate economic growth, help reduce greenhouse gas emissions by ensuring efficient carbon pricing, and contribute to a just transition.

The Roadmap for a Resource Efficient Europe included a target to shift from labor to environmental taxes by 2020, which would help to significantly increase the share of environmental taxes in public revenues **(European Commission, 2011)**.

According to Eurostat data, environmental taxes in the EU are divided into the following categories: energy taxes, transport taxes, and taxes on pollution and resource use. In the Republic of Moldova, although there is no explicit definition of environmental taxes at the legislative level, they can be classified according to the EUROSTAT methodology, as shown in Table 1.

Table 1

A Review of Environmental Taxes in the European Union and the Republic of Moldova

	Environmental taxes in the EU	**Environmental taxes in the RM**
Energy taxes	-Taxes on energy production; -Taxes on energy products used for both transportation (petrol and diesel) and stationary purposes (heating oil, natural gas, coal, and electricity); -Taxes on biofuels and any other forms of energy from renewable sources; -Taxes on stocks of energy products; -Taxes on carbon dioxide (CO2); -(EU ETS) related to greenhouse gas emissions.	-Excise duties on liquefied gases; -Excise duties on petroleum products.
Transport taxes	- Taxes related to the ownership and use of motor vehicles; - Taxes on transportation equipment (e.g. airplanes, ships, or railway stocks), and related transportation services (e.g. duties on chartered or scheduled flights); - 'one-off' taxes related to the import or sale of equipment; - Recurrent taxes (annual road tax); - Taxes on railway rolling stock, public transport, and electric cars; - Vehicle registration taxes to encourage the purchase of low-carbon vehicles; -Taxes and charges on airline passengers.	- Excise duty on imported cars; - Road use taxes; - Vignette.

Pollution taxes	-Taxes on measured or estimated emissions to air and water; -Taxes on solid waste and noise management; -Charges for specific products (waste electronic and electrical equipment, end-of-life vehicles) -Taxes on lubricating oils.	-Payments for emissions of air pollutants from stationary sources; -Payments for discharge of pollutants into aquatic facilities and sewerage sources through wastewater; -Payments for the storage of production waste; -Taxes on products that pollute the environment during their use (such as pesticides, batteries, tires, etc.); -Taxes on packaging.
Resource taxes	-Taxes linked to the extraction or use of natural resources, such as water, forests, and wild flora and fauna; -Biodiversity regulation charges.	-Payments applied to the exploitation of natural resources other than those used as energy sources; -Payments applied to water abstracted from any source (springs); -Payments for useful minerals (deposits); -Timber released on the foot.

*Source: Authors' construction, based on Eurostat **(2013)** and (**PNUD, 2018, p. 10-11**)*

Analyzing the information presented in Table 1, the following aspects can be highlighted:

Energy taxes in EU countries include CO2 taxes because they are levied on the carbon content of fossil fuels. CO2 taxes differ from other energy taxes because they do not increase the price of energy products but stimulate the use of low-carbon fuels. Fourteen EU Member States and four EFTA Member States levy such taxes. In many countries, this CO2 tax varies. For example, in Poland, it is around €1/metric ton of carbon, and in Sweden, Switzerland, and Liechtenstein, it exceeds €110.

The EU ETS, or European Emissions Trading Scheme, was introduced in 2005 to control total CO2 emissions. Until 2012, national governments allocated emission allowances free of charge. From 2013 to 2020, emission allowances were distributed through auctioning. From 2021 to 2030, the number of allowances is expected to decrease. Simultaneously, 100% free allocation of allowances will be made in those sectors at risk of relocating production outside the EU. For less-risky sectors, free allocation is expected to be phased out by 2026.

The payments collected by EU Member States for emission permits or certificates are examples of CO2 taxes. Total CO2 tax revenues from EU ETS permits reported by EU countries amounted to €16.5 billion in 2021, compared to €3.0 billion in 2014. In 2021, Germany's tax revenues from EU emission permits totaled €3.3 billion, with Poland coming in second with €2.9 billion, Italy with €2.5 billion, and Spain with €1.7 billion.

As of October 1, 2023, the European Union has introduced a border carbon adjustment mechanism, the so-called Carbon Tax, or CBAM, applicable to imports of products from highly polluting industries to avoid the relocation of production to other countries. Thus, until 2025, importers are not obliged to pay the CBAM tax but only to report the carbon content of imported products. From 2026, importers will have to purchase "CBAM certificates."

The Republic of Moldova does not apply carbon taxes, but the authorities intend to set up their carbon pricing systems by the end of 2025 to avoid paying the CBAM tax.

Transport taxes include taxes on vehicle ownership and use. Revenues from transport taxes reflect the dynamics of vehicle sales and vehicle stocks, and this explains the reduction in transport tax revenues observed after the two main economic crises of the last two decades: the one in 2007 and the one in 2020 due to the COVID-19 pandemic.

In many countries, vehicle registration taxes have been developed to promote the purchase of low-carbon vehicles, such as Ireland, the Netherlands, Portugal, and Spain. Some countries apply taxes and charges for air passengers, such as Germany, Austria, the United Kingdom, and France.

Pollution charges cover different types of taxes: measured or estimated emissions to the air (e.g., NOx, SO2), water, noise, and solid waste management charges. In all EU countries, there are payments and taxes on waste management. In addition to landfill taxes, certain materials (such as combustible waste and specific products) are prohibited from being disposed of in landfills; these are particularly enforced in Austria, Belgium (Flanders and Wallonia), Denmark, Finland, France, Hungary, Italy, the Netherlands, Norway, Sweden, and Switzerland.

Air pollution payments exist in two-thirds of countries and cover a wide range of air pollutants. Such measures have been introduced in some Central and Eastern European countries (Bulgaria, Estonia, Latvia, Lithuania, and Romania), where they are often linked to fines for not complying with environmental legislation.

Most EU countries levy different charges for water: for drinking water supply and consumption, for wastewater disposal, and drainage systems. Product charges are usually applied only to groups of products that account for a small proportion of the respective market outputs. In many EU countries, there are differences in the specific products covered by these measures: waste electronic and electrical equipment, old, end-of-life vehicles, batteries and accumulators, packaging, used tires, light bulbs, and plastic bags. Denmark is a leader in this area of regulation and applies several instruments, including taxes on chlorinated solvents, phthalates, and PVC, excise duties on antibiotics and growth incentives, and taxes on light bulbs and fuses.

In the Republic of Moldova, environmental pollution charges and charges for goods that, in the process of use, pollute the environment cover five categories of pollutants.

Natural resource taxes are applied in almost half of the EU countries. In Bulgaria, Croatia, Estonia, Latvia, and Lithuania, they mainly regulate the extraction and exploitation of natural resources such as sand and gravel; in Belgium, the Czech Republic, Denmark, France, Latvia, Lithuania, Sweden, and Estonia, they regulate the exploitation of peat, coal, and lignite.

In the field of biodiversity regulation, some countries apply charges for logging and felling, environmental protection charges, and non-fiscal hunting taxes. In some cases, revenues from these instruments are used for biodiversity protection, conservation, and wise use. A limited number of countries also apply land-use change taxes (Croatia, Czech Republic, Poland, some US states) and land taxes, which in principle can help protect natural areas and reduce urban sprawl (Denmark, Estonia, Australia, New Zealand, some US states).

Some countries have introduced taxes and levies that are directly related to fisheries and marine biodiversity. Revenues from these taxes are used to protect the marine environment and conserve and maintain fisheries. Taxes and charges in other areas, such as the harbor waste fee, NOx and engine oil fee on ships, polyethylene bag fee, sea dumping fee, and marine aggregates fee, are also of significant importance in regulating the consumption and use of items in the marine environment.

In the agriculture sector, several countries have introduced levies on pesticides and fertilizers. Some of these measures, particularly fertilizer levies, have been repealed in various EU Member States after the introduction of the Directive on the protection of waters against nitrate pollution from agricultural sources.

In the Republic of Moldova, in addition to the resource charges mentioned in Table 1, several payments are applied to activities with an environmental impact, such as fees for the issuance of environmental permits, fines for violation of environmental legislation imposed for poaching, illegal felling of forests, ecological offenses, and damage to the environment because of pollution. These are part of the damage recovery mechanism. At the same time, these payments are considered parafiscal charges and represent sums of money transferred to the accounts of public institutions and/or public interest bodies **(EaP Green, 2016, p. 17)**. Thus, fiscal and parafiscal payments play a central role among the economic instruments used to implement environmental policies.

A feature of environmental taxes in EU countries is the category of taxpayers: households and businesses. For instance, in 2020, the contribution of households as taxpayers exceeds the share of businesses in total environmental taxes: 48.6% of households and 47.6% of businesses. In the case of pollution and resource taxes, households pay more than half of the tax revenues, as household waste, sewage, wastewater, water abstraction, plastic bags, hunting and fishing taxes,

and so on, are taxes that, in 2020, combined 56% of the total revenues from pollution and resource taxes.

Analyzing receipts from environmental taxes on GDP in the Republic of Moldova, they are comparable to those in the European Union. The position of the Republic of Moldova by the ratio of environmental taxes to GDP shows that these receipts represented 2.43% of GDP in 2021, while in the EU, this indicator was 2.24% (Figure 3).

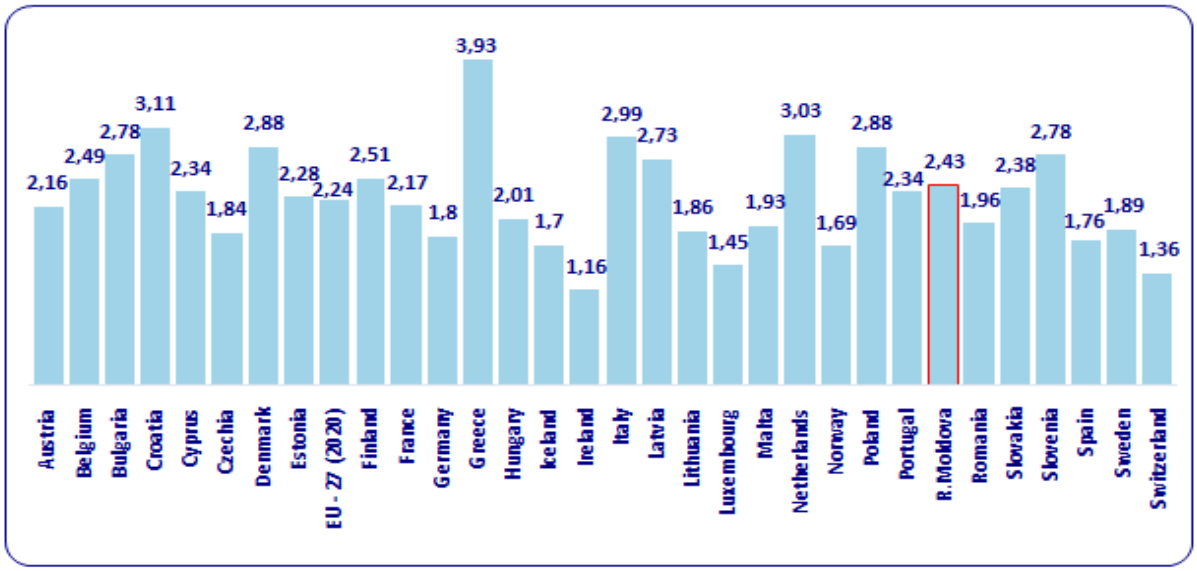

Figure 3 - Share of environmental taxes in GDP (%) in 2021, %

Source: Authors' construction based on basic data from the EUROSTAT Database and the Ministry of Finance of the Republic of Moldova.

Figure 4 shows the evolution of environmental taxes in the EU from 2017 to 2021. Thus, the total revenue from environmental taxes in the EU-27 in 2021 was €325.837 billion, representing 2.24% of GDP and up to 5.38% of total tax and social contribution revenue. Revenues from energy taxes have the largest share of total environmental taxes in almost all countries and account for approximately 78.4% of revenues; transport taxes account for approximately 18.1%; and pollution and resource taxes account for 3.5% of total environmental taxes in 2021.

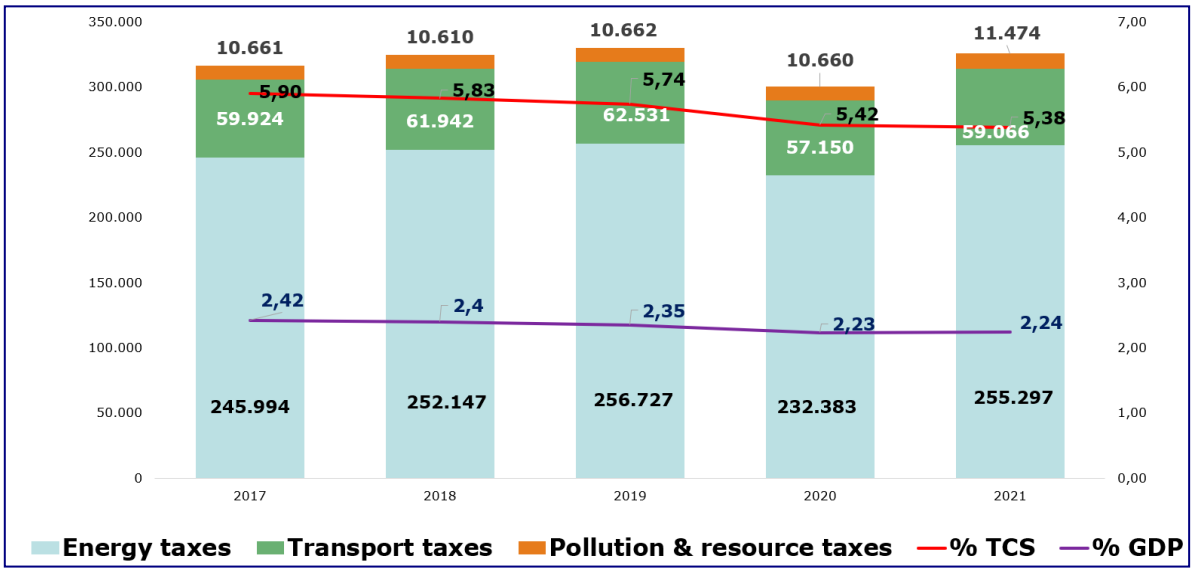

Figure 4 - Environmental tax revenue by type (billion EUR) and total environmental taxes as a share of TSC and GDP, EU 2017-2021

Source: Authors' construction, based on basic data from the EUROSTAT Database (2022).

An analysis of environmental taxes in the Republic of Moldova showed a steady increase in the period 2018–2022, bringing revenues to the state budget from 4.28 billion lei at the beginning of the analyzed period to over 6.09 billion lei at the end of this period (Figure 5).

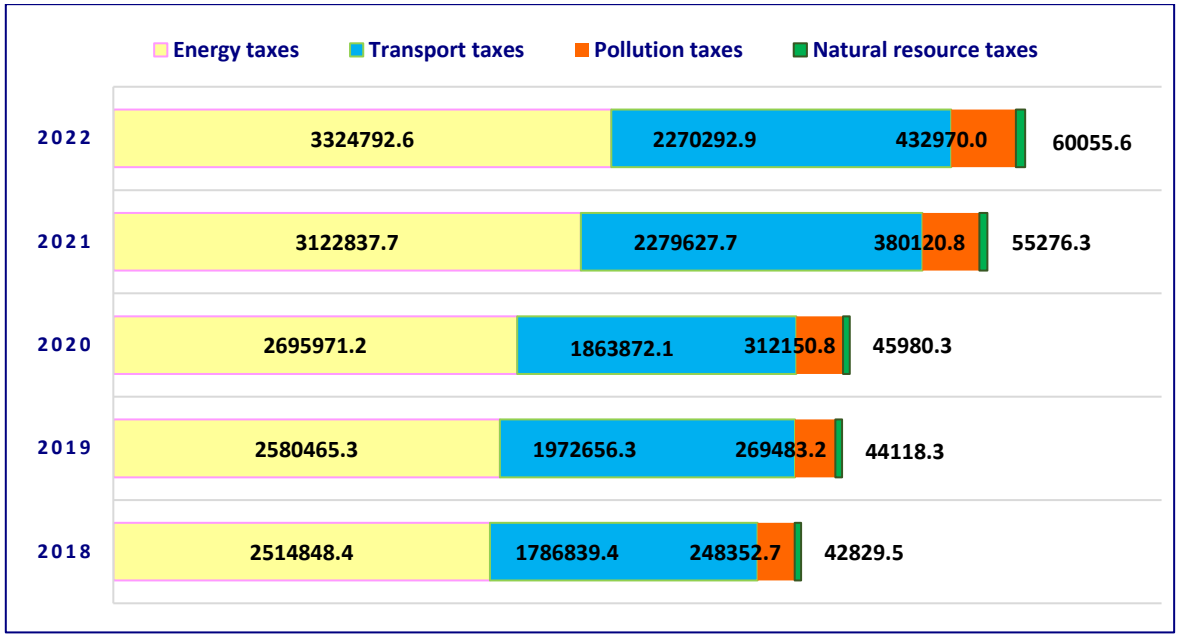

Figure 5 - Environmental tax revenue by type (thousand, MDL), 2018-2022

Source: Authors' construction, based on reports on the execution of the state budget and information on revenues to the national public budget corresponding to the classification of budgetary revenues (2018-2022).

During the review period, 2020 saw the lowest growth in environmental tax revenues due to the COVID-19 pandemic crisis. An analysis of energy tax receipts shows a steady increase, whereas transport taxes show a fluctuating trend. Pollution and natural resource taxes have a smaller share of total environmental taxes. While pollution charges have shown an upward trend over the period analyzed, natural resource charges have shown an uneven trend.

The environmental taxes applied in the Republic of Moldova exceed the average of other countries. They contribute more than 10% of total tax revenues (Figure 6), and their share of total taxes collected in the budget has a downward trend from 12.2% in 2018 to 10.6% in 2022. This was due to the much higher increase in tax and duty collections (on goods and services because of increased imports) compared with the increase in environmental taxes.

The percentage of environmental taxes in GDP was 2.42% in 2018; however, this percentage decreased due to the pandemic-related decline in economic activity (2.32% in 2019 and 2.38% in 2020). After rising to 2.41% in 2022, the share of environmental taxes in GDP fell to 2.23% in 2022 as a result of the substantial GDP growth (Figure 6).

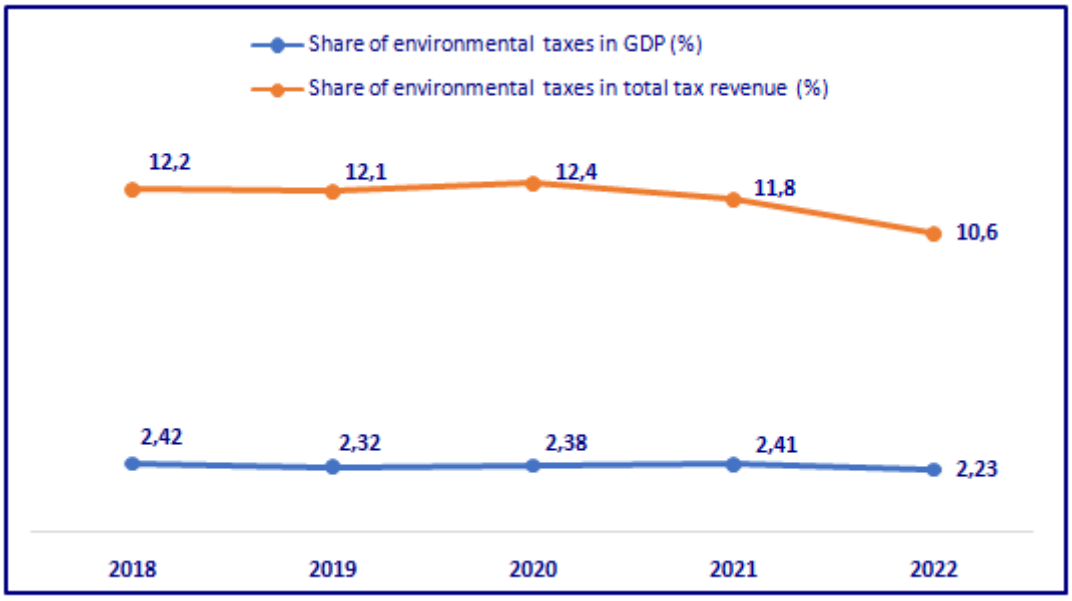

Figure 6 - Share of environmental taxes in GDP and total taxes, 2018-2022

Source: Authors' construction, based on reports on the execution of the state budget (2018-2022).

The legislation of the Republic of Moldova does not stipulate the notion of an environmental tax.

However, a system for environmental taxes and payments has been developed following Eurostat's methodology. The OECD considers that environmental taxes on harmful products were introduced in the Republic of Moldova in 2002. However, in European countries, the ecological tax system is much better designed and more efficient because environmental taxes operate according to the "double dividend" principle, which has two positive effects: improving the environmental situation and increasing economic competitiveness by improving the tax system **(Timuș, Chironachi, 2022)**. The Moldovan ecological tax system does not target or affect producer or consumer behavior, does not achieve the goal of ensuring environmental protection, but serves to generate revenue for the state budget, and most of the time ecological taxes are not adjusted for inflation **(Fala, 2023)**.

Energy taxes are geared toward environmental protection because excise duties on fuel can be recognized as ecological payments to the state budget. They are based on differentiated fuel tax rates and are adjusted annually for inflation.

Transport taxes hardly serve their environmental purpose because excise duties on imported cars account for a significant share of the total, which is calculated according to the vehicle's age and engine power rather than the amount of pollutant emitted into the air.

There are several inconsistencies in the case of pollution taxes that do not correspond to international practice. These relate to the unavailability of data allowing comparative analysis with other countries and the fact that the charging system is quite confusing. Taxes on polluting goods are adjusted annually for inflation because they are applied to the value of products and take into account price dynamics.

Taxes on natural resources consist of fixed rates. The polluter calculates them and pays them into the administrative-territorial unit's budget, where the natural resources are extracted. The number of these charges has not been adjusted to price trends for a long time.

To ensure better implementation of environmental policies in the Republic of Moldova, it is necessary to update the legal framework with international practices, bring the new environmental protection regulations into line with existing legislation, and remove all inconsistencies.

Conclusions

The role of tax policy and its instruments in facilitating the transition to a green economy is indisputable. This includes green taxes and charges, subsidizing green sectors, fund allocations, public investments in sustainable infrastructure, sustainable public procurement, and other mechanisms. Tax policies also increase government revenues, which can be used for green investments, wider tax reforms, or other priorities such as health and education. A system of environmental taxation plays an essential role not only in the rational use of resources and protecting the environment but also in repairing environmental damage.

The main problem in determining the parameters of environmental taxes is the assessment and measurement (spatial, temporal, physical, in monetary terms, etc.) of environmental damage, such as emissions to air and water bodies, etc., and the distribution of the tax from the producers of products subject to environmental taxation to consumers. Thus, the purpose of ecological taxes is to motivate economic agents to implement environmentally friendly practices. There is also a need for regular evaluation of the effectiveness of environmental taxes, their continuous updating, and their correct application.

The state has the leading role in eliminating imbalances in the market, so through appropriate regulation, the state must create all the conditions and opportunities for business and society to move toward 'greening' the economy.

A comprehensive review of environmental tax legislation can identify areas where taxes and charges can be introduced or abolished. An aspect for consideration is the impact of these taxes and charges on the poor, administrative costs, and sectoral competitiveness. Environmental taxes can be used in several sectors of the economy. These taxes correct price signals and help shift consumer and business behavior toward more sustainable models.

The green tax system in the Republic of Moldova is in the formative stage of its development, and the main task of tax policy is to shape a set of tax instruments, considering national particularities and priorities. The Republic of Moldova has a well-structured legal framework in the field under review, but it needs to be regularly revised and adapted to the European regulatory framework.

Future Directions

Future research directions in the field of ecological taxes in the Republic of Moldova will include an assessment of the effectiveness of the fiscal-budgetary system; a comparative analysis of fiscal and environmental systems with those of other countries; performance studies and case studies; and an analysis of legislation to identify opportunities to improve the domestic tax system.

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THE IMPACT OF RISING ENERGY PRICES ON PUBLIC FINANCES

Rareș-Ștefan UNGUREANU [24]

Abstract:

This study explores the dynamics of the energy market, with a particular focus on Romania, investigating factors such as demand and supply imbalances, state intervention, and the social implications of energy pricing. The analysis reveals disparities in the energy market and justifies the belated but necessary intervention of the state to protect households and establish market order, despite the budgetary strain leading to an amplified deficit.

Keywords: *Energy Market Dynamics, Romanian Energy Industry*

JEL classification: *H69, H62, N70*

Introduction

The energy system represents a complex and multidimensional structure that can only be comprehended and analyzed through a multidisciplinary approach. It encompasses all installations and processes for the distribution and utilization of energy within a specific country, region, or area. Regardless of the overall management of certain sectors, the energy system is interconnected at an international level, so crises and/or natural phenomena occurring in a particular region can lead to disruptions in the structure of the system, both at the regional and national levels, as well as internationally.

The analysis presented below aims to highlight conclusions regarding the impact of recent increases in energy market prices on national public finances. In this regard, the issue has been examined from an external perspective of the industry by identifying relevant statistical data based on general interest indicators.

By identifying, examining, and interpreting events that have caused turbulence in the energy market in relation to the general theoretical framework, an analysis of overarching issues has been conducted, along with proposing economic solutions. It is evident that energy prices serve as a means through which the impact of the economic crisis can be observed by all entities involved, ranging from individuals to legal and institutional entities. However, the pricing process in the energy sector is extremely complex and can be challenging to comprehend.

Therefore, this paper intends to contribute to the development of research aiming to identify the causes and mechanisms that could influence the dynamics of energy prices in the technological and distribution chain. This will enable us to propose relevant solutions and suggestions to positively impact public finances.

Through literature, it can be observed that economic development, as the foundation of the state budget, is built on several pillars, one of which is the maintenance and promotion of a fundamentally upward trend in the use of green energy. In the current context, the energy sector plays a crucial and even defining role for everyone, as innovation and survival in climatic conditions are dependent on it.

The study conducted by Ohio University Press, titled "Perfect Competition and the Effects of Energy Price Increases on Economic Activity" reveals a direct correlation between unfair competition generated by rising energy prices and innovation based on competition, thus contributing to long-

[24] *Bucharest University of Economic Studies,5-7 Mihail Moxa Street, District1, 010961Bucharest, Romania, email: ungureanurares21@stud.ase.ro*

term economic development. Researchers at Digitales Argchiv have successfully demonstrated a close correlation between taxes imposed on the consumption of natural gas, oil, and other derivatives, and the budget deficit on commodity markets, thereby supporting the hypothesis of this work.

Methodology and Data

To conduct tests on time series to demonstrate Granger causality, it is necessary to check the stationarity of the data using the Augmented Dickey-Fuller test (ADF). This test involves estimating the regression model below:

$$\Delta Y_t = \beta_1 + \beta_2 + \delta Y_{t-1} + \sum_{i=1}^{p} \alpha \, \Delta Y + \varepsilon_i$$

where Y_t is the variable being tested to determine if the data is stationary or not, δ emphasizes the lags used in identifying possible higher-order autocorrelations, and ε_i is the error term.

In this case, the statistical test was generated under the null hypothesis H_0 through which $\delta = 0$ compared to the alternative hypothesis H_1 through which $\delta<1$. The testing procedure used is the same as in the Dickey-Fuller test; therefore, the lower the ADF test statistic (preferably negative), the more the null hypothesis is rejected.

In the Granger approach, X is considered a cause of Y if it is used to forecast Y based on past values of Y. Thus, three different cases are identified where Granger causality can be applied:

a. For two variables and their lags;

b. For a multitude of variables;

c. For testing all variables considered (in the context of VAR).

To conduct the test, we can estimate the following Ordinary Least Squares (OLS) regressions:

$$\Delta Y_t = \alpha_0 + \alpha_1 \Delta Y_{t-1} + \cdots + \alpha_l \Delta Y_{t-1} + \beta_1 X_{t-1} + \cdots + \beta_l X_{t-1} + \varepsilon_t \, \Delta Y_{t-1}$$

$$X_t = \alpha_0 + \alpha_1 X_{t-1} + \cdots + \alpha_l X_{t-1} + \beta_1 \Delta Y_{t-1} + \cdots + \beta_l \Delta Y_{t-1} + u_t$$

Based on the estimation of OLS coefficients, we can assert the following relationships between the two variables:

1.X causes a unidirectional causality towards Y.

2.There is evidence of bidirectional causality.

3.There is no evident Granger causality in either direction.

The database was constructed using statistical data provided by Eurostat, including information on budget deficit, revenues, and expenses of our country, as well as import and export transactions between European states and Russia. Both the ANRE platform was utilized to understand the formation of various prices in our country, and the OPCOM and BRM platforms were used to collect necessary data on the current commodity market. Additionally, various data for the analyzed companies and state budget were identified and processed to obtain more information relevant to this study.

For the analys, Eviews software was employed to generate a correlation regarding the influencing factors concerning the increase in public expenditures as a percentage of GDP and market prices.

Theoretical Aspects

To gain a comprehensive understanding of the energy industry and price formation we must analyze all the process and the journey of the product. Additionally, all defining factors in price formation, such as supply and demand, weather conditions, stock market transactions, long-term contracts, and spot markets, should be included in the analysis.

In the natural gas industry, several companies operate in accordance with specific regulations of each state, with various objectives. Initially, the extraction process involves a typically large-capital company subject to strict regulations, capable of operating under adverse conditions. Subsequently, the gas is transported by specialized operators, known as Transmission System Operator (TSO), through pipelines to processing centers. It is then intermediated by a distribution company that assumes the role of administration and distribution through smaller pipelines, compared to those used in the previous stage, to deliver gas directly to consumers.

In Europe and USA, natural gas prices are determined through gas hubs - centers for trading natural gas, where producers, transporters, traders, and consumers can buy or sell gas. These are locations where prices are set based on supply and demand, enabling greater market transparency. Some examples of trading hubs include HHGP (Henry Hub Natural Gas Spot Price) in the USA, TTF (Title Transfer Facility) in the Netherlands, NBP (National Balancing Point) in the UK, or PEG (Point d'Échange de Gaz) in France.

The production and distribution of oil involve several companies and stages. After extraction from reservoirs, oil is transported through pipelines, ships, or tanker trucks to refineries. Here, it is processed to produce petroleum products such as gasoline, diesel, or kerosene. After processing, petroleum products are transported through a distribution chain that may involve multiple companies handling storage, transportation, and distribution.

These companies can be suppliers, transporters, terminal operators, or final distributors. Ultimately, petroleum products reach gas stations and other points of sale, where they are purchased by consumers.

In establishing prices for oil, the impact of OPEC (Organization of the Petroleum Exporting Countries) must also be considered. OPEC controls approximately 44% of the world's oil production and holds around 73% of global oil reserves. It can influence oil prices by regulating the quantity of oil produced and exported by its members. For example, by reducing oil production, OPEC can decrease the supply of oil in the global market, leading to price increases. Conversely, increasing production can lead to price decreases.

OPEC can also influence prices through policies and decisions regarding investments in oil production, exploration, and refining, as well as through price stabilization actions, such as reducing production or creating mechanisms for price stability.

Electricity is generated by various power plants that can use different primary energy sources such as coal, gas, hydro, nuclear energy, or renewable sources. After production, electricity is transmitted through regional and national grids to distribution companies. These companies are responsible for managing local distribution networks and supplying electricity directly to consumers, whether industrial or residential. The transmission and distribution process involves various costs, including infrastructure and transaction costs, which are included in the final price of the product.

It is important to mention that all intermediate costs are borne by the end-user, reflecting in the final product price. Additionally, some states offer partial or total subsidies for different categories of individuals or for all users.

In the context of price formation, tax implications (excises, environmental taxes, etc.) must also be considered, leading to a much higher final price for the end consumer.

Regarding theoretical concepts, understanding the basic competitive model is crucial. This model allows for an analysis of the organization and functioning of any market, consisting of a set of economic conditions that permit the existence of a large number of producers and consumers. The

price is determined through the mechanism of supply and demand. In this model, each economic agent plays a significant role in setting the price and is motivated to maximize profit by offering or buying goods and services at the most advantageous prices. Among the pillars supporting this work is the rational consumer who pursues their own interest, firms aiming to maximize profit, and markets characterized by competition.

Drawing from specialized literature, it has delineated various hypotheses regarding the purity of competition and the concept of perfect competition, including:

-Homogeneity of the Product: The product shows no differentiation among consumers in the context of pure competition. All products are regarded as identical in the eyes of consumers, thereby eliminating specific preferences.

-Unrestricted Market Entry: Any entity is legally entitled to enter the market. This condition supports the purity of competition, allowing for an open and unrestrained competition among legal entities.

-Perfect Market Transparency: In this scenario, there is no informational asymmetry between producers and consumers regarding product details. All economic agents have access to the same information, ensuring a transparent environment where buying and selling decisions hinge on identical data.

-Flawless Mobility of Production Factors: The pursuit of profit is undertaken with a view to utilizing capital as efficiently as possible. This involves the seamless movement of production factors, such as labor and capital, to sectors where they can yield the highest returns.

Due to its significant importance, the state can intervene in the energy sector in cases of utmost necessity and has the authority to cap prices. This method is particularly useful in the short term, with the caveat that the imposed maximum price should closely align with the equilibrium price to avoid creating imbalances in demand or supply. In the energy sector, it is well-established that the equilibrium price can be considered one that covers production costs.

In instances of market imbalance in the energy sector, price capping should be accompanied by additional measures addressing: the quantity of goods and services that can be produced by efficiently utilizing all available resources to meet increased demand; applicable legal standards; and commitments to reduce existing climate-related issues.

To comprehensively consider the socio-economic framework, it is essential to recognize that, in general, this work is based on welfare states that aim, among other objectives, to ensure the minimum necessary for the development of all citizens and to combat poverty. In the energy market context, the European Commission has defined energy poverty as: *“Energy poverty occurs when a household must reduce its energy consumption to a degree that negatively impacts the inhabitants' health and wellbeing. It is mainly driven by 3 underlying root causes”.*

Given the vast scope of the field, we commenced with a comprehensive analysis of global energy consumption before narrowing our focus to a specific country, Romania.

Additionally, an analysis of the legislative and economic framework of the respective state is imperative to determine the variation and significance of the energy industry on its public finances. In Romania, the National Energy Regulatory Authority (ANRE) is tasked with setting tariffs for the transportation, system operation, and distribution of electricity and natural gas services. Consequently, any decision by ANRE can ultimately influence prices in the energy market. In terms of revenues flowing into the state budget, these are comprised of direct taxes on the energy supply chain and various excise duties on consumption. Due to the extensive framework and the multitude of actors involved, we will not consider indirect revenues from VAT or similar taxes.

Analysis

Regarding the approach to the current issue, the energy sector manages to prioritize collaborative efforts within the academic and specialized community to identify specific causes and generate viable solutions.

Moreover, based on the extracted data below, it is evident that a global crisis is unfolding, with more pronounced effects at the local level.

A. Globally, the crisis can be explained by the imbalance in the demand and supply ratio generated by:

1.The resumption of economic growth post the Covid-19 pandemic;

2.Increased demand in the natural gas and energy market, particularly in the Asian market (due to the replacement of coal with natural gas and renewable energy)

3.Rising electricity demand through:

-Intensification of household and industrial consumption towards this type of energy, becoming renewable in the long term.

-Emergence of major electricity consumers, such as cryptocurrency mining farms, and the digitization and automation of large industries, such as manufacturing.

Additionally, the resumption of economic growth after the Covid-19 pandemic has had an inflationary impact on price creation.

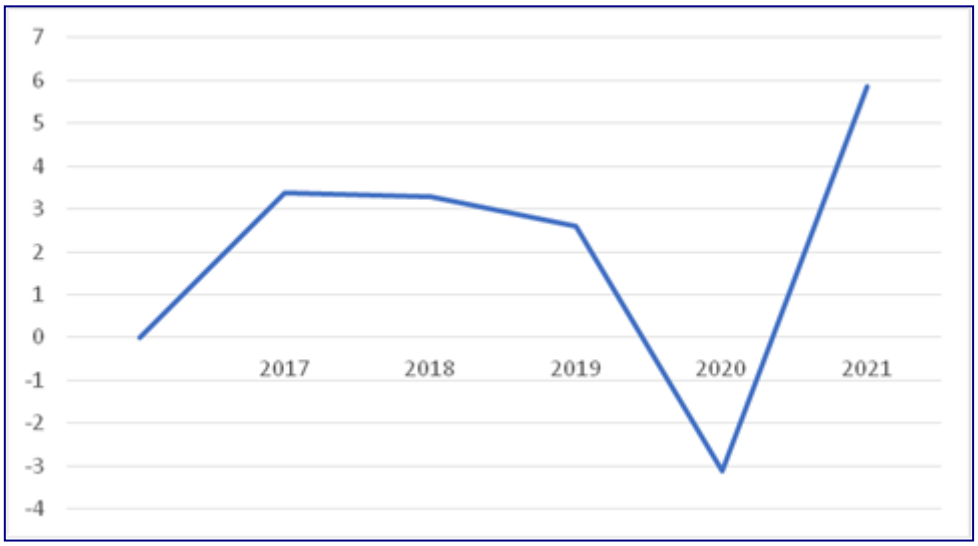

Fig.1- The global Gross Domestic Product (GDP) growth rate (%)

Source: World Bank national accounts data, and OECD National Accounts data files

Known for being part of the major energy consumers, cryptocurrency mining centers have formed a notable consumer type, as indicated by the data in the table below:

Table 1

Bitcoin Energy Consumption 2018-2023

Year	Estimated TWh/ year	Minimum TWh/year
2018	62.52112191	40.10674184
2019	63.95641494	44.34568118
2020	70.29231902	49.13453667
2021	134.015419	45.69561958
2022	161.2063544	65.05523027
2023	89.52930318	89.52930318

Source: https://digiconomist.net/bitcoin-energy-consumption

Table 2

Ethereum Energy Consumption 2018-2023

Year	Estimated TWh/year	Minimum TWh/year
2018	16.88188057	10.97785186
2019	7.920307651	2.722878796
2020	9.072771097	3.399765091
2021	39.03850898	10.27581623
2022	58.71332048	11.71750345
2023	0.013306308	0.00070967

Source: https://digiconomist.net/bitcoin-energy-consumption

In terms of the reduction in energy consumption for ETH, this shift is attributed to market changes, where the mining of this currency is currently prohibited, allowing only trading activities.

B. On a broader European scale, beyond the impact of the pandemic and the economic revival, notable effects stem from policies addressing climate issues, particularly in the supply sector.

These effects include:

1.Renewable Energy Instability: Disruptions in renewable energy production, aligned with the phase-out of conventional energy production methods.

2.Market Reconfiguration: Significant changes in the electricity and natural gas markets, characterized by:

-A rising trend in short-term operations and transactions for natural gas and electricity supply.

-A strategic shift to decrease the share of long-term contracts, facilitating the integration of reusable electric energy into the market. This shift is evident in the decisions of the U.S., Qatar, and Norway to move away from traditional long-term contracts indexed to oil prices.

-A relaxation of requirements regarding the establishment of winter and buffer deposits.

Furthermore, due to the Russo-Ukrainian War, there has been a substantial decline in natural gas supplies from Russia, impacting numerous European countries, including Germany, Italy, France, Austria, Slovakia, Poland, Hungary, the Czech Republic, Romania, and Bulgaria.

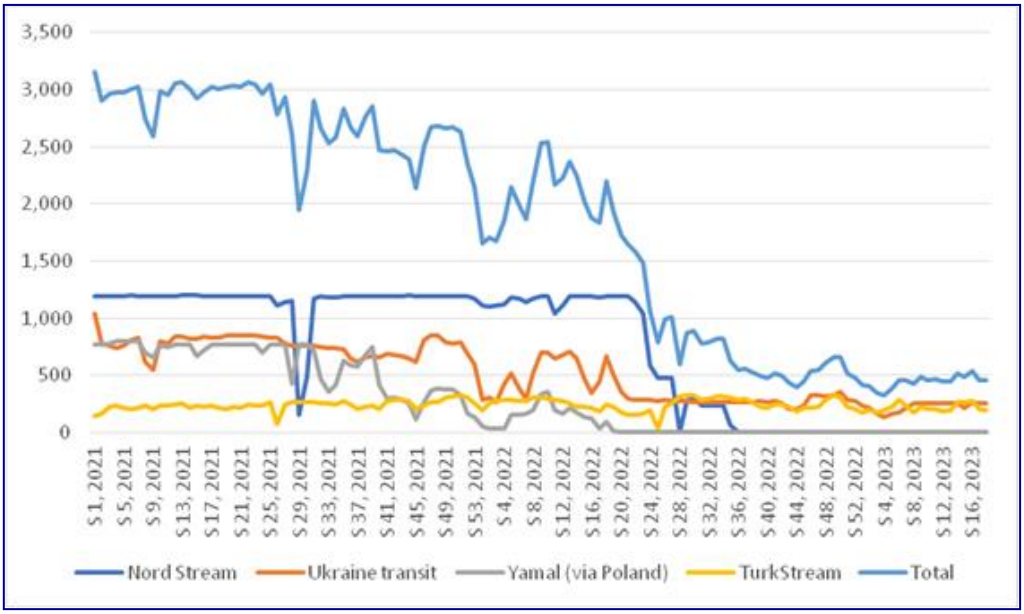

Figure 3 - Imported Gas from Russia (million cubic meters)

Source: Bruegel European Natural Gas Demand Tracker

All of the above had direct consequences regarding price formation, as follows:

EQUINOR (Norway) sells:

70% at the next-day price, compared to 25% in the previous period;

Due to limited supply and increased demand, prices surged even by 304.39% in the third quarter of 2022 compared to the same period the previous year and by 2920% compared to Q3 of 2020.

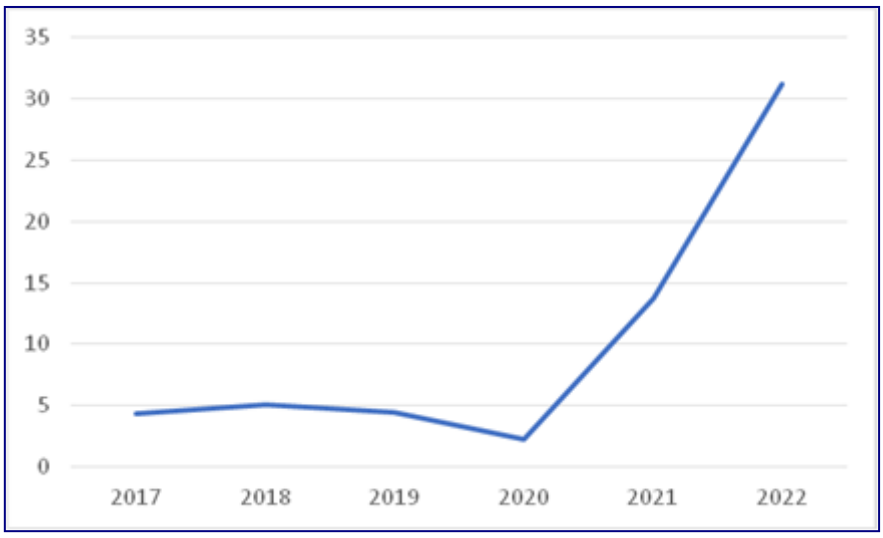

Figure 4 - Domestic Price of Natural Gas Reported ($/MMBTU)

Source: Equinor Investor Relations

The purchase price of natural gas for immediate delivery (spot price) increased by over 1250% in Q3 of 2022 compared to the same period in 2020 or 2021, according to the graph below:

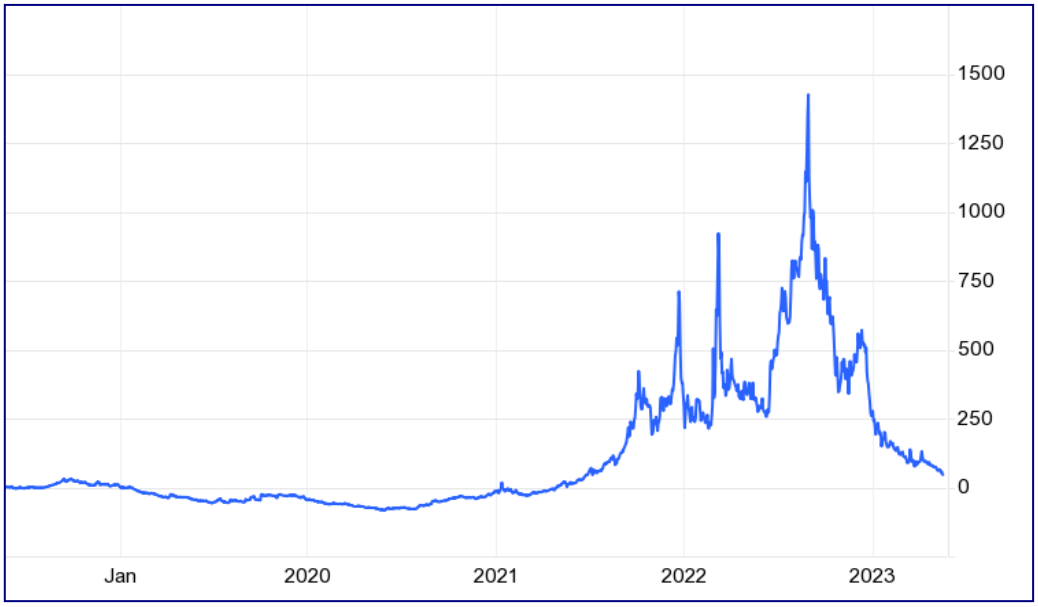

Figure 5 - Spot Price of Natural Gas in Norway,

Source:Trading Economics

Regarding the energy market in Romania, constant price increases have been observed since 2020. These have been exacerbated due to the liberalization measures promoted during this period and implemented under precarious conditions – the studies, analyses, and predictions regarding the practical energy market being insufficient.

The liberalization process had an unexpected effect – price increases (contrary to the market competition principle mentioned above). Among the causes triggering this rise are the lack of information provided by suppliers to consumers and the absence of protective legislation for the end consumer. In the same context, major producers and distributors recorded profits, supporting the unjustifiability of the increase that would lead to a higher final price.

Regarding the energy taxes imposed, they vary depending on the type of energy in question, as seen in the data presented in the table below:

Table 3

Excise Duties on Energy Consumption

Year	Natural Gas For Commercial Use	Natural Gas For Non-commercial Use	Electricity For Commercial Use	Electricity For Non-commercial Use	Gasoline	Diesel
MU	GJ		Mwh		Tone	
2021	0.89	1.68	2.61	5.23	2372.91	1981.75
2022	0.93	1.74	2.71	5.42	2458.10	2052.89
2023	1.03	1.94	3.03	6.05	1931.61	1931.61

Source: https://mfinante.gov.ro/

In 2020, the energy sector experienced a significant contraction in total excise revenues, marking a -12.6% decrease compared to the previous year. This decline was primarily attributed to the reduced consumption of gasoline and diesel amid the pandemic. In 2021, the Romanian government, aiming to stimulate business activities, took the initiative to refund amounts collected through diesel excise. Despite this, energy products saw a noteworthy 13.6% increase, driven by the normalization of consumption compared to the preceding year. Excise revenues for 2021 totaled 34.48 billion RON.

Moving into 2022, the second quarter witnessed excise revenues amounting to 8.28 billion RON. This downturn was influenced by the adverse trajectory of excises from the sale of energy products, particularly diesel and gasoline.

Simultaneously with the recording of low excise revenues, one of the economic activities that experienced significant growth was the electricity and thermal energy sector, as well as gas, hot water, and air conditioning. This surge was justified by both the increase in prices despite stagnant costs and the deregulation of prices in the gas sector. In the preceding year (2021), Law No. 259/2021 was enacted, taxing additional incomes of electricity producers, contributing a surplus of 0.6 billion RON to the state budget in the following year (the second quarter).

Regarding producers in the petroleum and gas production sector, companies with a surplus of over 20% from the average taxable profits for the financial years 2018-2021 pay an additional tax of 60% on that portion. Taxes in the energy sector play a crucial role, being one of the essential industries generating a significant portion of the annual budget revenue. In Romania, these taxes amount to 16% for enterprises with a turnover exceeding 500,000 euros and 1% for firms with employees and a turnover below 500,000 euros.

In 2022, OMV Petrom, one of the major players in the energy market, contributed 7% to Romania's fiscal revenues, totaling over 19 billion RON. This had a direct impact on public finances and overall budgeting.

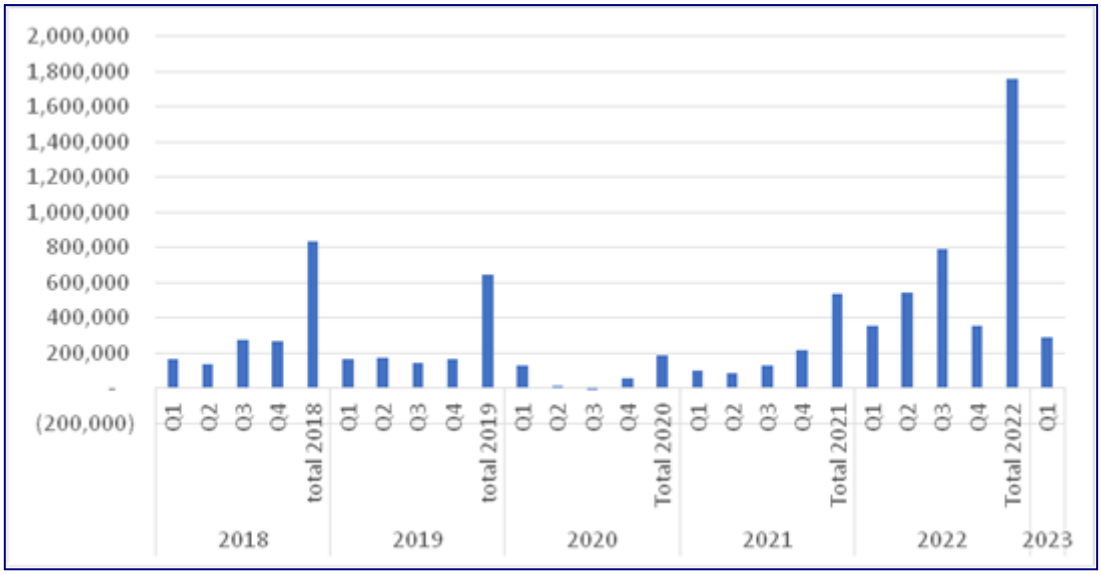

Figure 6 - Corporate Income Tax Paid by OMV Petrom (RON)

Source https://www.omvpetrom.com/ro/investitori/rapoarte-si-prezentari

In the case of Romgaz, a significant Romanian producer, majority-owned (70%) by the government through the Ministry of Economy, Trade, and Business Environment, its contribution to the state budget amounted to around 3 billion RON. This underscores its substantial impact on public finances and overall budgetary considerations.

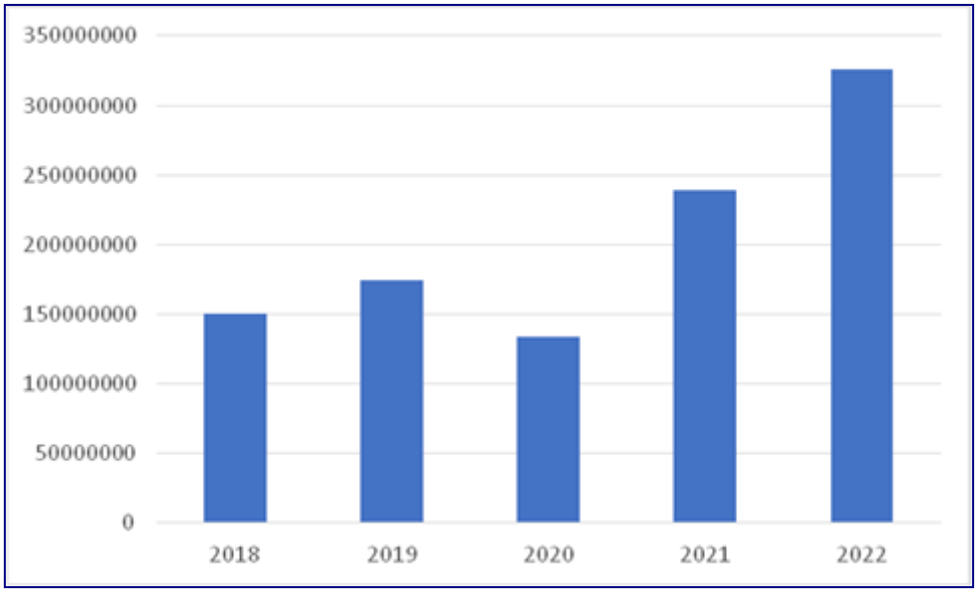

Figure 7 - Taxes Paid by Romgaz (RON)

Source: https://www.romgaz.ro/rapoarte-anuale

The distinction between these two competitors lies in the breadth of the energy spectrum they navigate, with OMV Petrom emerging as a key player in the domestic oil and natural gas industry.

Despite continuous efforts by the Romanian government to consistently model energy prices for both the general population and businesses, providing subsidies, these measures have not significantly impacted the bills paid by end consumers. This is evident in budgetary expenditures, as illustrated below, expenses that have been directly correlated with the increase in energy prices. Utilizing a price index established with the assistance of average quotations of NDI (the price for the next day represents the wholesale market component for electric energy with firm hourly transactions for active electric energy, with delivery on the day following the transaction) on a monthly basis, we managed to estimate a general price index (a proxy variable) for all forms of generated energy, considering the January 2019 average as a reference value numerically equal to 100. As a result, we generated the following prices using the formula:

$$the\ price\ index\ for\ the\ previous\ day * \frac{NDI_0}{NDI_1}$$

After collecting and analyzing the data through Granger causality, a notable trend emerged: as the price index increases, there is a direct and corresponding rise in budgetary expenditures. This analysis spanned multiple quarters from 2019 to the close of 2022, with a confidence level set at 10%.

Pairwise Granger Causality Tests
Date: 05/18/23 Time: 01:11
Sample: 2019Q1 2022Q4
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
CHELTUIELI does not Granger Cause INDICE_DE_PRET	14	0.14095	0.8704
INDICE_DE_PRET does not Granger Cause CHELTUIELI		7.21127	0.0135

Figure 8 - Granger Causality

Source: Report based on MFP database, Eviews software

Drawing on the information above, it becomes evident that, from an energy perspective, the imposition of additional taxes is not only justified but also yields a substantial impact on the state budget, warranting encouragement. Nevertheless, Romania presently grapples with the escalating challenge of a growing budget deficit, a predicament exacerbated beyond the dimensions instigated by the Covid pandemic. As expenditures rise to sustain the economic landscape and households in the realm of energy, the budget deficit undergoes expansion.

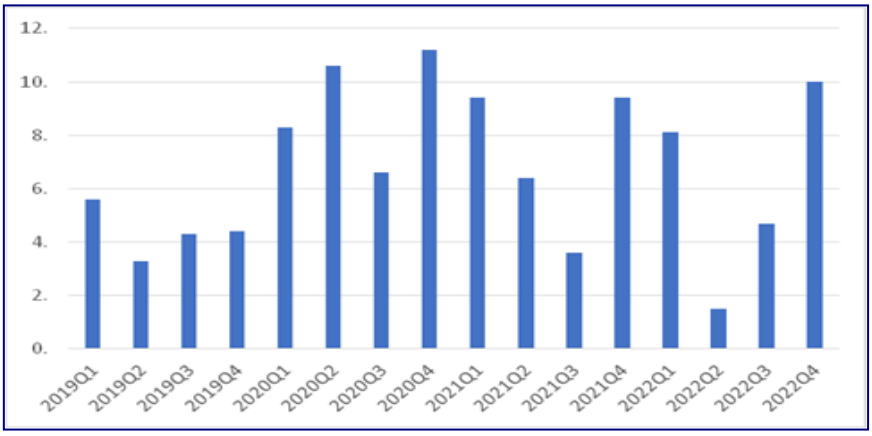

Figure 9 - Quarterly Budget Deficit (2019-2022)

Source: Eurostat

Budgetary expenses are fundamental to the operation and progress of any state. Hence, an alternative avenue for their utilization could be directed towards investments. However, to reach this stage, implementing temporary price controls might be necessary until the market achieves values similar to the norm. This approach mirrors the situation observed earlier this year in the natural gas market, where the freezing of prices for natural gas producers contributed to a gradual stabilization of both supply and demand.

Conclusions

The analysis conducted in the study has yielded several conclusions, such as the existence of disparities between demand and supply in the energy market. The state's intervention, albeit belated, in the energy markets is justified for the protection of households and the establishment of market order, even with a budgetary effort that has exacerbated the deficit, but carries a social character for the population.

A direct correlation has been identified between public expenditures as a share of GDP and energy prices, but not a substantial increase in income. This leads to the conclusion that the profits obtained by companies in the energy industry, whether producers, suppliers, or distributors, have an immoral component, as production costs are not directly impacted by the factors mentioned.

Looking ahead, it is anticipated that measures to protect households, with a direct impact on the budget balance, will be maintained, and the energy market will undergo a self-regulation process.

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ECONOMIC OUTLOOK AND POLICY RESPONSES IN EASTERN EUROPEAN COUNTRIES IN THE CONTEXT OF RECENT CRISES. CASE OF THE REPUBLIC OF MOLDOVA

Denis VOSTRICOV[25]

Angela CASIAN[26]

Ludmila COBZARI[27]

Abstract:

Recent global economic shifts stem from the pandemic and Eastern Europe's crisis; Moldova's proximity to Ukraine intensifies these impacts. The aim of the paper is to analyze the effects and policy responses adopted by the authorities of the Republic of Moldova as a result of the Ukrainian crisis emergence, and to define potential policy recommendations. The data used for the paper are official sources and open market data. The methodology is mixed and mainly based on analysis and synthesis.

Analysis findings suggest that monetary and fiscal authorities are not the main actors in the current circumstances, but act as supporters of wider national policies, but based on deep knowledge of economic interlinkages and the ability to holistic view, have to play an important role in shaping crisis management actions.

Keywords: *Monetary policy and Fiscal policy, Crisis management, Geopolitical conflict economic effects, Policy Measures, Policy effects*

JEL classification: *E61, H00, H12*

Introduction

The recent sanitary crisis and the geopolitical conflict in Ukraine emerged as two important unforeseen forces producing an influence on the current state of the world economy. At the time of steady recovery from the Covid-19 crisis, these were hit by the effects of the Ukraine-Russia geopolitical conflict which materialized in negative economic and financial repercussions and uncertainty in many respects for a larger geographic area. The inflow of refugees, sanction measures and distortions in supply chains have affected the economies, resulting in a rapid increase in commodities prices and inflation. The crisis is complex and requires urgent measures from the side of the authorities. Monetary and fiscal authorities are in a challenging situation which necessitates finding policy trade-offs in order to limit socio-economic stress and avoid the economy and population entering into a lasting depression.

The Moldovan economy, being in close physical proximity to the conflict area, has experienced a particularly pronounced impact, with its existing vulnerabilities being re-emphasized to a greater extent than in other regions. The effects of the neighboring geopolitical crisis have shed light on these weaknesses and triggered various policy responses from the Moldovan authorities. This research aims to analyze and examine the vulnerabilities of the Moldovan economy and the corresponding policy responses in the face of the Ukraine-Russia geopolitical conflict, as well as to define potential policy recommendations.

[25] *PhD, Associate Professor, Academy of Economic Studies of Moldova, vostricov.denis@ase.md*
[26] *PhD, Assoc. Prof., Academy of Economic Studies of Moldova, casian.angela@ase.md*
[27] *PhD, Univ. Prof., Hab., Academy of Economic Studies of Moldova, cobzari.ludmila@ase.md*

The following sections will delve into an assessment of the weaknesses inherent in the Moldovan macroeconomic landscape and the policy measures or those which could be potentially undertaken by the government and central bank, to address the challenges posed by the crisis. By examining these aspects, the paper seeks to shed light on the specific vulnerabilities of the Moldovan economy, the implications of the geopolitical conflict, and the effectiveness of current and potential policy responses in mitigating socio-economic strains.

To achieve these objectives, the paper will adopt a structured approach. The literature review will serve as the foundation for understanding the context and identifying key research gaps that this study aims to address. The limitations of the literature review in this research paper can be attributed to several factors. Firstly, the unprecedented situations of the world sanitary crisis and the geopolitical conflict in Eastern Europe have created unique circumstances that to the best of knowledge may not have been extensively studied or documented in the existing literature. The dynamics and implications of these situations are complex and multifaceted, making it challenging to find comprehensive studies that directly address the specific context of the Republic of Moldova.

Moreover, the particular circumstances and features of the Moldovan economy further contribute to the limited scope of the literature review. The geopolitical situation of Moldova, with its close proximity to the Ukrainian conflict area, introduces specific dynamics and challenges that may not be adequately covered in the existing literature. The funding capacity, both domestic and international, available to Moldova may also differ from those of other countries, necessitating an understanding of the country-specific context and its implications for policy responses. In light of these factors, the authors of the paper primarily relied on the literature for data, seeking to establish a foundational base for the assessment and analysis of the effects of the Ukrainian crisis and the policy responses adopted by the Moldovan authorities.

While the limitations in the literature review are acknowledged, it is important to note that the mixed methodology employed in this study, combining analysis and synthesis, allowed for a comprehensive examination of the specific situations and circumstances of the Moldovan economy. The reliance on official sources, and open market data further facilitated the analysis of the effects and policy responses, ensuring the accuracy and validity of the findings.

Following the literature review, the research methodology will be outlined, highlighting the approach, data sources, and analytical techniques employed in the analysis. The subsequent sections will present the analysis of the Moldovan economy's vulnerabilities in light of the Ukraine-Russia geopolitical conflict. These sections will explore various dimensions, including the impact on trade, fiscal sustainability, financial stability, and insights on some aspects of the socio-economic situation. Additionally, the policy responses implemented by the Moldovan authorities will be examined, in order to make possible to identify areas for improvement.

The general macroeconomic outlook section examines the overall economic situation in Moldova and also in the context of the Ukrainian crisis. It assesses factors such as GDP growth, inflation, trade patterns, and proves, to the possible extent, a holistic understanding of the macroeconomic impact. The financial sector and monetary policy section focus on the resilience of the financial system in Moldova and the measures undertaken by the authorities to mitigate risks. It examines the stability of the banking sector, liquidity management, and the ways to rise the effectiveness of monetary policy in addressing the challenges arising from the crisis.

The public finance policy response section evaluates the fiscal measures adopted by the authorities to counteract the economic impact of the Ukrainian crisis. It assesses the government assistance programs, liquidity support for businesses and households, and how the effectiveness of these policies in addressing socio-economic stress can be increased.

The discussions and recommendations section presents a thorough analysis of the findings, highlighting the strengths and weaknesses of the policy responses and identifying areas for improvement. It offers policy recommendations to enhance the resilience of the Moldovan economy and mitigate the impact of future crises.

Finally, the paper will conclude with a summary of the findings, policy implications, and recommendations for potential future actions, which emphasize the importance of holistic crisis

management actions. By providing a comprehensive analysis of the vulnerabilities and policy responses in the Moldovan economy amidst the Ukraine-Russia geopolitical conflict, this study aims to contribute to the existing literature and inform policymakers and stakeholders in their efforts to navigate the challenges posed by such crises.

In summary, by examining the effects of the Ukrainian crisis on Moldova and evaluating the policy responses of the authorities, this research paper has a goal to contribute to the understanding of crisis management in the context of geopolitical conflicts, particularly, this research paper aims to investigate the vulnerabilities of the Moldovan economy in the context of the Ukraine-Russia geopolitical conflict and to draw strategic conclusions and recommendations. By analyzing the impact of the crisis on various economic dimensions and evaluating the policy responses, this study seeks to provide valuable insights for policymakers and other countries facing similar challenges, as well as to contribute to the existing knowledge surrounding the economic consequences of geopolitical conflicts.

Methodology

The methodology of this research paper (research) is mixed and based on analysis and synthesis. The combination of analysis and synthesis research methodology in its essence consists of examining and combining information and ideas from different sources for obtaining a thorough understanding of a subject or an issue. The applied research methodology involved the following stages:

1. Determining the background of problematics and nature, source and origin of the issues, scope of research and intermediary objectives. Determining the preliminary methodology means permitting the achievement of research objectives.

2. Collecting information and data relevant to the research topic, through the official sources' such as government, central bank and supranational institutions influencing national policy making processes search; research reports and working papers and specialist articles' examination. Literature review and cited information, credited in the research, contributed to strengthening the arguments.

3. To determine the objectivity of the information on the criteria such as the absence of political bias, relevance, quality, and validity in the context of the research - reviewing and evaluating the information sources' through analysis and critical evaluation of information was applied.

4. Identifying the key information and statements, which constituted from important themes, ideas, and concepts' identification and their organization into logical and coherent statements?

5. Data analysis constituted of analyzing the data and information collected to, in the possible limits, identify patterns, potential trends, and relationships between variables. This involved mainly a qualitative analysis or openly prepared, structured and provided field data. The type of analysis was conditioned by the nature of the data and research objectives.

6. Synthesis of information, which involved the combination, interconnection and integration of the information and ideas from the sources reviewed for the development of an integrated and coherent understanding and development of the topic and the research problem. This process included formulating clear hypotheses about the optimality of existing policies and conclusions based on data analysis and evaluation.

7. Presentation of results included formulation of findings, arguments, conclusions, policy discussions, potential considerations, and recommendations, based on the conducted research, thus contributing to the knowledge base in the field of study.

The chosen mixed methodology proves to be fit and relevant to the researched topic as it allows for a comprehensive analysis and synthesis of the effects of the Ukrainian crisis and the policy responses in the specific context of the Moldovan economy.

General Macroeconomic Outlook

Moldova is a small landlocked country in Eastern Europe, which has experienced pronounced structural reforms since gaining independence in 1991. These reforms have aimed to transition from a centrally planned economy to a market-oriented system, although challenges persist in achieving full economic liberalization. Despite progress in implementing structural reforms, Moldova faces persistent challenges related to transparency, infrastructure, and foreign direct investment. These factors impede private sector development, hinder economic diversification, and constrain overall economic growth.

Since gaining the state independence, Moldova's Gross Domestic Product (GDP) per capita has been growing at an average pace of circa 5 per cent, marking decades of economic growth although volatile. Still being considered as one of the poorest countries in Europe, the Moldovan economy exhibits characteristics reflective of a transitional and emerging market. A feature of the Moldovan economy is its openness to international trade. The country has pursued integration into global markets through various trade agreements and participation in international organizations. However, the Moldovan economy remains susceptible to external shocks due to its high dependency on a few key trading partners, limited product diversification, and vulnerabilities associated with its geographic location.

Moldova's economic development is influenced by massive emigration, with a notable portion of the population looking for employment opportunities abroad. This emigration pattern has led to remittances playing a crucial role in the Moldovan economy, contributing to household income, consumption, and poverty reduction. Nonetheless, heavy reliance on remittances exposes the economy to risks associated with fluctuations in global labor markets and the situation of migrant workers. The declining population is seen as both an accompanying and contributing factor to the productivity dynamics. The main reasons therefor are the ageing of the population and significant rising emigration. A powerful shock to the relatively small Moldovan economy is the unprecedented inflow of Ukrainian refugees, who account for 13-17 per cent of the local population.

One characteristic of the Moldovan economy is its heavy reliance on agriculture, which contributes significantly to the country's GDP and employment. The agricultural sector encompasses various activities such as crop cultivation, livestock rearing, and viticulture. However, the sector's productivity and competitiveness are hindered by fragmented land ownership, outdated farming techniques, and limited access to modern technologies and financial resources. Supported by a strong agricultural harvest and stable private consumption growth, in 2021 the economy glowed by about circa 14 per cent reaching the pre-pandemic level. The Russian military conflict with Ukraine is anticipated to have a considerable impact on the GDP development of Moldova, explained by migration acceleration, trade effects, financial and economic ties and, not least important – the energy crisis. A more detailed mapping of conflict effects is presented in the Figure 1.

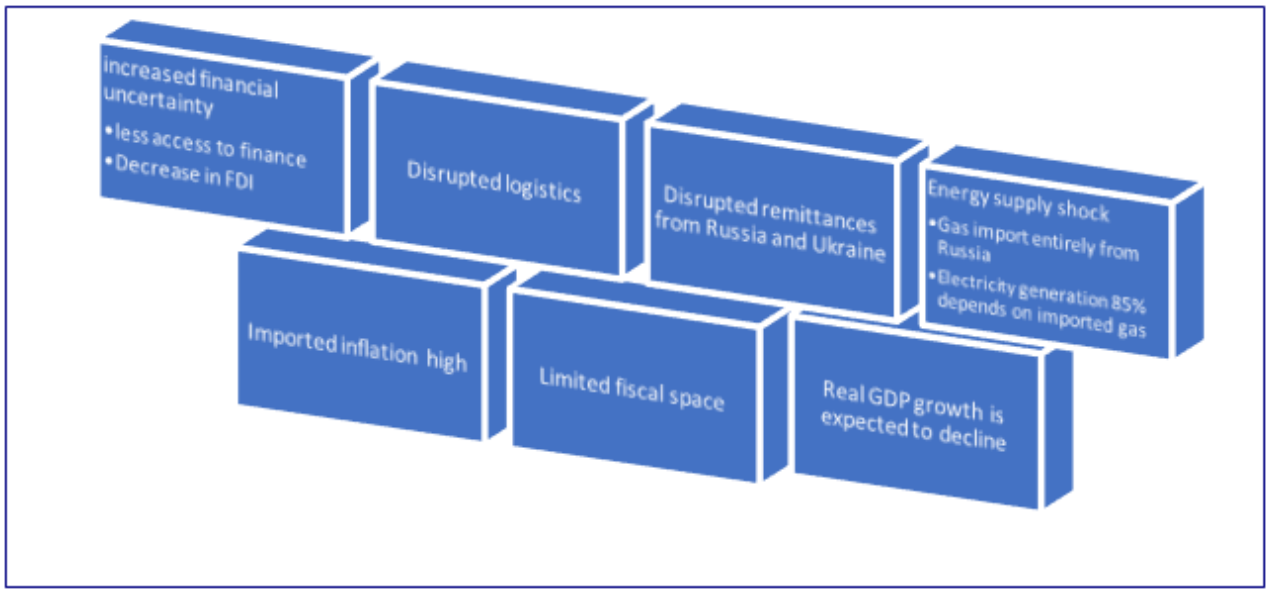

Figure 1. Mapping of Russia-Ukraine conflict effects on the Moldova economic situation

Source: Elaborated by the authors based on World Bank reports

According to the World Bank data, with a 78% market share and 11% GDP, IT services are Moldova's largest outsourcing sector and have a promising future because to low-cost labor and government regulations. A consumption-based Moldovan economy combined with important commodities import dependence, makes the Moldovan economy sensitive to current shocks. Moldova's economy is significantly dependent on the wholesale and retail sectors, making it especially sensitive to contemporary and current types of shocks. As per the data from the International Monetary Fund (IMF), disturbances in trade with Russia, Ukraine, and Belarus - which collectively represent approximately 24 percent of total imports and 15 percent of total exports of goods and services - along with international sanctions imposed on Russia and Belarus, exert strain on the current account and negatively impact net exports. Moldova is presently facing challenges in exporting its existing stock of agricultural commodities, including apples and wheat - for which Russia was the main trade partner - due to constricted land and maritime transit routes. Approximately 40 per cent of Moldova's food imports are sourced from Russia and Ukraine. The ongoing crisis is contributing to the increase in food prices, which had already witnessed a 20 per cent increase since 2021. Commerce repercussions with conflict-affected nations run the danger of impacting government revenues through trade.

Broadly, the surge in global prices, especially for commodities, food, and energy, coupled with disruption in trade routes, are projected to sustain inflationary evolution. Notably, Moldova's total dependence on Russian gas supplies for electricity production (85%) had already in 2021 led to higher energy consumer's prices. In response to escalating import prices, natural gas tariffs have tripled. Due to a substantial surge in global natural gas prices and a new gas supply contract agreed upon with Russia in 2021, Moldovan authorities increased the tariff for natural gas from about 5 lei per m^3 to 11 lei in 2021, and then to 15 lei at the start of 2022. The current tariff stands at 29 lei. A subsidized tariff was applicable in 2021, and a differentiated support program was prepared for the winter of 2022-2023.

The evolution of energy prices and domestic tariffs further impact inflation, diminish purchasing power, and exert stress on public finances.

In conditions of disrupted logistics, supply shocks, limited fiscal space, high inflation, and increased financial uncertainty, it is expected that the economy will stagnate while the current account deficit will widen as a result of decreased exports and the ongoing, steep increase in energy import prices. In this context, the resilience and preparedness of the national economy play a crucial role in managing the crisis. Also, such circumstances can be long-lasting and require coordinated efforts

from policymakers, central bank, and international institutions to mitigate risks, restore stability, and support economic recovery.

Financial Sector and Monetary Policy

A geopolitical conflict in a neighboring country has far-reaching consequences for the national financial sector and monetary policy. These effects are primarily driven by the increased uncertainty and instability that come with armed conflict and geopolitical crisis in the region. Firstly, the financial stability of the Moldovan economy can be jeopardized as the outbreak of war leads to a decline in investor confidence, triggering human resources and capital outflows. Trade disruptions may make the managing trade finance and addressing the impact on the balance of payments challenging for the financial sector.

The central bank may struggle to effectively manage inflation, interest rates, and exchange rates due to heightened uncertainty and volatility. Adjusting policy tools and frameworks becomes necessary to address the changing economic conditions and maintain stability in the financial system. Banks and financial institutions may face increased risks such as non-performing loans, currency volatility, liquidity shortages, and disruptions in payment systems. Lastly, government's fiscal policy and debt management can be affected. The outbreak of war often prompts increased defence and security spending, resulting in higher fiscal deficits and increased government debt levels. Consequently, the financial sector may experience changes in government borrowing patterns and the availability of government securities in the market.

Russia-Ukraine conflict spillovers from the war affect the economy through several channels in the immediate near, near and medium time horizons. The average annual inflation rate is currently 34.29 per cent, which is primarily being driven by further rises in the cost of food and energy, pressure from depreciation, and changes to consumer’s tariffs on the basic household needs. According to the latest projection round of the National Bank of Moldova (BNM) (BNM, 2022), annual inflation is anticipated to reach 29.5 in 2022 and 15.7 in 2023.

The anticipation is that commodity prices begin to achieve a degree of stability starting from the latter half of 2022. This stabilization is projected to lead to a reduction in inflation, starting from the end of 2022 and continuing into 2023. As trade disruptions subside and alternate supply sources are discovered, pressures from rising food prices are also anticipated to reduce. As a result, until the end of 2023, BNM expects inflation to remain significantly over the BNM's target range of 5 per cent. (Figure 2).

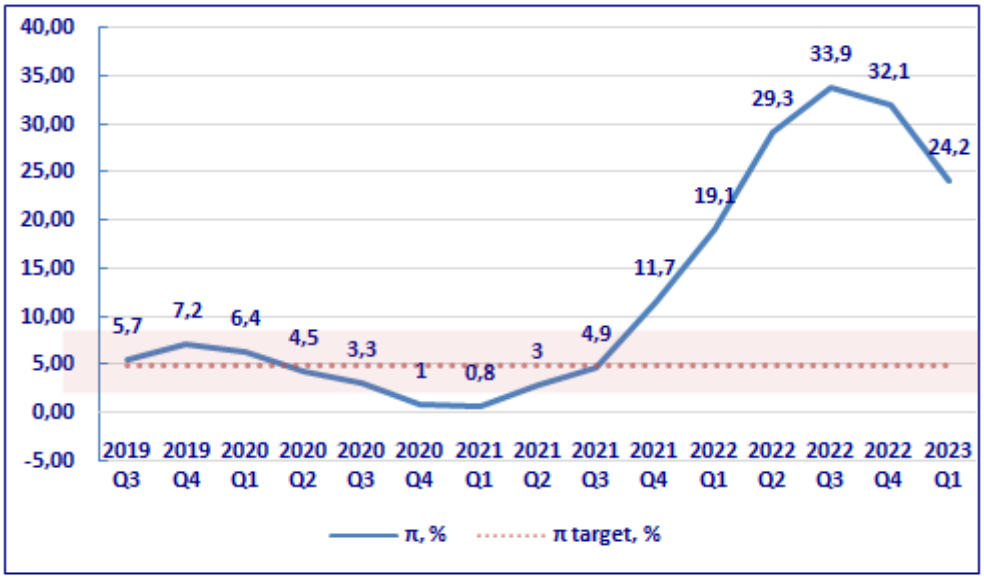

Figure 2. Consumer Price Index (CPI) dynamics

Source: elaborated by the authors based on the data of the National Bank of Moldova

Confidence effects associated with the invasion in Ukraine and international sanctions against Russia are continuing to pressure the currency market reserves, bank liquidity, and the government's borrowing capacity, as well as are expected private consumption and investment levels. This triggered tactical currency interventions from the central bank and on the market - bank deposit withdrawals, while the demand for foreign currencies euro and American dollar increased. Dollarization restricts the ability to implement the monetary policy. It hampers the economy's ability to respond to economic downturns or tailor policies to address specific domestic needs. With the weakening of the transmission mechanism, the economy may face challenges in managing the crisis and mitigating the impact of external shocks.

The financial sector in Moldova is predominantly concentrated around the banking industry, with a small share of non-banking financial institutions (NBFIs). Despite the regional conflict leading to liquidity strains in the financial system due to withdrawals of deposits in both national and foreign currency, banks have managed to cope, because Moldovan banks are highly capitalized - much above the regulatory levels - have balanced foreign exchange positions, and hold a significant part of the portfolio in government securities. However, this situation indirectly discourages private-sector lending outside of the financial sector. From the public finances' perspectives, under the conditions of a tightened monetary policy stance, the government's costs to sustain debt are also increasing, which combined with increased crises' cost and pre-crises budgetary pressures create serious challenges to the public polices' decision-makers.

At the same time, while there may be initial uncertainty and market volatility during a neighboring geopolitical crisis, financial systems can demonstrate resilience and adaptability. Remittances act as a stabilizing factor, supporting consumption, investment, and contributing to the overall economic activity, where the financial sector plays a vital role in facilitating remittance transfers and providing financial services to the recipients.

In the responsibility of the central bank and regulatory authorities lies to implement measures to maintain stability, such as providing liquidity, implementing prudential regulations, and providing support to the affected sectors. By carefully monitoring the situation and employing appropriate policy tools, the central bank mitigates the adverse effects of the military conflict on the monetary stability. In a sensitive situation and limited capacity to deal with such a multilateral crisis, the international financial assistance and cooperation play an important role in stabilizing the economy and implicitly the financial system.

In the context of policy responses, although the currency level is not a target of the BNM, but as a part of a complex policy instruments, easing pressures on national currency, ensuring that the supply of foreign currency that had been interrupted by the closing of the airspace, the central bank increased the quantity of lei through its standing facilities, foreign exchange swaps, conducting market interventions. Foreign exchange intervention serves to achieving the main price stability goal and financial stability, along with the measures aimed at addressing the liquidity constraints. One of the biggest challenges remaining is the resumption of deposit runs and excessive demand for the foreign currency which erodes the reserves. In such a situation the central bank communication, confidence and credibility play a crucial role. Among other targeted measures, an open and transparent communication can help restore trust and alleviate concerns among depositors and the public. The central bank should clearly communicate its commitment to financial stability, its ability to provide liquidity support, and its readiness to take necessary measures to safeguard the banking sector. In extreme situations, the central bank may resort to imposing temporary capital controls to limit capital outflows and stabilize the financial system, these can include restrictions on withdrawals, limits on transfers abroad, or measures to discourage speculative activities. But these measures are typically used as a last resort due to their potential impact on financial markets and international reputation.

The IMF Article IV report (IMF, 2022a) chart, from the point of view of a complex analysis and deeper informativeness, conveniently depicts a combination of National Bank of Moldova (BNM) policy tools (Figure 3) - the BNM has increased the policy rates and intervened heavily amid inflation and currency pressures. The Ukraine conflict is exerting additional stress on the Moldovan leu. In response, the BNM has increased the base interest rate to 21.5 per cent and enabled the macroprudential tools.

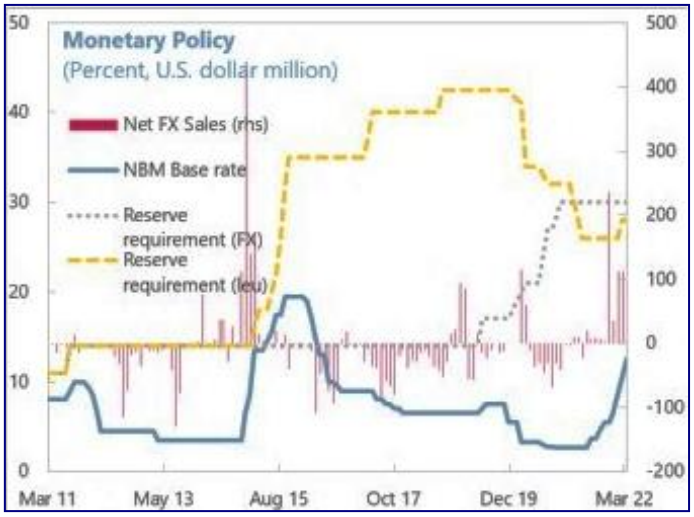

Figure 3. Monetary policy rates and interventions in dynamic

Source: IMF (2022a), p.13

Supply-shock inflation is of concern for many central banks, obviously from the side of NBM further policy interventions will be expected as well. Difficult policy trade-offs are to be found in tackling high inflating while preserving growth and maintaining financial stability. The BNM based on the common knowledge and practice for similar situations, tightened its policy to prioritize the preservation of banking system liquidity and support economic growth, all the while maintaining sufficient foreign currency reserves to manage any unexpected shocks.

Modern central banks, having well-developed analytics tools, conduct predominantly data-based and data-driven policy actions and argue that decisions should continue to be data-dependent. Professional judgement applies as well, for maintaining sound contingency plans, considering the risks of second-round effects and potential further risks' amplification and intensification.

Critics of tightening or fast tightening, are based on households and business shocks, that such a policy produce, and amplify recession. From a point of view, once the inflation is driven by costs of energy and food products, central banks should have a lesser role in the management of current structural inflation, but only support the general government policies. It is therefore recommended to reconsider other policy instruments, which would have a "softer" impact on the participants to the economic relations by helping in making the crisis' effects less felt and shorter, as well as by preserving the value of population's monetary assets.

Public Finance Policy Response

As UN document (Molina et al., 2022, p. 8) gives a broad but comprehensive taxonomy of the policy support toolkit: "the governmental policy toolkit for protecting people's livelihoods has several options: one-off or timebound income support; in-kind and quasi-cash transfers (e.g., school-feeding and vouchers); "blanket" subsidies (e.g., price caps or freezes); unemployment insurance; and tax cuts (e.g., VAT or fuel tax). Each of these options brings advantages but also its own set of challenges—including delivery capacities and fiscal sustainability". Each of the options can move in a certain direction and have effects on another key policy areas, therefore, based on natural logic, authors call for a strong context understanding. The UN study (Molina et al., 2022) results contain the idea that the most developing countries move in the direction of price-related policies, being justified by the urgency to respond to price spikes.

Through the lenses of mentioned taxonomy, despite having a constrained budget, the government of Moldova has responded to the sanitary crisis by combining income assistance programs and policies meant to increase liquidity for businesses and households. Russian invasion of Ukraine emerged in a crucial policy and budgetary need in many respects as well: big inflow of refugees requiring humanitarian and administrative assistance, hindered access to finance for many, due to

declining asset quality, bank runs, and the most important – support of household in dealing with higher food and energy prices.

The authorities adopted a supplementary budget to respond to the shock from the military conflict in Ukraine:

- Aside from external aid, according to the IMF (IMF, 2022a), high inflation boosts revenues by 0.7 per cent of GDP, while higher external grants add a further 0.3 per cent of GDP. Consumption-based taxes comprise around 45 per cent of revenues. Even in conditions of decreased demand, higher price inflation is anticipated to keep nominal consumption-based revenues high. However, concerns still exist for those revenue categories that are less susceptible to inflation.
- Expenditures increased to higher energy costs both for public sector need and households, but also to cover the humanitarian needs of refugees. A targeted household energy costs subsidy scheme was put in place for both winter 2021-2022 and 2022-2023.

High inflation has also put a strain on household budgets, and for preventing a significant drop in living standards and guaranteeing the delivery of essential services, adequate indexation of wages, pensions and social protection payments are necessary. In such circumstances, an increased use of public funds in one of the pillars to sustain the crisis management. Enhancement of effective budget execution and monitoring processes, improving procurement practices, enhancing financial reporting and auditing mechanisms, and strengthening internal controls to prevent corruption and ensure proper use of public resources – all these need an accelerated implementation in order to build resilience in face of the current shocks.

For the assistance receiving country as Moldova is, it is essential to work on sound debt management practices for strengthening the fiscal stability. One should not overlook the opportunity presented by a crisis, as it provides a chance to develop a comprehensive debt management strategy, establish transparent debt sustainability frameworks, and exercise cautious borrowing practices. It is crucial to meticulously evaluate debt levels, repayment capacity, and the associated risks to avert the accumulation of unsustainable debt burdens.

Although all the attention is turned towards the current problems, but enhancing the overall public sector crisis resilience would have longer-term effects. For example, enhancing the revenue mobilization, which is vital for the fiscal sustainability in time, will create a solid base to the improving tax administration, stimulate the reducing of tax evasion, broadening the tax base, simplifying tax system, ensuring a fair and efficient tax structure and strengthening the fiscal discipline. Measures such as exploring non-tax revenue generation opportunities, such as public-private partnerships should be considered as these, by their flexibility, could significantly contribute to strengthening revenue streams and participation in the policy toolkit.

Discussions and Recommendations

In circumstances of an energy security crisis, the government should mobilize urgent efforts to develop and diversify its capacities primarily in the fields that as a result of the crisis were found to be problematic and vulnerable. In that sense, competent authorities shall urgently review the energy policy in light of the changing energy markets' environment, develop contingency plans considering the lessons learned during the crises and deploy alternative energy sources projects suitable to Moldova's regional characteristics. Taking into account that problems are multifaceted, the search for solutions creates a base for stronger cross-sectoral cooperation thus strengthening optimal policy formulation capacities and providing opportunities to solve more problems at once, for instance, energy sectors' challenges are interconnected with social well-being through costs, as well as climate, environmental and economic aspects.

To enhance government and central bank policies in order to tackle recent and current supply-side shocks, while limiting recession effects, several key principles and strategies could be considered:

- It is essential for policymakers to demonstrate adaptability and preparedness in response to fluctuating economic circumstances. This may necessitate improved synchronization between fiscal and monetary authorities, along with modifications to the intensity and emphasis of policy measures

as the situation unfolds. For instance, policymakers could adjust their fiscal stimulus or monetary contraction programs depending on the severity and duration of the supply disruptions, as well as their impact on inflation and growth expectations. The failure to rightly balance the policy response is necessary to avoid overreacting or underreacting to the supply-side shocks, which may cost the economy in terms of lost growth. Tailoring the actions to the specific needs and conditions of the economy prevents policy mistakes that could worsen the situation or create new problems, such as triggering inflationary pressures, distorting market signals, or undermining confidence and credibility, which are difficult and takes long to restore.

- It is suggested that policymakers focus more on the active implementation of modern structural reforms that can bolster the economy's ability to withstand prolonged supply-side shocks. At least, the policymakers could prioritize reforms that can improve the resilience and diversification of the energy sector, such as expanding renewable energy sources, enhancing energy efficiency, and reducing dependence on external suppliers. Identifying and investing in the development of infrastructure, including energy infrastructure, fostering human capital, promoting innovation, enhancing labor market flexibility, and encouraging competition. It's crucial to explore and efficiently implement reform strategies, including the investigation of potential trade-offs, challenges, and possible effects.

Implementing modern structural reforms are aimed to bring efficiency to the crisis response policies because they are expected to enhance the productivity, competitiveness and diversification of the economy, implicitly its resilience. This will reduce the vulnerability of the economy to external shocks, as well as its reliance on fiscal and monetary stimulus, and instead foster sustainable and inclusive growth and development.

Diversification of the economy is essential to reduce dependence on traditional sectors. By promoting the development of high-value-added industries, such as technology, innovation, and research, Moldova can leverage scientific advancements to foster economic growth and external competitiveness. This involves fostering collaboration between academia and industry, and creating supportive policies for startups and entrepreneurship.

Infrastructure development plays an important role in attracting investments and supporting economic activities. Robust transportation networks, digital infrastructure, and energy systems enhance connectivity, reduce transaction costs, and promote trade and investment. Emphasizing sustainable and green infrastructure also contribute to long-term environmental sustainability and resilience.

In an emerging economy, the strengthening institutions and governance is a basic necessity for creating an enabling business environment. Measures to reduce corruption, streamline bureaucracy, and enhance the rule of law foster investor confidence and attract foreign direct investment. Implementing effective regulatory frameworks and enforced property rights provide stability for businesses, encouraging innovation and growth.

Investments in human capital, such as education and skills development, enhance workforce productivity in medium and long term. Access to quality education, vocational training programs, and lifelong learning opportunities equip the workforce with the necessary skills for integration in a modern labor market of a rapidly changing global economy. More focused alignment of educational systems with labor market needs ensures a skilled workforce that contribute to economic growth and bring social benefits.

Promoting technology transfer through collaboration between academia, research institutions, and industry facilitates the practical application of scientific knowledge. Establishing innovation ecosystems, supporting research and development activities, and fostering public-private partnerships encourage innovation, technology adoption, and the creation of new industries and job opportunities.

Through these structural reforms and by harnessing scientific advancements, Moldova can significantly enhance its resilience. Reduced reliance on fiscal and monetary stimulus fosters sustainable and inclusive growth, ultimately improving living standards for the population. By embracing these structural reforms, countries Moldova can realize its potential and pave the way for exiting the crisis and also to the long-term economic prosperity.

- Fiscal and monetary management should be prudent during both crises and 'normal' times. It is incumbent upon authorities to maintain a robust financial position to ensure they can react to supply-side shocks without resulting in unsustainable public debt levels, ensuring that revenue and expenditure policies are aligned with long-term development goals. Moreover, policymakers should ensure that their fiscal and monetary interventions are transparent, accountable, and consistent with their long-term objectives and commitments. However, this task can be challenging, particularly in the presence of restrictive policy programs and the ongoing demographic crisis faced by Moldova. Nonetheless, by adhering to principles of efficiency and good governance, policymakers can overcome these challenges and effectively manage their interventions. Efficiency principles emphasize the need to maximize the impact of interventions while minimizing costs and resource wastage. Policymakers should strive to design and implement policies that achieve the desired outcomes in the most effective and efficient manner.
Good governance practices, such as transparency, accountability, and stakeholder engagement, provide a framework for sound decision-making and effective implementation of interventions.

Transparency is essential in ensuring that the decision-making process and outcomes of fiscal and monetary interventions are clear and accessible to the public. This requires policymakers to provide comprehensive information about the rationale, goals, and expected impacts and results of their interventions. By doing so, they will foster trust and confidence among citizens, businesses, and investors.

Accountability is another key aspect that policymakers must prioritize. They should be held responsible for their actions and outcomes, both in terms of meeting the objectives set for their interventions and managing public funds effectively. By establishing robust mechanisms for monitoring and evaluation, policymakers can ensure that their interventions are delivering the desired results and making efficient use of available resources.

Finally, the consistency with long-term objectives and commitments is important to avoid short-term decision-making that may undermine sustainable development and long-term stability. Policymakers should align their interventions with overarching goals such as reducing inequality, promoting sustainable growth, and ensuring fiscal sustainability. By maintaining consistency, policymakers will provide a stable and predictable environment that encourages investment and economic progress.

- Internationality and multilateralism are vital to an efficient cooperation. Given that the current crisis impacts multiple sectors and geographic areas, governments and central banks should collaborate internally and with their international counterparts to coordinate policy responses and exchange best practices. This could entail harmonizing regulatory frameworks, facilitating cross-border trade and investment flows, sharing information and data, providing mutual assistance and support, and participating in regional or global initiatives and institutions.
Not the least role of fostering synergies, is that through them is possible to promote mutual learning and cooperation, which can facilitate the identification and implementation of best practices and solutions.

The findings of this analysis suggest that while monetary and fiscal authorities are not the main actors in the current circumstances, they play a crucial role as supporters of wider national policies. In light of their deep knowledge of economic interlinkages and the ability to take a holistic view, monetary and fiscal authorities must contribute significantly to shaping crisis management actions.

Through re-emphasizing the importance of efficient principles and strategies, the government and the central bank will enhance their policy responses to the current supply-side shocks, minimizing the risk of causing a recession and ensuring a more resilient and stable economy.

Conclusions

The primary channels of transmission of the conflict in Ukraine are financial markets interlinkages, disruptions to the logistics and trade, accelerated migration and supply-side inflation - all of which have a significant impact on the economy and society’s wellbeing. For an externally dependent country as Moldova, the key specific risks continue to include disruptions in the energy supply and

a further unanticipated rise in energy prices. Lost opportunity trade-related profits, social support programs and government debt financing erode fiscal sustainability and at the first sight, minimize the space for government actions.

Additional but resultative risks in the financial sector include deteriorating confidence effects, which would increase systemic liquidity constraints and put pressure on currency rates. The opportunity for the economy consists in the scenario, where when an armed conflict breaks out in a nearby country, it affects the trade relations with that country, but it can also open up new possibilities for the local industries to meet the demand that the war-torn country cannot satisfy. This can stimulate domestic output, export variety, and sectoral growth. Consequently, the financial sector may gain from providing and assisting these rising industries.

Government support is essential when an economy faces such prolonged supply-side shocks caused by a geopolitical crisis, because it helps stabilize the economy, protect vulnerable population, encourage investment and innovation, and foster coordination and cooperation among various stakeholders.

In current conditions of structural inflation, monetary policy and fiscal policy shall have a secondary/ supportive role to other necessary key policies for talking current crisis. But the complex nature of risk factors, rise the opportunity for better policy cooperation and solving more of the problems with optimally combined responses. Therefore, in order to preserve growth potential and keeping living standards, would be appropriate to consider alternative policy tools and their better coordination with the social goals and policies. By adopting efficiency principles and good governance practices, policymakers will optimize the use of available resources, ensure effective allocation of funds, and implement measures that address the specific needs arising from the current crisis.

By focusing on critical areas and tasks in policy discussions, policymakers could develop a comprehensive and coherent approach to addressing current challenges, thus minimizing the risk of a recession, while ensuring the long-term stability and resilience of the economy and population's welfare.

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SECTION II. FINANCIAL AND MONETARY CHALLENGES

FINANCING AND LENDING IN THE E-COMMERCE ECOSYSTEM: BENEFITS AND CHALLENGES OF AN AI-DRIVEN ENVIRONMENT

Tudor CIUMARA [28]

Abstract: *In this paper we investigate some key financial aspects of e-commerce and the use of emerging artificial intelligence (AI) tools. Considering the exponential growth of e-commerce, we note a significant change in the manner in which businesses use financing and lending. Therefore, the analysis focuses on the role of AI in reshaping these financial processes. Potential advantages, such as enhanced accuracy, automation, personalization, and rapid adaptability to market shifts are considered. Also, we look into potential challenges such as the risk of algorithmic discrimination, data security issues, and dealing with an evolving regulatory framework. With the use of available data, the paper highlights practical applications of AI in e-commerce financing and lending processes, concluding with a perspective on future trends in the field.*

Keywords: *artificial intelligence, e-commerce, financing, lending*

JEL classification: *L81, L86, O33*

Introduction

The exponential growth of e-commerce is an obvious trend, as a result of the digital age, which is characterized by ample technology improvements and more worldwide communication. The COVID19 pandemic brought a shift in the adoption rate of e-commerce and accelerated its gaining of a rapidly increasing share of total trade. A useful perspective on the role of artificial intelligence on e-commerce was provided by Soni (2020), a few years before the actual hype on this issue began. Numerous businesses switched from traditional brick-and-mortar locations to online platforms, and it was obvious that the corresponding financial systems had significantly changed. E-commerce requires unique or tailored finance and lending solutions since it operates, scales, and interacts with customers in a unique way. The sector's dynamism, where enterprises constantly adjust to changes in consumer behavior, technology, market trends, and regulatory frameworks, further compounds these complexities.

The foundation of the current technological revolution, artificial intelligence (AI), is gradually integrating into the structure of e-commerce financing. Even if its roots can be traced many years ago, only in 2023 it became a really significant trend for all companies. The capabilities of AI, which also include data analysis and predictive modeling, offer answers to some complex problems that the digital commercial landscape presents. But while the use of AI has a wide range of potential advantages, it also comes with numerous complications. As examples of the complexities involved, unintentional biases, data security issues, and regulatory ambiguity need to be mentioned, along to human reluctance of lack of adequate skills.

In this paper I aim to explore some of the mutually beneficial aspects of the relationship between artificial intelligence and e-commerce financing. This is not an easy task, considering both the depth of the subject and its novelty, which leads to a lack of relevant data. I intend to offer a structured perspective of the current situation and future possibilities, acknowledging some benefits afforded by AI, such as improved accuracy and flexibility, and contrasting them against the problems. The main objective is to understand how, if used wisely, AI might spark a more equal, effective, and robust financial environment in the e-commerce industry.

"Financing" typically refers to the process of providing funds for business activities, making

[28] *PhD,Centre for Financial and Monetary Research "Victor Slăvescu", Romanian Academy, Bucharest, Romania. E-mail:tudor@ciumara.ro. ORCID: https://orcid.org/0000-0001-5142-3538.*

purchases, or investing. In the context of e-commerce, this can contain various mechanisms:

•Equity financing, where e-commerce businesses raise capital by selling shares.

•Debt financing, which involves borrowing money through mechanisms other than traditional loans, such as issuing bonds.

•Self-financing or bootstrapping, where business operations are run on the founder's personal savings or the company's revenue.

AI can impact financing in various ways, such as predictive analytics helping investors identify profitable e-commerce ventures or tools that help businesses optimize their financial strategy.

"Lending", on the other hand, specifically refers to the act of providing funds on the agreement they will be returned, typically with interest. In the e-commerce arena, this might involve:

•Consumer-facing credit solutions, like "buy now, pay later" services.

•Business loans provided to e-commerce entities to aid in their growth or manage cash flow.

AI's role in lending is expansive. Advanced algorithms can assess credit risk by analyzing vast amounts of data quickly, leading to faster loan approvals. Moreover, AI can help in fraud detection, ensuring safer lending processes in e-commerce.

Description of the Problem

Characterized by its ability to rapidly change and evolve, the e-commerce ecosystem is driving new patterns of business activity and customer interactions (Lari, 2022). These changes create complex webs of financial challenges (Kanodia, 2023). As e-commerce companies are challenged by issues such as managing inventory, predicting customer needs and navigating global supply chains, they also face different types of financial constraints from traditional operations of arrangements. Therefore, some aspects need to be discussed:

a) The need for advanced/adjusted financial instruments, due to the existence of:

•Diverse business models: E-commerce platforms span a variety of business models, from B2B and B2C to C2C and dropshipping. Each model presents unique financial challenges, such as varying cash flow patterns, credit demands, and risk profiles.

•Global operations and currency transfer challenges: Unlike localized brick-and-mortar stores, e-commerce entities often operate on a global or at least international scale. This introduces complexities related to currency fluctuations, cross-border taxation, and diverse financial regulations.

•Dynamic market environment: The online marketplace is subject to swift changes. Events like flash sales, product launches, or even viral social media trends can cause abrupt spikes or dips in revenue, requiring adequate financial strategies.

b) Ensuring equitable implementation of AI, while considering aspects such as:

•Algorithms challenges: The "black-box" nature of many AI models makes it challenging to understand their decision-making processes. This opacity can inadvertently result in biases, whether understood or not, which can lead to misguided decisions.

•Data reliability: AI models are only as good as the data they are trained on. Inaccurate, outdated, or otherwise flawed data can result in misinformed financial decisions, potentially causing harm to businesses relying on them.

•Ethical considerations: Beyond the technical aspects, there are ethical concerns. Questions arise about who holds responsibility if an AI-driven financial tool leads to errors or causes harm, or how to ensure that AI-driven financial solutions remain accessible to all businesses, including small and upcoming entities, without bias.

c) Adapting to an evolving landscape, taking into considerations issues like:

•Consumer needs and expectations: With the integration of AI in e-commerce, consumers have grown accustomed to personalized experiences. This personalization extends beyond product recommendations to financial services, like credit offerings and payment plans, tailored to individual financial health and purchase history. Often, however, too much personalization may lead to fear for loss of privacy and manipulation.

•Regulatory challenges: As governments and financial institutions come to terms with the implications of AI, and slowly understand it’s power and characteristics, they're constantly updating regulations to ensure consumer and business protection (Hasan, Rizvi, 2022). E-commerce platforms need to stay updated and compliant with current regulations, which can be a moving target in this ever-evolving environment.

A brief investigation of the payment options offered by national or international e-commerce stores or marketplaces (Amazon, Dedeman, eMag, Empria, Walmart, 2023) reveals a large diversity of options, certainly much larger than that available at traditional stores. This highlights the importance of payments in e-commerce and also the potential for the use of AI tools in this area.

In conclusion, while AI presents a promising solution to many of the financial challenges faced by e-commerce platforms, its integration is not without complications.

Methodology

This research paper adopts a qualitative approach, relying on the author's personal knowledge and an exhaustive analysis of current trends in the field. Therefore, no empirical or experimental data is used; instead, a synthesis of the specialized literature is carried out to identify and discuss the main developments and challenges in the studied field.

It is important to note that, as the research does not involve empirical data or statistical analysis, the conclusions drawn are largely interpretive and may be subjective. Certainly, it must be acknowledged that as an analysis based solely on existing literature, it may not (and probably does not) cover the entire spectrum of perspectives and experiences in the studied field. These limitations are acknowledged and taken into consideration in interpreting the conclusions and future directions indications.

Conclusions

While AI undeniably brings a plethora of advantages to the table (some of the mentioned in Glajchen, 2022), its challenges cannot be ignored. The advantages highlight the potential that artificial intelligence has in revolutionizing the financial landscape of e-commerce. However, the challenges highlight the pressing need for more transparent, secure, and standardized AI applications in finance.

The interplay and synergies between AI and e-commerce financing are deep, probably leading to a reshaping of the industry's foundations. This intricate relationship, with its numerous facets, presents an innovative frontier for businesses to harness AI's capabilities while navigating its complexities. This analysis leads us to several basic conclusions:

a) Inescapable advancements: AI's integration into e-commerce financing isn't just an advancement—it's becoming a necessity. The sheer volume of data and the rapid pace of the digital market environment make human-driven analytics and decision-making increasingly difficult to manage. AI's promise of enhanced accuracy, efficiency, and personalization appears to become an essential tool for future financial strategies. Most importantly, it appears to be here to stay and accompany the development of the business environment.

b) Dual-edged sword: While considering its potential, AI remains a tool with dual outcomes. While its capabilities can lead to growth, efficient processes, and optimized decision-making, it is also bringing challenges, such as biases or even fraud. A transparent approach to AI-driven financing can mitigate many of these challenges.

c) Evolutionary, not revolutionary: AI's integration into e-commerce financing is an evolutionary process, not a sudden revolution. Businesses, regulators, and consumers need to understand that while AI can be transformative, it is not an overnight solution. A gradual approach, with continuous learning, adaptation, and improvement, will yield the most sustainable results.

d) Collaborative frameworks are important: The challenges - ranging from algorithmic biases to regulatory ambiguities - highlight the need for a collaborative approach. Stakeholders from all sectors, including AI developers, e-commerce platforms, regulators, and consumer protection groups, need to engage in an ongoing dialogue. This ensures that the ecosystem evolves cohesively, with checks and balances in place.

e) Ethical responsibility: Beyond technical and regulatory aspects, there is an ethical dimension. As businesses increasingly rely on AI for financial decisions, there's a responsibility to ensure that these decisions are made fairly, transparently, and without undue harm to any party. Businesses must consider not just what AI can do, but also what it should do.

In summary, AI's role in e-commerce financing is clear and can be viewed as transformative. However, as with all transformative tools, its application needs to be approached both with of enthusiasm and caution. The future of e-commerce financing is not just about leveraging AI's capabilities, but about ensuring its application is responsible, equitable, and aligned with the broader goals of societal progress and fairness.

Future Directions

We find that the business environment is at a crossroad and there is a need for new skills to navigates the challenges that lay ahead, while maximizing the benefits. The confluence of AI and e-commerce financing paints a picture of great potential. Based on this analysis and insights, several future directions emerge:

a) There is a need for enhanced data security, to reduce the foreseeable misuse of AI in this field.

b) Regulatory innovations and collaboration, which include global regulatory frameworks (since e-commerce companies often operate across borders, there is a need for internationally coordinated regulatory frameworks for AI in finance to ensure consistency and fairness). Also, as AI evolves, static or slow changing regulations may become outdated. Dynamic, regularly updated regulatory mechanisms, developed in collaboration with tech leaders, can ensure relevance and effectiveness.

c) Ethical aspects regarding AI-driven financing. This is an area that will probably bring many interesting developments, considering the vast ethical implications of the use of AI.

d) Consumer and business education. Artificial Intelligence literacy is one area that will fast become very important. As AI plays a larger role in finance, consumers and businesses must be educated about its functions, benefits, and potential risks. This will enable informed decision-making and promote trust in AI-driven financial tools.

e) Interdisciplinary aspects. Merging tech and finance expertise to a higher degree than before will lead to future innovations, which will benefit from a collaborative approach, bringing together AI experts, finance professionals, ethicists, and consumer advocates. This interdisciplinary synergy can lead to improved and sustainable solutions that address technical, financial, and ethical dimensions.

Imagining the road ahead, it becomes evident that the journey of integrating AI into e-commerce financing is complex and multifaceted. A proactive, informed, and collaborative approach will be of utmost importance in shaping a future where AI doesn't just drive financial processes but does so in a manner that's secure, transparent, and sustainable. The promise of AI in e-commerce financing is immense, but its true potential will be realized through concerted efforts across sectors and disciplines.

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THE FALL OF THE CRYPTOCURRENCY MARKET

Cătălin DRĂGOI[29]

Abstract:

Started following the financial crisis of 2008 with the launch of the first virtual currency - bitcoin (launched in 2009), which was followed by the subsequent launch of hundreds and then thousands of other virtual currencies, the value of the crypto currency market has constantly developed attracting an increasing number of participants and which required the development of an increasing number of trading platforms. Cryptocurrency markets are made up of companies that launch virtual currencies, those that trade these currencies and trading platforms. Virtual currency exchanges are similar to stock exchanges, only that they exist exclusively in the online environment and being still at the beginning, they have a relatively short existence time, they are less regulated. Even if the desire of those active in the crypto market "to buy coffee with bitcoin" is far from being achieved because the number of commercial agents that accept payment with cryptocurrencies is limited, most new participants were attracted by the potential quick earnings that the companies launching different virtual currencies promised them, the crypto market grew rapidly reaching a capitalization of almost 3 trillion uds at the end of 2021 and investors' hopes had taken wings, followed by a sudden fall in the markets, in a few months the capitalization reached at less than one trillion usd. The paper aims to analyze what are the main factors that influence the evolution of cryptocurrencies and to explain what was the sum of factors that led to the collapse of the cryptocurrency market in 2022.

Keywords*: cryptocurrency; cryptocurrency market;*

JEL Classification*: E42, G23, O23;*

Introduction

Virtual currencies have often been compared with fiat currencies issued by the national banks of different states, being considered a possible alternative to them, with private currencies, with gold (especially bitcoin because it has a finite amount and is obtained through a process called "mining "), with the shares of existing companies on the stock exchanges, with gambling, or with Ponzi-type pyramid schemes. Given the degree of novelty brought by the appearance of virtual currencies and the rapid evolution through the integration of innovative ideas in the mode of encryption, issuance, transaction, use, in order to be able to explain the evolution of crypto markets it is important to analyze their "currency" characteristics, especially by comparing with fiat currency and private currencies. Then we will see what were the conditions and factors that triggered the sudden fall of the cryptocurrency market in 2022.To be considered currency, a form of money (eg digital currencies) must be able to be used as a unit of account, store of value and medium of exchange.

Characteristics of virtual currencies

Cryptocurrencies are used as a means of saving (with much higher volatility than traditional currencies), but they largely fall short of the other two criteria.

Cryptocurrencies have no intrinsic value. Although limited as a resource - bitcoin and other cryptocurrencies have a finite supply - investors trade them in hopes of higher value in the future,

[29] *Researcher, Centre for Financial and Monetary Research "Victor Slăvescu", Romanian Academy, Bucharest, Romania, E-mail: hipercub@gmail.com.*

rather than the ability to purchase other goods and services. However, use for other initial coin offerings is growing.

As a medium of exchange, cryptocurrencies are only used to a limited extent for the purchase of goods and services, with a limited number of economic agents using them.

In addition, virtual currencies are generally converted into sovereign currencies after transfer. Therefore, cryptocurrencies are not used for accounting purposes, (they do not satisfy the characteristics of the unit of account).

Volatility is an obstacle to the acceptance of cryptocurrencies for making payments, being a unit of account and a store of value. Digital currencies exhibit extreme volatility with a purchasing power that changes continuously and rapidly.

Price stability is essential for currencies to be a reliable medium of exchange. If the value of the digital currency goes down, it encourages consumers to get rid of it as quickly as possible, and if it is rising, to buy it.

Despite the technological novelty, cryptocurrencies are a contemporary form of private money. Private currency is a unit of value issued by a private business entity, (private bank, financial or non-financial institution, or a natural person), which is accepted as a means of payment by other economic agents [30].

However, this term is also sometimes applied to similar liabilities issued by local public authorities or municipalities, or by public banks. In such broader interpretations, we are talking about decentralized money rather than private money.

In economic history, private money was a popular phenomenon between the late 18th and early 20th centuries, and was associated with the era of "free banking" - when banks they were subject to relatively little regulation and had the right to issue notes that served as a means of payment for the general public.

Private money existed in parallel with sovereign money, such as coins minted by the government or notes from government banks that gradually assumed the role of the central bank. Private money emerged in the early industrial era as a necessity to the rapidly growing demand for money and credit that could not be met by traditional means of payment.

In the mid-19th century, the opposite trend began, countries established their central banks and gradually gave them regulatory powers over private commercial banks, the role of lender of last resort and the central monetary authority with dominant rights or even exclusive rights to issue national currencies.

It should be remembered that various money surrogates, such as promissory notes, barter transactions, clearing accounts, were designed to avoid liquidity constraints. They were and are used in special circumstances, such as doing business in remote locations, closing banks in times of financial crisis, wars and other conflicts, conducting business operations in the absence of currency convertibility, or circumventing harsh budget constraints by state-owned enterprises in the first stages of the post-communist transition. However, money surrogates cannot be considered as full-fledged money and do not provide a benchmark for comparison with cryptocurrencies.

Private money has failed to compete against sovereign currencies. There are two major advantages of sovereign currencies: network externalities and the potential ability to address the problems of information asymmetry and adverse selection.

Network externality means that a given currency is widely accepted by other economic agents in a given market and performs all the functions of money. This allows the creation of a sufficiently extensive and liquid financial market for various instruments. This was not possible in the environment where several private currencies circulated in parallel and competed with each other.

The existence of several private currencies in a certain territory meant an increase in transaction costs for all economic agents. Even though they were denominated in the same currency, they were traded at different rates depending on the reputation and reliability of their issuers – with volatile and unpredictable exchange rates. Sovereign currencies eliminated this competition between currencies and helped create single internal markets for goods and services in individual currency jurisdictions.

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[30] https://www.investopedia.com/terms/p/private-currency.asp

This was an important expansion of the network for all economic agents - using the same currency as buyers, suppliers, creditors, debtors and tax authorities.

The problem of information asymmetry (ie the informational advantage of the financial service provider over its customers and its inability to fully assess the quality of the purchased product, including private currency) is inherently present in financial intermediation. This creates the possibility for the issuer to take excessive risks at the cost of customers and even the risk of intentional abuse or fraud.

Free banking competition does not always lead to the choice of the best products (in this case, private money) and the best providers. Therefore, the need to address the problem of information asymmetry and adverse selection serves as the main argument in favor of government regulation of financial services.

The need to have stable and reliable money for the proper functioning of the market economy forced most countries to adopt the gold standard in the second half of the 19th century, which largely eliminated the monetary discretion of governments. In the early 1970s after a period of higher inflation, the role of the stabilization mechanism was taken over by central banks that set strict monetary policy rules.

Compared to private currencies, cryptocurrencies differ in particular by their global or "non-local" characteristic, as well as their "virtual" character (there was no attempt to launch physical tokens). On the other hand, private currencies fulfilled the characteristics of currency, cryptocurrencies did not reach this "performance".

Looking at the technological features of cryptocurrencies at least some of them (such as bitcoin) offer a chance to eliminate at least some of the disadvantages of private money mentioned above. The transparency of their operation and the predetermined algorithm of their creation reduce information asymmetry.

However, their exclusively digital form, the rather complicated mechanism of their creation and the lack of political will to accept them as official legal tender in any jurisdiction (at least for the foreseeable future) limits their circulation and use and will make them unlikely to be competitors sovereign money. (See also the study "Virtual currencies and central banks monetary policy challenges ahead" [31])

2022- Cryptocurrency crush

The evolution of bitcoin:

- In 2009, bitcoin, the first virtual currency, appeared.
- Until 2011, it has a price with evolution from $0.3/bitcoin to $11
- In 2013 the price jumps from $14 to $1000 based on the economic crisis in Cyprus which led to the blocking of the bank accounts of many depositors.
- Since 2014, bitcoin miners and investors have appeared, which will take the crypto market to another level.
- In the first two weeks of March 2020, bitcoin fell by more than 40% due to concerns about Covid-19, investors sold everything in panic
- In 2021, the price rose more than 700% in 12 months to a record $69,000 in November
- In June 2022, it fell below $18,000.
- In February 2023 the price is around $22,000.

[31] http://www.europarl.europa.eu/RegData/etudes/IDAN/2018/619009/IPOL_IDA(2018)619009_EN.pdf

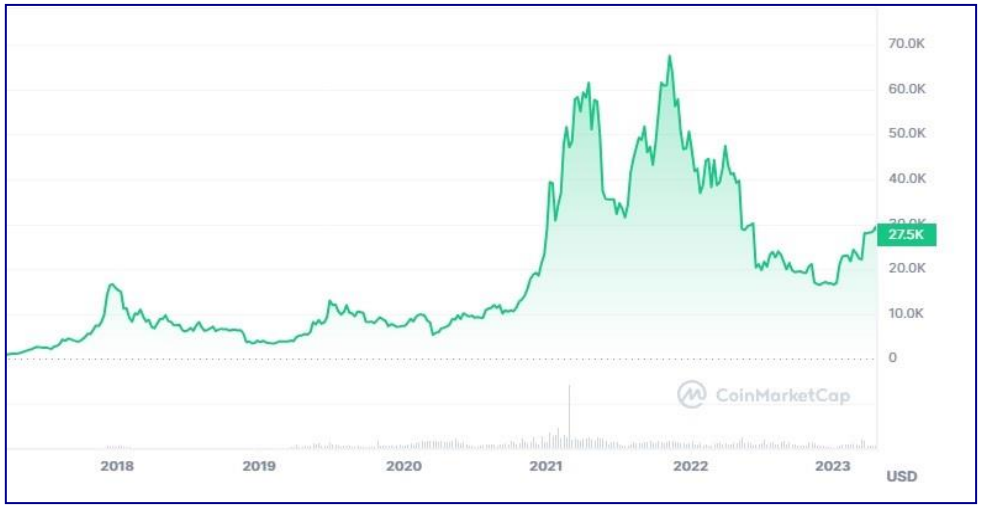

Figure 1. Historical bitcoin price (2017-2023)

Source: https://coinmarketcap.com/

It appears that the bitcoin bubble has burst as investors have lost faith in the crypto sector. Uncertainty about bitcoin's future caused prices to crash. Although there are signs of recovery, it is still far from record highs.

There were also big falls in the crypto market in other years (2013, 2014, 2017), but on a different scale because there was less interest in the field, there were fewer investors and investments in cryptocurrencies were smaller. For the first time, the total number of virtual coins was decreasing for a long period, approximately one year. On the other hand, the crypto crush of 2022 surprised even by the fact that currencies considered stable, called "stablecoin", created precisely to be less volatile and whose value is directly linked to asset reserves such as US federal bonds, small amounts of cash and corporate debt. The most famous stablecoin is Theter. The same dramatic loss of value was recorded by the stablecoin Terra (from the Luna-TerraUSD crypto binomial), which is not directly linked to the dollar, but is supported by an algorithm that adjusts the offer of Terra through the other currency, Luna, so that Terra maintains its parity with the dollar.

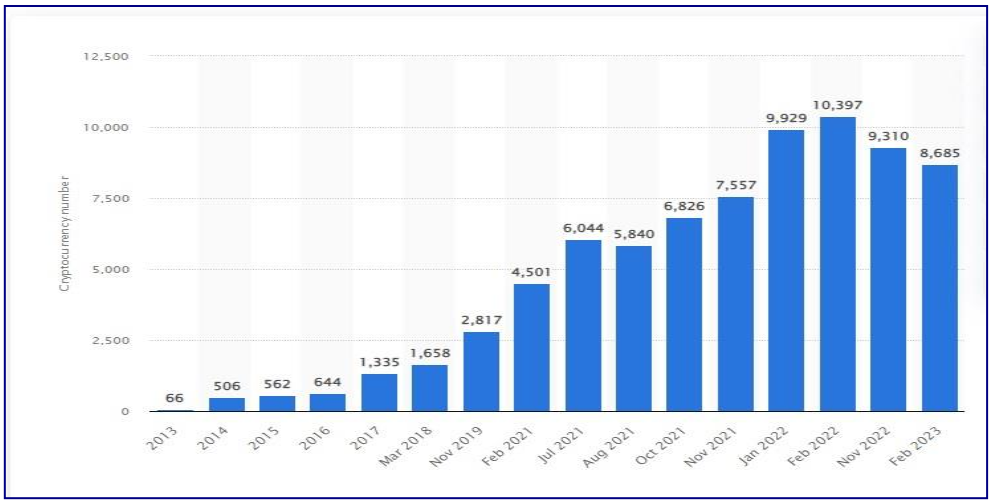

Figure 2. Number of cryptocurrencies worldwide from 2013 to 2023

Source: https://www.statista.com

Cryptocurrency Market Component (February 2023):

Total capitalization approximately 920 billion dollars, of which:

- The top 50 cryptocurrencies with a capitalization of more than $1 billion each;
- Top 10 cryptocurrencies by market capitalization with capitalization over $10 billion each;
- The top three virtual currencies: bitcoin $420 billion (45.6% of the total cryptocurrency market), ethereum $185 billion (20% of the crypto market) and tether $69 billion (7.5% of the crypto market)

The cryptocurrency market went into a decline as a result of the general conditions at the global level generated by the war in Ukraine which led to a state of uncertainty and stress at the level of the population, inflationary fears as a result of extremely large and rapid increases in the price of gas . natural resources and the price of energy, the decrease in the value of real interest rates in conditions where interest rates have increased at a lower rate than inflation rates in various countries, bans on mining or trading in various countries such as China, regulatory trends around the globe (but especially in the USA and the EU), environmental concern in the conditions of the energy crisis, the level of consumption for a bitcoin minar equals the consumption of a medium-sized country, security problems, many frauds and shows that the dark web works through crypto payments due to. the fact that the participants in the transaction remain anonymous.

Sudden and severe sell-offs in major cryptocurrencies that triggered panic and subsequent cascading sales once consumer confidence was damaged.

There were a series of incidents that determined the price fluctuation (in reverse chronological order, considering that the closer they are to the current moment, the more obvious the effects are):

- 2023, the US Federal Reserve, the ECB, and other national banks consider launching their own "central bank digital currency" (CBDC).

- November 2022, cryptocurrency trading platform FTX went bankrupt after its rival Binance pulled out of a deal to buy it

- June 2022, Celsius Network, a major US cryptocurrency lending company, froze withdrawals and transfers, citing "extreme" conditions.

- June 2022 Binance, one of the world's largest cryptocurrency exchanges, halted bitcoin withdrawals, (blaming a "blocked transaction" that caused a backlog).

- February 2022, it was reported that Russia may ban cryptocurrency operations.

- after the invasion of Ukraine, cryptocurrency trading platforms were called upon to ban Russian transactions.

- March 2022, President Joe Biden issued an executive order proposing to coordinate the actions of the US government on the regulation of digital assets.

- May 2021 ElonMusk said electric car maker Tesla will no longer accept digital payments due to concerns about the environmental impact of cryptocurrency mining.

- June 2021, banks and payment institutions in China were forced to stop allowing crypto transactions and the Chinese government banned cryptocurrency mining. Then, in September 2021, all crypto transactions were declared illegal.

- June 2021 President Donald Trump described bitcoin as a "scam" competing with the dollar to be "the world's currency".

- August 2021, the Financial Conduct Authority, the UK regulator, blacklisted Binance, one of the largest cryptocurrency trading platforms. Big banks HSBC and have followed Santander's lead as well as how to make payments to Binance.

- August 2021, the International Monetary Fund issued a warning on countries using cryptocurrencies as legal tender, saying that their widespread use would threaten "macroeconomic stability" and could compromise financial integrity.

- August 2021, Cryptocurrency Theft: Last August, a hacker stole $600 million in a cyber attack from the PolyNetwork crypto platform,

Conclusions

Unlike traditional investments such as a company's stock, where price movements are influenced by the performance of the business, cryptocurrencies do not have an underlying asset. This means that its price movements are based solely on expectations among investors about future price developments. Therefore, there can be sudden and large amplitude fluctuations in the price of cryptocurrencies, in very short periods of time, even less than a day. Right now, high inflation and the cost of living crisis are causing people to reduce their investment risk by selling cryptocurrencies.

On the other hand when assets rise very quickly in price and reach a record high, this makes a crash much more likely - or at least a correction, which lowers the price to a more "normal" level.

What was the main cause of the fall of the crypto market in 2023? It is not possible to speak of a specific factor, but of an accumulation of factors that include both existing global conditions and certain "incidents" regarding the crypto field, together they formed a perfect storm in which investors on an emotional basis sold excessively many crypto assets.

What will happen in the crypto market? As in the previous cases, the crypto market will recover after a period, it will have ups and downs, but overall the capitalization value will tend to increase. And this will happen related to economic developments at the global level but also to the possible regulations that may appear and can boost the crypto field or stop it.

The qualities of virtual currencies characterized by simple and cheap transactions by eliminating intermediaries, new technology that can revolutionize transactions and global trade, because, a non-fiat currency, it does not raise problems regarding exchange rates, confidentiality of transactions, deposits of safe value, in the meaning that it cannot be printed or confiscated, and in certain situations they can be a hedge against inflation, and last but not least the fact that there are investors who consider cryptocurrencies as a diversifier in balanced portfolios to which is added technological innovation and the generation of new solutions that to adapt to the challenges of the crypto market but also of the banking and financial market can lead the entire crypto environment (cryptoassets and related technologies) to spectacular yet unsuspected developments.

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THE MACROECONOMIC DETERMINANTS OF CREDIT RISK IN THE ALBANIAN BANKING SECTOR

Albina HYSAJ[32]

Abstract:

The Albanian financial system, due to the lack of financial market, development is mainly based on the banking system. The banking system has a decisive role in the financial economy of the country as the banks are the main intermediaries and the main source of financing. Considering its role, the developments and challenges of the banking system are important for the development and soundness of the economy of Albania. The 2007-2008 global financial crisis has shown that the management of banks' risks especially credit risk is very important not only for the national financial system but at the international level as well.

Through an empirical analysis, by employing a multiple regression model, the study aims to investigate the effect of main macroeconomic variables such as unemployment, inflation, lending interest rate, GDP growth rate, and exchange rate on nonperforming loans rate for the period from 2010 until 2022. The data are retrieved from the database of the World Bank and the E-Views software is used to analyze the collected data. The empirical findings of the study imply that the inflation rate, the exchange rate, and the unemployment rate, are significant determinants of the level of non-performing loans. The employed test fails to prove that the GDP growth rate and lending interest rate are significant in determining the rate of non-performing loans. The findings suggest that when the inflation rate increases, the rate of non-performing loans decreases, while when the unemployment rate increases the rate of nonperforming loans increases as well. Moreover, when the Euro becomes more expensive in terms of Albanian Lek, the rate of non-performing loans increases.

Keywords: *credit risk, non-performing loans, macroeconomic*

JEL classification: *C32, E51, G21*

Introduction

The banking system is the main component of the financial system in Albania. Based on the statistics published by the Bank of Albania, bank assets amount to 90% of the overall financial sector assets in 2022 (Q3), with currently 11 banks with foreign and domestic capital operating in Albania (BOA, 2023). As the country still does not have a stock exchange, the banking sector is the main source of financing not only for households but for companies as well.

The value of total loans has increased year by year, reaching a level of about 7.172 billion dollars at the end of 2022. Even though the value of total loans is increasing, the percentage of non-performing loans has decreased in recent years. However, during post-crisis periods, it is noticed a sharp increase in the ratio of non-performing loans.

[32] *Doctor of Philosophy Faculty of Economics and Administrative Sciences, Epoka University, Tirana, Albania. E-mail: albinahysaj@gmail.com. ORCID: 0000-0001-9632-316X.*

Figure 1. shows that non-performing loans have increased following the financial crisis of 2007-2008. Even though Albania does not have a stock exchange and the spillover effect is not direct, as Italy and Greece which are the main economic partners and among the countries of origin with the highest share of FDIs of Albania, suffered severe effects of the crisis, the overall economy and financial sector of Albania are affected from the crisis as well.

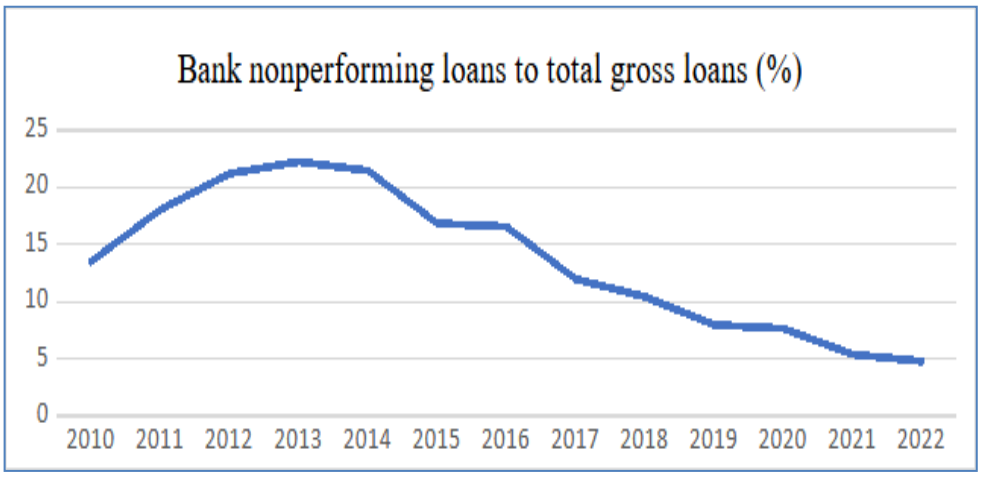

***Figure* 1. Non-performing loans during 2010-2022**

Source: World Bank Data

Figure 2 shows the non-performing loans in Western Balkan countries, Italy, and Greece for the period from 2010 until 2022. The figure shows that there has been a downtrend of non-performing loans starting from 2015 in all countries except Greece because of the severe effects of the last financial crisis in the Greek economy.

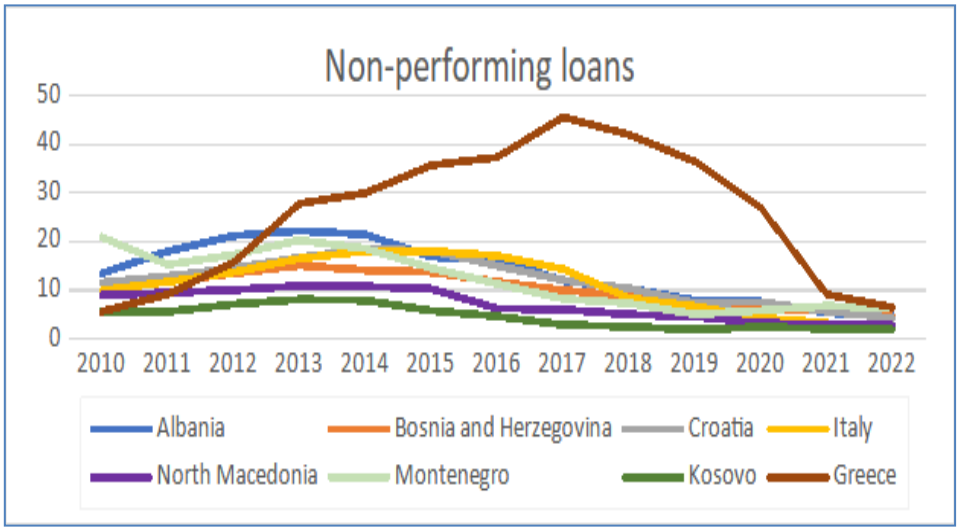

***Figure 2.* Non-performing in Western Balkans, Greece and Italy 2010-2022**

Source: World Bank Data

Gila-Gourgoura & Nikolaidou (2022) investigate the factors determining the credit risk in Albania for the period 1999-2019. They suggest that the Italian debt crisis had a positive impact on bank credit risk, apart from other country-specific factors. Şan (2018) analyses the factors lying behind the increase of nonperforming loans in the Albanian Banks during the recent financial crisis. The study finds that apart from macroeconomic and internal managerial and operational factors, the rise of non-performing loans is explained by the strong economic and social relations that Albania has with Italy and Greece, both countries much affected by the global crises.

The purpose of this research paper is the investigation of the macroeconomic variables that affect the non-performing loan ratio in the Albanian banking system for the period between 2010-2022.

The objective of the study is to identify the effect of each of the chosen macroeconomic variables on the non-performing loans ratio as a proxy of credit risk.

Literature Review

The factors affecting nonperforming loans are divided into two groups, macro factors and micro factors that are related to bank specifics. Naili & Lahrichi (2022) explore the systematic and specific factors that determine the bank non-performing loans in MENA emerging markets from 2000-2019 by using a panel data approach. The empirical results suggest that non-performing loans are determined by macroeconomic factors such as GDP growth, unemployment, inflation, sovereign debt, and specific factors such as bank capitalization, performance, operating inefficiency, ownership concentration, and bank size. Also, Muhammed et al. (2023) analyze the bank-specific and macroeconomic factors that affect non-performing loans in Ethiopia. The authors find that bank-specific factors such as bank size, efficiency, profitability, and capital adequacy positively affect credit risk. Regarding macroeconomic factors, there is a positive relationship between inflation and credit risk, while other factors such as loan growth and currency rates are negatively related to credit risk.

Another study that investigates the bank-specific and macroeconomic factors affecting credit risk in India is conducted by (Antony & Suresh, 2023). The empirical results of panel data modeling suggest that return on equity, bank size, and operational efficiency are negatively related to non-performing loans, while other bank-specific factors such as bank age and ownership type are positively affecting credit risk. While GDP positively affects credit risk, inflation has the opposite effect. Gabeshi (2016) which investigates the determinants of non-performing loans in Albanian banks from 2005 until 2014 by using multiple linear regression finds that credit risk is negatively affected by GDP growth rate, credit growth rate, and share price indices, and positively affected by interest rate, deposit ratio and real exchange rate.

Marouf & Guellil (2017) investigate macroeconomic variables that affect the credit risk in Algeria for the period 1980 until 2014 by using the Ordinary Least Squares and Granger Causality Test. The findings of the study show that factors such as political stability, GDP, financial development, and money supply affect the credit risk in Algerian banks. ALrfai et al. (2022) use panel data regression to analyze the macroeconomic factors influencing credit risk in the Jordanian banking system from 2008 until 2019. They conclude that public debt and remittances increase non-performing loans, whether FDI, tax income, and output gap have the opposite effect. Konstantakis et al. (2016) which use Vector Autoregressive and Vector Error Correction find that during the recession, aside from financial factors, macroeconomic factors such as public debt and unemployment have a significant impact on non-performing loans.

There are many studies that analyze the macroeconomic factors affecting non-performing loans in Albania. Shingjergji (2013) which employs Ordinary Least Squares finds that macroeconomic factors such as GDP growth, foreign exchange rate EUR/ALL, and interest rate affect the level of non-performing loans in Albania for the period from 2005 until 2012. Also Gjini & Koprencka (2018) use simple and multiple regressions to analyze the relationship between macroeconomic variables and non-performing loans in Albania from 2003 until 2016. The authors conclude that the GDP growth rate, interest rate, and unemployment rate negatively impact the non-performing loans. Baholli, Dika, & Xhabija (2015) study the macroeconomic factors that influence non-performing loan rates in Albanian and Italian banking systems by using a simple linear regression model and make a comparison analysis between countries. The findings of their study suggest that the increase in GDP reduces the non-performing loans level, less lending will result in a low level of non-performing loans, while Lek depreciation will increase the non-performing loans level.

Methodology

The literature review suggests that macroeconomic variables are significant determinants of credit risks of banks. Through an empirical analysis, this chapter investigates the macroeconomic variables that determine the non-performing loans in the Albanian commercial banks for the period 2010 until 2022. Based on the literature, this study uses a multiple regression model to analyze the effect of economic growth rate (GDP), inflation rate (INFR), lending interest rate (LIR), unemployment rate (UNEMP) and exchange rate between EUR and ALL (ER)on nonperforming loan rates (NPL), where macroeconomic variables will be the explanatory variables and non-performing loans rate will be the dependent variable. The data for the variables are retrieved from World bank database and Bank of Albania.

The hypotheses that will be tested are:

H1. GDP effect on NPLs is negative

H2. The inflation effect on NPLs is positive

H3. The lending interest rate effect on NPLs is positive

H4. The unemployment effect on NPLs is positive

H5. The exchange rate effect on NPLs is positive

The general regress equation is:

logNPLt = C + b1*logGDPt + b2*logINFRt + b3*logLIRt + b4*logUNEMPt + b4*logERt +μi

In order to have an unbiased model it is important to conduct a series of preliminary tests to address each assumption of the Classical Linear Regression Model. Before continuing with the other test, the stationarity of the series is checked. The stationarity is checked by using the Augmented Dickey-Fuller test statistic. Table 1 gives information regarding the results of this test.

***Table 1*. The estimation of series stationarity**

	t-value	p-value
Log(NPL)	-4.14	0.0008
D(LogGDP)	-2.16	0.0392
D(LogINFR)	-2.84	0.0447
Log(LIR)	-2.7	0.0115
D(LogUNEMP)	-2.43	0.0211
Log(ER)	-2.09	0.0399

Source: Author/ E-views 9

As the time series have less than 30 observations, it is necessary to test if the data are normally distributed by using Jarque–Bera test. The results are shown in Figure 3.

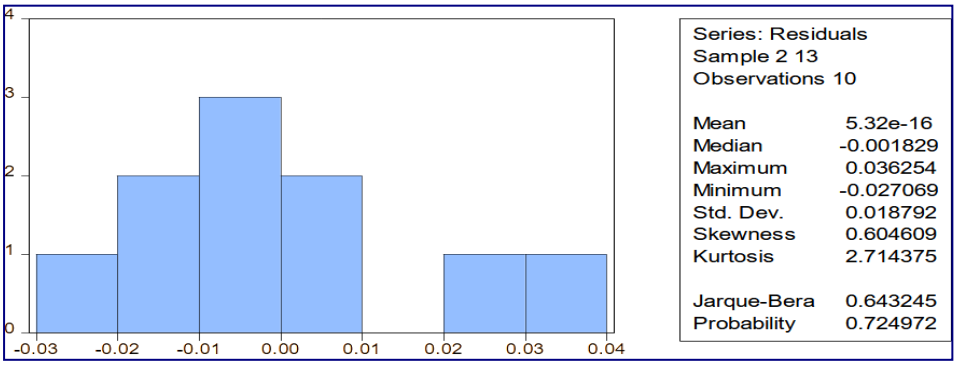

***Figure 3. Histogram* Normality test**

Source: Author/ E-views 9

The probability value is higher than 5%, thus the null hypothesis of the normal distribution of resids can not be rejected.

As the independent variables should not be correlated with each other the multicollinearity test needs to be performed. The correlation matrix is shown in Table 2.

Table 2. **Correlation matrix**

	Log(NPL)	Log(LIR)	D(LogINFR)	D(LogGDP)	Log(ER)	D(LogUNEMP)
Log(NPL)	1					
Log(LIR)	0.66	1				
D(LogINFR)	-0.67	-0.34	1			
D(LogGDP)	0.4	-0.27	-0.13	1		
Log(ER)	0.96	0.66	-0.53	0.46	1	
D(LogUNEMP)	0.55	0.5	-0.22	0.03	0.45	1

Source: Author/ E- views 9

As all values do not exceed the value of 80%, the assumption of no correlation among independent variables is satisfied.

In order to check whether the variability of residuals in this model is constant at different levels of our dependent variable Heteroskedasticity Test Breusch-Pagan-Godfrey is performed and the outcome is shown in table 3.

Table 3. Heteroskedasticity Test output

F-statistic	0.670192	Prob. F(5,4)	0.6688
Obs*R-squared	4.558533	Prob. Chi-Square(5)	0.4721
Scaled explained SS	0.625203	Prob. Chi-Square(5)	0.9868

Source: Author/ E-views 9

As the value of probability is higher than 5% the null hypothesis of no heteroskedasticity cannot be rejected, thus the assumption of homoskedasticity is satisfied.

The last assumption is related to the lack of serial correlation of residuals. To check whether there is serial correlation or not Breusch-Godfrey Serial Correlation LM Test is performed as can be views in Table 4. As the value of probability is higher than 5% the null hypothesis of can not be rejected.

Table 4. Serial Correlation LM Test

F-statistic	1.45461	Prob. F(2,2)	0.4074
Obs*R-squared	5.926033	Prob. Chi-Square(2)	0.0517

Source: Author/ E-views 9

Empirical findings

The results of the equation are displayed in Table 4. As shown in the table, the independent variables explain 99% of the variation of non-performing loans, while R square has a slight difference with R. Furthermore, the probability of F statistic is close to zero, indicating that the statistical significance of the model. Regarding the significance of independent variables, the probabilities of the independent variables show that variables such as inflation rate, exchange rate, and unemployment are significantly affecting the rate of non-performing loans. However, the probabilities of lending interest rates and GDP growth rate are higher than five percent, indicating that those variables are not statistically significant.

Table 5.

Regression results

Source: Author/ E-views 9

Dependent Variable: LOGNPL				
Method: Least Squares				
Variables	**Variables coefficients**	**Std. Error**	**t-Stat**	**Prob.**
LOG(LIR)	-0.05089	0.24099	-0.21115	0.843
D(LOGINFR)	-0.22246	0.054	-4.11946	0.015
D(LOGGDP)	-0.01293	0.11587	-0.11159	0.917
LOGER	6.566824	1.16639	5.630028	0.005
(LOG_UNEMI	0.788626	0.25705	3.068049	0.037
C	-12.7696	2.29622	-5.56113	0.005
R-sqrd	**0.992581**			
Adj R-sqrd	0.983308			
F-stat	107.033			
Prob(F-stat)	0.000239			

Based on the results of the regression, the first hypothesis regarding the effect of GDP growth rate on and lending interest rate on non-performing loans, cannot be accepted as the test proves that the relationship is not significant. The results indicate an inverse relationship between the inflation rate and the non-performing loans rate. Even though the second hypothesis cannot be proved, the results are in line with (Anita, et al. 2022; Antony & Suresh, 2023) which also suggest a reverse relationship between inflation and non-performing loans.

The test proves a positive relationship between the unemployment rate and the exchange rate, indicating that the fourth and fifth hypotheses can not be rejected. The results suggest that increased unemployment and the higher price of Euro in terms of Albanian Lek will increase the non-performing loans ratio. The results are in line with the theoretical expectations and findings of other authors such as (Gabeshi, 2016; Baholli, Dika, & Xhabija, 2015; Akinlo & Emmanuel, 2014).

Conclusions

The banking system in Albania has a significant role in the financial economy and it has a huge contribution to the economic and financial development of the country. The lending activity of the banks is the main source of financing in Albania and other countries that do not have financial markets. Based on the crucial role of the banking system and banks, risk management, especially credit risk is very important, taking into consideration the genesis of the last financial crises and the way it went worldwide through the financial system.

This research paper analyses which are the macroeconomic factors that influence the credit risk in the Albanian Banking system for the period from 2010 until 2022, by using annual data retrieved from the database of the World Bank. The findings of empirical analysis suggest that macroeconomic variables such as the inflation rate, unemployment rate, and exchange rate are significant determinants of non-performing loans in Albania. The tests imply a positive relationship of non-performing loans with the unemployment rate, and exchange rate and a negative relationship among inflation and non-performing loan rate. The findings suggest that the central bank and its policies are very important in the management of credit risk.

The limitation of this study is the short period considering that data are annual. However, this study contributes to the literature and can serve policymakers, banks, the central bank, and other regulatory institutions.

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GLOBAL DEVELOPMENT TRENDS IN BANKING TECHNOLOGIES

Ivan LUCHIAN[33]

Angela FILIP[34]

Abstract: *Banking technology represents a solution for organizing the provision of financial services, ensuring certain functionalities, expertise in execution, infrastructure and hosting. Actually, the basic vector for the development of the modern banking industry is placed on the path of digitization ant artificial intelligence application. A multitude of opportunities for banks is offered by neobanking, open banking, cloud banking, blockchain, hyper-automated banking, hyper-personalized banking, immersive technologies, banking of things, quantum computing, bank-as-a-service, super-app, uberization of banking. The implementation of new technologies has generated, together with a complex of benefits, certain additional cyber problems. Therefore, an important field in banking activity has become the strengthening of cyber security, as well as the prevention and combating of banking frauds in the digital space.*

Keywords: *banking; technology; digitalization; artificial intelligence*

JEL classification: *G21, G28*

Introduction

In the opinion of the author Vadlamani Ravi (2011), "the term "banking technology" refers to the use of sophisticated information and communication technologies together with computer science to enable banks to offer better services to its customers in a secure, reliable and affordable manner and sustain competitive advantage over other banks."

Banking technologies represent the complex of techniques, skills, methods and processes applied to the provision of financial services, intended to ensure the basic functionalities for customers and internal operations, expertise in execution, infrastructure and hosting. (Banking technology…, n.d.)

The current period is considered as the information age (digital age), which marked the transition to an information economy based on the collection, transmission, processing and storage of information. (Era…, n.d.)

Inevitably this process leaves its mark on the evolution of banking technologies.

The purpose of this article is to examine the basic trends of the current evolution in the field of banking technologies.

Description of the Problem

It is about the implementation of the concept of Bank 3.0, which essentially finds the increasing placement of customer service in the informational space, the widening of the gap between the way customers with different levels of experience choose and use banking services being noted (Figure

[33] *PhD, Associate Professor, International Institute of Management IMI-NOVA, Chisinau, Republic of Moldova. E-mail: luchian_ivan@mail.ru. ORCID:* https://orcid.org/0000-0002-8683-7228.

[34] *PhD, Associate Professor, Moldova State University, Chisinau, Republic of Moldova. E-mail: filip77@mail.ru . ORCID:* https://orcid.org/0000-0003-2359-860X.

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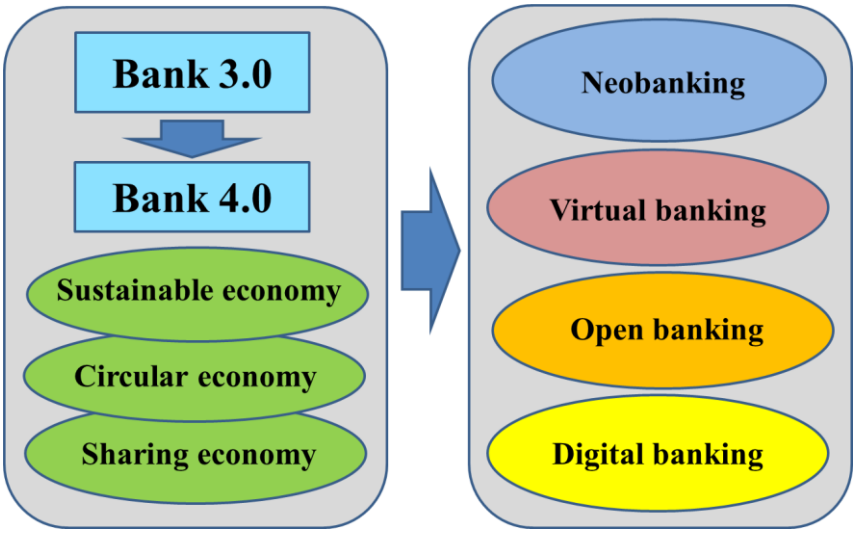

Figure 1 - Global trends in banking technologies

Source: developed by the authors

In this context Brett King stated: "Bank 3.0 is about the transition from banking dependent on a physical structure to banking that can be done at a time and place most convenient to the customer. It is about a new form of engagement and experience that harnesses the power of the internet without sacrificing the 'human touch'. It is about leveraging the potential of big data for better 1:1 interactions and more powerful marketing." (Marous, 2012)

It is about the ever-deeper exploitation of the capabilities of the Internet, the potential of big data and efficient marketing. The implementation of this concept was linked to the development of self-service banking services, the use of technologies and digital devices.

Since 2020, the financial community has started talking about the Bank 4.0 concept. In this context, we consider the vision of the expert Akanksha Mishra (2022) important: "Banking 4.0 can be defined as the foundation of creative destruction that came through fintech companies, transitioning innovation, and traditional retail banks reorganizing their business models on new-age digital principles of platforms, apps, data intelligence, and embedded finance. This radical reordering brings a promise of platform-based banking to deliver experience-driven customer satisfaction through the optimum channel."

At the same time, the situation created at the global level, which essentially represents an economic and ecological crisis, requires the implementation of new models of economic activity, which have found expression through the sustainable economy, the circular economy and the sharing economy.

All these require the connection of banking technologies and products to the new realities.

Methodology and Data

The object of the study was the basic global trends in the development of banking activity in cyberspace. For this purpose, open access publications on the Internet were examined by experts in the field of banking information technologies and specialized companies. Then a synthesis of the examined materials was carried out and a general presentation of the addressed field was made.

Results

The basic directions of the evolution of banking technologies are presented in Figure 1.

Neobanking represents the activities of providing financial services by the respective institutions (neobanks) exclusively digital.

The author Danielle Antosz (2023) thus presents this banking institutions: “A neobank is a digital-first financial company that offers banking services like checking accounts and debit cards but does not have a physical location. The term neobank is often used interchangeably with fintech bank, challenger bank, or digital bank. Neobanks aim to streamline the banking process by delivering financial services in a customer-centric, digital-only format.”

Also, this expert forecasts an increase in the global number of users from 146.4 million in 2021 to 350 million in 2026.

A notion close to the previous one is *virtual banking*, which refers to the activities of accessing traditional banking services online, without the need for physical infrastructure. As particular cases of virtual banking are remote banking, internet banking, online banking and the provision of telephone banking services. (*Virtual…*, n.d.)

Open banking (also known as *open bank data*) has become one of the important sources of promoting the innovative process on the banking market.

Open banking is a type of banking activity that gives customers access to their bank accounts through third-party applications. Open banking provides third-party financial service providers with open access to consumer banking data, transactions and other financial data from banks and non-bank financial institutions through the use of application programming interfaces. (*Open…*, n.d.)

But the basic vector for the development of the banking industry is placed in the field of *digitization*, which requires banks to collaborate with fintech companies in various areas, such as loans and the creation of co-branded products.

In this context, two notions are important:

•*Bank digitization* is the conversion of data into a digital format with the adoption of technology. (*What are…*, n.d.)

•*Digital banking* is the digitization of all traditional banking products, processes and activities to serve customers through online channels. (Malyshev, 2023)

Wikipedia defines *digital bank* as “a virtual process that includes online banking, mobile banking, and beyond”. (*Digital banking*, n.d.)

A certain part of the new banking technologies is based on *artificial intelligence (AI)*, which is the ability of machines (or software) to mimic the problem-solving and decision-making capabilities of the human mind. (*What is…*, n.d.)

Likewise, its core components are remarkable - *machine learning* and *deep learning*.

The use of artificial intelligence in banking activity takes the following forms:

•*Chatbot* is a software application or web interface designed to mimic human conversation through text or voice interactions. (*Chatbot*, n.d.)

•*Robo Advisor* is a digital platform that offers financial planning and automated investment services, with client contact being maintained in the form of a dialogue about the financial situation and future goals. The data obtained is used to provide advice and invest automatically. (Frankenfield, 2023)

•*Predictive Analytics* is a branch of data analytics that uses data to apply machine learning models to predict future outcomes. In banking and finance, these can be, for example, predicting customer behavior, forecasting market trends, risk assessment. (Welland, 2023)

•*Cybersecurity* - AI in banks can be applied to prevent potential cyber-attacks before they affect employees, customers or internal systems. AI also helps banks to identify fraudulent activities, track gaps in their systems, minimize related risks. (*AI in Banking…*, n.d.)

•*Internet of Things (IoT)*. According Wikipedia, IoT „describes devices with sensors, processing ability, software and other technologies that connect and exchange data with other devices and systems over the Internet or other communications networks.” (*Internet…,* n.d.) Using IoT In Banking refers to obtaining real-time feedback, identifying fraudulent activity, customer service, data analytics, improving security, smart wallets, automation. (*The Applications…*, n.d.) In some sources,

the application of IoT in the banking industry has been called *Banking of Things*. (*Banking of…*, n.d.)

•*Self-service kiosks* are automated self-service machines that provide customers with access to certain banking services (deposits, withdrawal of funds, transfer of funds between accounts, online bill payment, check ordering, and others). They often have touch screens, cash dispensers, card readers and other sophisticated technologies for interactive customer service. (*Wavetec…*, n.d.)

•*Interactive Teller Machine (ITM)* is interactive video-based technology that allows bank customers to perform transactions and services conducted by a central teller in a real-time video/audio interaction. (*Interactive…*, n.d.)

•*Virtual avatar* is a virtual consultant (assistant) presented as a digitized bank worker, who communicates with customers in natural language, usually in the form of asking questions by customers to the virtual assistant in order to obtain general information and personalized advice. (*Commerzbank…*, n.d.)

Some experts mention: "A report by Business Insider suggests that nearly 80% of banks are aware of the potential benefits of AI in banking. Another report by McKinsey suggests the potential of AI in banking and finance would grow as high as $1 trillion." (*AI in Banking*…, n.d.)

Also, artificial intelligence is used for the development of credit scoring technologies.

Apart from those mentioned, the following new banking technologies can be presented: cloud banking, blockchain, hyper-automated banking, hyper-personalized banking, immersive technologies, banking of things, quantum computing, bank-as-a-service, super-app, uberization of banking.

According to some views, *cloud banking* is the on-demand delivery of hosted computing services (servers, data storage, communications and networks, applications and data analytics) to banks over the Internet. (*What is…*, n.d.)

According to expert Alex Malyshev (2022): "Cloud banking services refer to deploying (and managing) banking infrastructure in order to control banking cloud services and financial operations without dedicated physical servers."

Blockchain technology (also known as *distributed ledger technology*) is a decentralized, distributed ledger system that allows transactions between two parties without the need for a trusted intermediary. The ledger consists of a series of interconnected blocks, each containing a list of transactions. Once a block is added to the chain, it cannot be modified. Blockchain also uses cryptography to ensure that only authorized parties can access and validate transactions. (*Blockchain…*, n.d.)

According to some experts, the areas of banking activity potentially recommended for the application of blockchain technology are international payments, peer-to-peer remittances and identity verification. (*Blockchain…*, n.d.)

On the other hand, the expert Cem Dilmegani (2023) is of the opinion that "*hyper-automation* is a digital transformation strategy that involves automating as many business processes as possible while digitally augmenting the processes that require human input."

At its core, hyper-automation is a combination of certain technologies, including artificial intelligence, machine learning and robotic process automation, to automate repetitive and time-consuming processes, allowing employees to focus on more strategic and value-added activities. (Singhal, 2023)

Hyper-personalized banking is intended to transcend traditional banking models by leveraging advanced technologies, data analytics, and artificial intelligence to provide customers with highly personalized financial experiences by understanding and anticipating each customer's needs, preferences, and behaviors. The implementation of hyper-personalized banking is linked to certain important activities, such as data collection and analysis, customer segmentation, investment in AI and advanced technologies, customer education and communication. (*Hyper-Personalized…*, n.d.)

Certain trends in the innovation process in the banking market are related to the application of

immersive technology.

This is an integration of virtual content with the physical environment in a way that allows the user to naturally engage with mixed reality. (Wigmore, 2018)

Some specialists see virtual reality as the future of digital banking. With the help of the metaverse, financial transactions can take place in virtual space. Virtual reality has the potential to change the way people use banking services and interact with their finances. Banks are likely to adopt virtual reality technology as new ways are developed to engage customers via mobile devices or computers, provide better understanding of complex data and even better educate staff. It is about the use of virtual avatars, digital reality, and immersive experiences. (*Banking in…*, n.d.)

Some innovative expectations are related to *quantum computing*, which tends to harness the laws of quantum mechanics to solve problems too complex for classical computers. (*What is…,* n.d.)

Thus, the author Alex Clere (2023) states: "Quantum computing can perform operations magnitudes quicker, meaning complex financial information – such as the data that goes into assessing credit risk, for example – can be analysed quickly and with more accuracy."

Banking as a service (BaaS) is a financial technology solution that allows non-bank companies, such as platforms and marketplaces, to provide services directly. (*What is…*, n.d.)

In other words, BaaS is the provision of banking products and services through third-party distributors. Through BaaS, there is the integration of non-banking businesses with regulated financial infrastructure into financial or non-banking platforms through application programming interfaces. BaaS allows third-party companies, often fintech firms or other businesses, to provide banking and financial services to their customers without having to build and maintain banking and payment infrastructure from scratch and without holding a financial services license. (*Banking as…*, n.d.), (*Unleashing…*, n.d.)

An important banking innovation has become *the financial super-app*, which constitutes an ecosystem of functions and services that are customized according to the needs of the user. Its core is user experience and continuity. A possible list of services offered includes: a shared wallet; bill reminders; car bill payments; managing subscriptions; investment options; savings accounts; and budgeting tools. (*Financial…*, n.d.)

The sharing economy has determined certain changes in retail banking.

This is an economic model designed to leverage peer-to-peer social and commercial activities to increase the utility of goods and services. (Kunov, 2019)

Uberization has become a specific form of the sharing economy.

The increased use of this type of Uber digital platforms will impact the banking industry. For example, this can be expressed in the platform having the ability to provide loan approvals in an instant, or even to anticipate and make recommendations about the types of services the customer will need now and perhaps in the immediate future. (Ragu, 2019)

In choosing the opportunities to implement new technologies, banks are required to take into account the following considerations: complexity, cost-effectiveness, integration. The implementation of new technologies has generated, together with a complex of benefits.

Some authors mention, for example, the benefits of banking digitalization for customers through the reduction of human errors, the permanent accessibility and convenience of online banking services, the facilitation of cashless transactions, all of which contribute to strengthening the loyalty of consumers of banking products. (What are…, n.d.)

Other experts present a broader list of key benefits of digitization for banks (*Digital transformation…*, n.d.):

- Improving efficiency and reducing costs;
- Improving the quality of customer service;
- Enhanced security;

- Greater agility and faster time-to-market;
- Improving data analysis and forecasting;
- Raising the level of competitiveness;
- Improved collaboration and communication.

At the same time, the promotion of digital innovations in banking is linked with certain problems.

For example, the application of new banking technologies has generated certain banking ethics issues.

The expert Marcin Frąckiewicz (2023) examined the ethical issues of neobanking:

- *The problem of financial inclusion* - the massive implementation of this concept can eliminate from banking services clients with insufficient informational culture and technical endowment;
- *The issue of ensuring data confidentiality and security* - banks hold sensitive financial information, the possibility of data breach and misuse is a significant danger;
- *The problem of job replacement* - the massive application of automation and artificial intelligence in banks reduces the need for employees, which touches on the social responsibility aspects of digital banks.

As the level of digitization of the banking activity deepens, the problems of cyber-attacks and digital banking frauds become more acute. Therefore, an important area in banking has become the strengthening of cyber security, as well as the prevention and combating of bank fraud in the digital space.

Conclusions

The establishment of the information society at the global level determines the creation of a new type of economy with an important field of industries based on information, which inevitably influences the world banking industry. Modern banking is increasingly moving into cyberspace. Depending on the level of activity in the information sphere, digital and virtual banking can be differentiated. An important boost to the innovation process in the banking market is due to the implementation of artificial intelligence in all its forms. Likewise, the digitization of banking has led to the development and implementation of a wide range of new banking products. This has brought a number of important benefits to banks, but also problems that require solutions.

Future Directions

In the coming years the process of broadening and qualitative improvement of digital banking activity will continue, which will determine the need for detailed study.

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DETERMINANTS OF THE TREND AND SUSTAINABILITY OF FOREIGN DEBT

Camelia MILEA[35]

Abstract

In the article[36]*, the author aims to highlight the factors that influence the evolution of foreign debt starting from macroeconomic equations. Thus, the external debt depends directly on the interest rate and the trade deficit, on the difference between domestic investment needs and domestic savings, and on the gap between budget expenditures and revenues. Also, the article shows the determining factors of the evolution of the external debt to GDP ratio, considered one of the most important indicators of debt sustainability, as well as of the external debt in exports ratio.*

A correct management of the external debt, accompanied by a rational economic policy, can change a debtor country into a net creditor, in a certain period of time, provided that exports grow faster than imports.

In the article, analytical and descriptive methods are used.

Keywords*: external debt, factors of influence, interest rate, trade deficit, net expenses*

Jel classification*: F21, F34, F43*

Introduction

The external debt represents a way to supplement the internal savings, offering the country that receives the loan, the possibility to finance a volume of investments larger than what it would be possible to achieve only based on internal resources.

It is good for a country to increase its volume of foreign loans as long as the marginal product of the borrowed capital is higher than or equal to the cost of the loans. Foreign loans do not concur to economic growth, if they are used inefficiently (e.g. with lower returns than the interest rate paid for them), but, on the contrary, they perpetuate the contracting of loans. A healthy economic growth, to which the increase in exports has also contributed, even if it may cause temporary problems related to high levels of indebtedness or high rates of external debt service, allows the return of loans in a certain period of time.

Perhaps the most important aspect about debt, in general, is ensuring its sustainability.

From a pragmatic point of view, the debt is sustainable if the forecasted debt-to-GDP ratios are stable or decreasing, reaching a low enough level not to lead to debt default. Practically, the debt should not increase faster than national income, at the same time the repayment capacity should be ensured. In the case of association with a series of macroeconomic risks, if the indebtedness rate is still high, despite its reduction, it may lead to the unsustainability of the debt.

[35] *PhD.* ,scientific researcher III, Centre for Financial and Monetary Research of the Romanian Academy "Victor Slăvescu", 13 Calea 13 Septembrie, Romania, email: camelia.milea@icfm.ro, © Camelia Milea https://orcid.org/0000-0002-6810-2164

[36] The article is based on the research project **" Romania's external indebtedness in current and perspective conditions"**, elaborated in CFMR "Victor Slăvescu" in 2022, under the coordination of Camelia Milea, Ph.D.

Dinga E. (2018) defines *sustainability* as a characteristic of a process (phenomenon, system) to maintain itself on the desirable trajectory, in a preset or acceptable interval for an indefinite period of time and on a global space of accessibility[37].

Milea (2019) defines *debt sustainability* as a property that assumes that the evolution of the debt ensures the payment of the debt service in the medium, and possibly long term, without the need for significant changes in economic policies, without producing shocks or/and tensions on the domestic market, without inducing major fluctuations of some macroeconomic variables of the national economy. Sustainability allows for fluctuations in the debt, being important to achieve the intended, positive effect in the medium and long term.

From the existing definitions in the economic literature on debt sustainability, *a criterion of debt sustainability* emerges, namely the borrowed capitals must be used for investments with a return at least equal to the interest rate paid on the contracted debt, or for the implementation of economic reforms.

From a qualitative point of view, the sustainability of the debt depends on the effects/consequences of the debt in the economy: yield, destinations (economic activities - consumption or production -, sectors of activity, development regions), contribution to the economic development by financing some objectives/projects of national and/or regional interest, removal of regional and social discrepancies.

Factors influencing the evolution and sustainability of foreign debt

Next, we shall present some equations that define the external debt in relationship with other macroeconomic indicators in order to highlight the factors that influence the external debt.

We start from the equation of the flows of an economy to and from the rest of the world in order to capture the evolution over time of the foreign debt. So,

$ED_t - ED_{t-1} + X_t = iED_{t-1} + M_t$, where(1)

ED_t represents net external debt at the end of the year t;

ED_{t-1} represents net external debt at the end of the year t-1;

$ED_t - ED_{t-1}$ is the net growth of external debt stock in year t

X are annual exports;

M are annual imports;

i is the average interest rate for the total external debt.

If we divide the previous equation by ED_{t-1}, we get:

$d = i + (M_t - X_t)/ ED_{t-1}$, where(2)

$d = (ED_t - ED_{t-1})/ ED_{t-1}$, represents the growth rate of foreign debt.

Equation (2) highlights the factors that influence the level of external debt. First of all, the growth rate of the external debt will be the greater, the higher the interest rate, in which case the debt service will also increase. Then, the growth of the trade deficit (M-X) will cause the debt to rise. Moreover, the growth rate of the external debt will be the more dependent on the interest rate, the larger ED_{t-1} will be. A restricted access to foreign capital requires, from the government, measures meant to support the growth of exports, in order to reduce the trade deficit, or the imposition of restrictions on imports.

We also use the equation that defines the trade deficit:

$S+(T-G) –I = X-M$(3)

[37] Not only a stationary process can be sustainable, but also an increasing or a decreasing one.

S are private savings,

I are private investments,

T is government income,

G are government spending.

Equation (3) means that the net financing capacity of an economy is equal to the net financing capacity of the private sector (S-I) from which the financing needs of the public sector (G-T) are subtracted and is equal to the balance of current operations.

Inserting equation (3) into equation (2), the latter can also be written:

$d = i + [(I-S) + (G-T)]/ED_{t-1}$(4)

From the above equation, it results that *if domestic private savings do not cover domestic private investment requirements, then the demand for external financing increases, causing a rise in external debt*. Overall, *the need for loans from abroad can be considered the consequence of an insufficient internal financing capacity of the national economy*. *In order to avoid a fast increase in external debt, private domestic savings should be at least equal to the need for private investments, and budget expenditures (investments and public consumption) should not be higher than budget revenues.* On the other hand, if an economy faces a limited access to external loans (for example, due to a high level of debt or for other reasons related to the country rating), it will have, on the one hand, to reduce the budget deficit (by cutting public expenditures and/or investments or by increasing budget revenues through a rise in taxes), and, on the other hand, to increase private domestic savings by reducing private domestic consumption and/or investments.

If we aggregate private savings with government revenues in domestic savings, and private investments with government expenditures in domestic investments, we have:

I_D-S_D = M-X = CA, where (5)

CA is the current account deficit

I_D are domestic investments;

S_D are domestic savings.

Next, we show the determining factors of the evolution of the ratio external debt to GDP, considered one of the most important indicators of debt sustainability. Thus, based on equations (1) and (5), we can express the growth rate of the external debt depending on GDP:

$$(ED_t\text{-}ED_{t-1})/ED_{t-1} = (I_D - S_D)/ED_{t-1} + i = \left[\left(\frac{I}{GDP_{t-1}} - \frac{S}{GDP_{t-1}}\right) / \frac{ED_{t-1}}{GDP_{t-1}}\right] + + i \quad (6)$$

The growth rate of the ED/GDP ratio is equal to the difference between the growth rate of external debt and the growth rate of GDP:

$$\frac{(ED/GDP)_t - (ED/GDP)_{t-1}}{(ED/GDP)_{t-1}} = (ED_t\text{-}ED_{t-1})/ED_{t-1} - (GDP_t\text{-}GDP_{t-1})/GDP_{t-1} \quad (7)$$

Starting from equations (6) and (7), the growth rate of the ED/GDP ratio can be expressed as follows:

$$\frac{(ED/GDP)_t - (ED/GDP)_{t-1}}{(ED/GDP)_{t-1}} = \left[\left(\frac{I}{GDP_{t-1}} - \frac{S}{GDP_{t-1}}\right) / \frac{ED_{t-1}}{GDP_{t-1}}\right] + i - g = \left(\frac{gk-s}{ED_{t-1}/GDP_{t-1}} + i\right) - g, \quad (8)$$

where g is the growth rate of GDP;

k is i/GDPt, i.e. the marginal coefficient of capital (or the marginal ratio of capital/production); and

s is the ratio between domestic savings and GDP (S/GDP_{t-1}).

The growth rate of the ED/GDP ratio depends directly proportional on the growth rate of external debt, on the trade deficit and on the insufficiency/lack of domestic savings compared to domestic investments, and on the interest rate, and inversely proportional on the growth rate of GDP, as it can be seen from equations (2), (7) and (8).

Another indicator for evaluating the external debt sustainability is the ratio between external debt and exports. The growth rate of the ratio (ED/X) can be expressed as follows:

$\frac{(ED/X)_t-(ED/X)_{t-1}}{(ED/X)_{t-1}} = \left(\frac{gk-s}{x(ED_{t-1}/X_{t-1})}+i\right)-h$, where(9)

h is the growth rate of exports

x is the ratio X/GDP

From equation (9) it can be concluded *that the growth rate of the ED/X ratio depends directly proportional on the interest rate, and inversely proportional on the ratio between domestic savings and GDP, and on the growth rate of exports.*

It is possible to calculate the maximum values that the share of external debt in GDP, respectively the share of external debt in exports (ED/GDP and ED/X) can reach, starting from the following expressions, derived from equations (8) and (9):

$\left(\frac{gk-s}{ED_{t-1}/GDP_{t-1}}+i\right)$= g , and $\left(\frac{gk-s}{x(ED_{t-1}/X_{t-1})}+i\right)$ = h

ED/GDP = (gk-s)/(g-i), for g>i and (10)

ED/X = (gk-s)/x(h-i), for h>i (11)

From the relationships above, it can be concluded that *a correct management of the external debt, together with a rational economic policy, can, in a certain period of time, transform a debtor country into a net creditor, provided that exports increase faster than imports.*

For example, suppose that in an initial phase, there is an accumulation of external debt. As a result, the ratios ED/X and ED/GDP increase. The volume of external debt continues to grow, as it does the external debt service, during which exports are assumed to be augmenting rapidly, so that the ED/X ratio could reach an acceptable level before the trade balance counterbalances. If the contracted debt leads to the development of the economy, and the trade balance continues to improve progressively, the ratios ED/X and ED/GDP will decrease. It is possible, on the other hand, that the ratio between external debt service and exports continues to increase, even after the trade balance has balanced, due to the maturing of contracted external loans, and/or to the high level of interest rates. A correct management of the external debt must keep the ratio between the external debt service and the GDP within reasonable limits, over the years.

If spending financed by external debt concurs only to the increase in the demand for loans, but not to the improvement of the production capacity, exports will not be able to grow enough. New borrowing may even be needed to prevent a decline in certain imports necessary for the exports, which ensure the payment of the foreign debt service. Therefore, external debt will continue to grow faster than exports, so the ED/X ratio will continue to rise. The set of problems generated by the increase in external debt will lead to an accrual in the risk associated with arrears and/or with renegotiations of the external debt, and to tougher credit conditions (namely, the reduction of the periods for which loans can be obtained, the boost of interest rates, which causes further increase in the ratio between external debt service and exports).

There is also an intermediate situation between the two cases presented previously. Namely, the ratios ED/X and ED/GDP increase, but at decreasing rates, so that they tend to appear stable. A country in this situation could be able to maintain its liquidity and solvency.

Conclusions

The need for foreign loans can be considered the consequence of an insufficient domestic financing capacity of the national economy, i.e. a level of necessary private investments higher than that of private domestic savings, respectively a level of budget expenditures (public investments and consumption) higher than budget revenues.

External debt grows in direct proportion with the interest rate and the trade deficit, with the difference between domestic investment needs and savings, and with the difference between budget expenditures and revenues.

The growth rate of the ED/GDP ratio, considered the most important indicator of sustainability, depends directly proportional on the growth rate of external debt, on the trade deficit, on the interest rate, and on the insufficiency/lack of domestic savings compared to domestic investments, and inversely proportional on GDP growth rate.

The growth rate of the ED/X ratio depends directly proportional on the interest rate, and inversely proportional on the ratio between domestic savings and GDP, and on the growth rate of exports.

If the contracted debt concurs to the development of the economy, the debt is sustainable, and the ED/X and ED/GDP ratios will decrease.

If the spending financed through external debt does not lead to the improvement of the production capacity, exports will fail to grow enough, and external debt will continue to expand faster than exports, with the ED/X ratio augmenting further, which brings about the increase in the risk associated to arrears and the tightening of credit conditions.

In conclusion, the faster growth of exports compared to imports, together with a rational economic policy and a good management of external debt can change a debtor country into a net creditor.

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USE OF MIRR AS TOOL FOR APRRAISING RELATIVE PROFITABILITY

Iuliana MILITARU[38]

Abstract:

The efficiency of investment financing sources at the microeconomic level is an approach whose successful achievement also requires the most efficient use of financing sources.

The measurement of this efficiency is carried out with the help of specific indicators - among which MIRR stands out, namely for management interested in quantifying relative profitability, on one hand, and for long term use of corporate governance – inter alia, of capital budgeting, on the other hand.We must, however, observe MIRR assumes cash inflows are reinvested at WACC, which, again, is – or, at least, must be – a crucial component of corporate governance: the inverse proportional relationship between the calculated value of WACC and the value of the firm means the minimum value of WACC corresponds to the peak of the growth trend (maximum) of the firm's value.

Keywords: *Modified Internal Rate of Return (MIRR), profitability, investment decision*

JEL classification: *G31, G32*

The internal rate of return is defined as rate of discount for which NPV value equals zero (0)[39]; in other words, internal rate of return *rule* states that a firm should accept an investment project if opportunity cost of capital is less than the internal rate of return[40].

However, this is not as straightforward as it may sound: namely, the use the internal rate of return as a criterion in preference to net present value can be, on one hand, deceiving – for, given that, as discount rate increases, NPV usually rises, to be followed by a no less usual decline – due to the double variation in cash-flow stream *sign*, there can be as many internal rates of return for a project as variations of cash flow stream *signs*[41].

A firm can, on the other hand, discount the cash flows from the end of an *investment* project's 'life' at capital cost until there remains only one change in the sign of the cash flows. Therefore, what is known as a modified internal rate of return (MIRR) can be quantified on basis of this revision.[42]

Formally, MIRR is solution to the following equation:

$$\sum_{t=0}^{n} \frac{COF_t}{(1+K)^n} = \frac{\sum_{t=0}^{n} CIF_t \cdot (1+K)^{n-t}}{(1+MIRR)^n}.$$

or

$$PV_{costs} = \frac{TV}{(1+MIRR)^n}.$$

[38]*PhD, Associate Professor Romanian - American University, Bucharest, Romania, Email: iuliana.militaru@rau.ro .*

[39] Brealey, R.A., Myers, S.C., Allen, F. (2020), p. 115.

[40] Id., p. 116.

[41] Id., pp. 116-117.

[42] Ibid., p. 118.

To illustrate this, in the table below are data illustrating in a quantitative approach the relationship between two (in this example) projects – named PROJECT BETA and PROJECT GAMA – and MIRR and IRR indices.

Processing both projects' data yields following results (assuming discount rate i = 7%, i.e. an *average* interest rate in a typical developed market economy, and a period of 5 years):

PROJECT NAME	**BETA $000**	**GAMA $000**
CF_0	(22000)	(49000)
CF_1	9000	22000
CF_2	6400	18000
CF_3	7600	18400
CF_4	8400	19200
CF_5	11000	22400

$$\sum_{t=0}^{n} \frac{COF_t}{(1+k)^t} = \frac{\sum_{t=0}^{n} CIF_t(1+k)^{n-t}}{(1+MIRR)^n}$$

PROJECT BETA

MIRR is computed as follows:

$$22000=\frac{\sum_{t=0}^{5} 9000(1+7\%)^{5-1}+6400(1+7\%)^{5-2}+7600(1+7\%)^{5-3}+8400(1+7\%)^{5-4}+11000(1+7\%)^{5-5}}{(1+MIRR)^5}$$

MIRR=17,04%

IRR is computed as follows:

$$CF_0+\frac{CF_1}{(1+IRR)^1}+\frac{CF_2}{(1+IRR)^2}+\cdots\ldots\ldots..+\frac{CF_n}{(1+IRR)^n}=0$$

$$-22000+\frac{9000}{(1+IRR)^1}+\frac{6400}{(1+IRR)^2}+\frac{7600}{(1+IRR)^3}+\frac{8400}{(1+IRR)^4}+\frac{11000}{(1+IRR)^5}=0$$

IRR=25,5%

PROJECT GAMA

MIRR is computed as follows:

$$49000=\frac{\sum_{t=0}^{5} 22000(1+7\%)^{5-1}+18000(1+7\%)^{5-2}+18400(1+7\%)^{5-3}+19200(1+7\%)^{5-4}+22400(1+7\%)^{5-5}}{(1+MIRR)^5}$$

MIRR=18,58%

IRR is computed as follows:

$$-49000+\frac{9000}{(1+IRR)^1}+\frac{6400}{(1+IRR)^2}+\frac{7600}{(1+IRR)^3}+\frac{8400}{(1+IRR)^4}+\frac{11000}{(1+IRR)^5}=0$$

IRR= 29,68%

Due to the fact that MIRR is higher than the cost of capital (7%), both for project Beta and for project Gama, if the projects are independent, both projects would be accepted.

If the projects are mutually exclusive, and for both projects MIRR is higher than the cost of capital, *we will accept* the project with the highest MIRR, in our case *Project GAMA*, *whose MIRR is 18.58%*, unlike Project BETA, whose MIRR is 17.04%.

The MIRR outperforms the conventional IRR in a big advantage.

While the conventional IRR assumes that each project's cash flows are reinvested at its own IRR, the MIRR assumes that all cash flows are reinvested at the cost of capital.

The modified IRR is a better predictor of a project's relative profitability because reinvestment at the cost of capital is typically more accurate; also, the issue of multiple IRR is likewise solved with MIRR.

MIRR is distinguished from the other variants of internal rate of return indexes by following distinctive features[43]:

(1) The discount rate – including the one at which the benefits resulting from the functional investment project are **reinvested** – is equal to the weighted average cost of capital (WACC);

(2) The use of the MIRR model generates – from the calculation – a *single* value of the internal rate of return (MIRR, in this case), i.e., it *cannot* yield more than one value of it;

(3) MIRR can be compared with the cost of capital, so that the decision to finance an investment project is – as far as figures go – appropriately taken.

WACC is, in fact, the index used to quantify the cost of long-term financing sources contracted and used by the company – especially so, for a joint-stock company[44], and one based on following premises[45]:

(1) the different sources of long-term financing of the company are, in fact, different types of capital - which, together, make up the capital of the company -, which, on the whole *is* more or less *risky*

[43] Ehrhardt, M.C., Brigham, E.F. (2011), p. 393.
[44] Id., p. 115.
[45] Ehrhardt, M.C., Brigham, E.F. (2011), p. 337.

(there is a risk for acquiring it and another risk for using it – inclusively, in the form of *opportunity costs*);

(2) thus, for each type of capital there is a specific size of expected rate of return (capital yield);

(3) the expected profitability of respective types of capital must register a dynamic that contributes decisively to the ***maximization*** of the company's ***share price***, which implies design of a desired (or optimal) capital structure - for which, the typical[46] elements of of the company's capital are considered to be[47]:

i. debts (long-term) – in WACC formula, D

ii. ordinary shares (eng. common equity) – in WACC formula, AO

iii. the preferred shares (eng. preferred stock) – in WACC formula, AP, and, thus, WACC formula has the following form (w stands for planned weights of the types of capital, r the cost of holding and using the types of capital, and T the marginal rate of interest income tax applied to the firm):

iv. $WACC = w_D \cdot r_D \cdot (1 - T) + w_{AO} \cdot r_{AO} + w_{AP} \cdot r_{AP}$.

Based on these premises, the cost of financing sources contracted and used by the firm in the long term is the weighted average of the costs associated with holding, on one hand, and using, on the other hand, various components of the firm's capital.

The dynamics of financing sources cost contracted and used by firm in long term is normally, say, designed and carried out by company's management so as not to violate a fundamental financial principle, according to which the capital structure of the firm must simultaneously satisfy following needs:

1) On the one hand, avoiding the materialization of the risk of bankruptcy;

2) On the other hand, financing of necessary investments for company's development.

From this perspective, the financial technique necessary for the materialization of the desired (optimal) capital structure, which will ensure - by definition - the ***decrease in the cost*** of long-term financing sources contracted and used by the company is applied by taking the following measures[48]:

1. Contracting credits (long-term) to take advantage of fiscal advantage of this source of financing - as long as the company does not record financial distress costs[49];

2. Continuing to access long-term financial sources in the form of long-term loans until the WACC value is minimal - which corresponds to the maximum increase in the value of the company.

Finally, the company's management must stop using long-term loans as sources of financing, the purpose of this decision being

3. Decreasing cost of long-term financing sources, so that the company's financial situation does not decrease as a result of the reduction of the company's value by increasing the current value of the (future) costs produced by the materialization of the bankruptcy risk for the company[50] - costs that exceed fiscal advantage of long-term loans.

The profitability of short-term financing sources - more precisely, reinvested profit and short-term credits (banking and commercial) – manifests itself somewhat indirectly, in the sense liquidity is indispensable for the existence of profitability of company's long-term financing sources (especially long-term credits) in that it ensures their operation, and respectively, and first of all, the company itself, in the long term.

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[46] Ehrhardt, M.C., Brigham, E.F. (2011), pp. 368; 399.
[47] Ehrhardt, M.C., Brigham, E.F. (2011), pp. 358-359.
[48] Ross, S.A., Westerfield, R.W., Jordan, B.D. (2013), pp. 541-542.
[49] Op. cit., p. 543. Financial distress costs are bearable for a company if a sensible part of its assets is made up of *tangible assets*, that is assets which can be sold, without any significant value loss, *for settling the company's debts*.
[50] Ibid.

More precisely, short-term financing sources are profitable because they support the company's ability to pay its maturing debts[51], which ensures the company's ability to further contract other (long-term) debts.

For long-term financing sources, significantly different levels of profitability are registered, depending on (as before, our analysis focuses on joint-stock companies)[52]:

1. Size of the company

2. The quality of the system, in general, respectively of the information mechanism, in particular available to the company - quality responsible for

a. Obtaining (privately) quality information regarding the prospects of the evolution of the company's profitability (in the future)

b. Avoiding informational asymmetry (and adverse selection);

3. The company's ability to organize its activity of attracting financing sources according to workings of *economies of scale*.

On the one hand, long-term financing sources consisting of borrowed funds - especially long-term loans - are more profitable for companies (or, in any case, used in a larger proportion), or, simply, accessible to them in practice in the situation where companies:

A) Appeal to a market of financing sources in which private lenders (e.g. banks) are better informed than public lenders (i.e. potential shareholders, etc.) on the characteristics of potential borrowers, on the one hand, and, on the other on the other hand, they are "young" or small companies - with the common characteristic of being more exposed to the influence of *information asymmetry*[53];

B) At the same time, are sensitively exposed to information asymmetry and are in possession of certain information regarding the prospects of the evolution of their *earnings*[54].

Such firms are, in general, economic agents of relatively small size, or – which, from the perspective of *sales volume*, is about the same thing – (relatively) little known in the market. In addition, debt-based financing is also generally more disadvantageous, given that the sources of financing in this category increase the variability of the dynamics of earnings before taxes.

If this dynamic turns out to be unreliable, its immediate effect is that of discouraging shareholders and *potential* shareholders, through the consequent and implicit increase in the variability of earnings per share dynamics [55].

On the other hand, stocks, both listed and unlisted, are much more profitable - in the long run - than loans, generally for large and/or well-known firms, which have, in short, the ability to be profitable, since they can make good use of[56]:

(I) Information obtained through their own means and connections about evolution of their level of profitability;

(II) Exposure in a (more) reduced proportion to information asymmetry – for which perspective we must note, however, that possession of such information does not entail exposure in the same proportion to information asymmetry for all firms in this situation[57];

(III) The size of their economic activities, from which, further, they can *derive* the issuance of shares (listed or unlisted, respectively) in terms of an *economy of scale* - which, first of all, will determine the significant ***decrease in the costs*** of share issues.

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[51] Ehrhardt, M.C., Brigham, E.F. (2011), p. 110.
[52] Journal of Financial Economics 51 (1999), p. 407.
[53] Ibid., p. 409.
[54] Ibid.
[55] Ehrhardt, M.C., Brigham, E.F. (2011), p. 779.
[56] Journal of Financial Economics 51 (1999), p. 422; 432.
[57] Ibid., p. 429.

Quantification of weighted average cost of capital has a great value for the analyst, from several points of view.

First, there is an inverse proportional relationship between the calculated value of WACC and the value of the firm: the minimum value of WACC corresponds to the peak of the growth trend (maximum) of the firm's value. An economy as Romania's, in which companies financing - inclusively - is mostly ensured - as far as borrowed financial funds *sources* are concerned - by the banking system, thus offers companies a means of making financing sources more efficient at the microeconomic level, whose qualities are, however, not absolute: it is about the fiscal advantage of long-term loans, which is no more when the company goes bankrupt.

On the other hand, low costs may not be a problem for companies, in the long run, if some measures are taken to prevent careless spending.

A firm can bear, in the long term, high costs – i.e. generated by the financing of its *investments* - corresponding to high risks, provided that:

1) high risks correspond to (very) profitable projects;

2) high costs are not associated with small risks, which correspond, therefore, to less profitable projects.

As for high costs that incur as immediate effect of investment, they do not contradict the principles of economy, efficiency and effectiveness, respectively the profitability target; in connection with this, we emphasize the following:

A) high costs imply high expenses - paid for materialization of investments;

B) the high costs will be borne by the firm without adverse effects for it on the basis of (at least) maintaining the level of the firm's *savings*.

Secondly, in relation to the MIRR indicator, it must be said that it reflects, as a tool for calculating profitability of investment projects:

I. the links that exist – or, respectively, that *must* exist – between the firm's investment strategy and corporate governance, on the one hand, and

II. its relative efficiency – e.g. compared to that of NPV –, on the other hand.

Regarding connections established between the firm's investment strategy and the results projected by/obtained by using the methodology and perspectives of corporate governance within the firm, we note, first of all, that MIRR, as a tool specially designed for "energizing" investment policy of company, is an indicator intended for[58]:

1. quantification of the increase in value from which the company - in its entirety, therefore, at least in one sense, more than its "simple" financial structure - will benefit from the materialization of investment projects, through the processing of inputs included in the production process;

2. quantification of (relative) profitability (i.e., rate of return) necessary to maximize the quantitative characteristics of outputs of production *process*.

MIRR, in other words, at the same time measures and promotes the quantitative - and qualitative - development of the production cycle, therefore of the company, from which "must" result, even if indirectly, the efficiency of investment financing sources (on a microeconomic level), unlike the NPV, which, applied to the data characterizing the investment projects, registers values at (higher) levels presupposing, respectively determining, directly, the existence/increase of the efficiency of investment financing sources.

[58] Ehrhardt, M.C., Brigham, E.F. (2011), p. 395.

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SECTION III. SUSTAINABLE DEVELOPMENT AND INCLUSIVE ECONOMIC GROWTH

SUPPORTING THE EXIT FROM THE CRISIS AND THE TRANSITION TO A CLIMATE-NEUTRAL ECONOMY

Georgiana CHIŢIGA[59]

Abstract: *The article has as a starting point the fact that Europe must face both the current unprecedented environmental and climate challenges and the recovery from the economic and social impact of the COVID-19 pandemic. These challenges require coherent policies, while also underlining the need to mobilize private financial and capital flows towards green investments. We maintain that the measures prove the ambitions of the European Union and the European countries, by establishing long-term objectives with concrete targets and by creating new financial instruments that reflect the scale of the challenge we face. At the same time, the goal is to lead to the achievement of a sustainable, healthy, strong and egalitarian economy, which requires taking into account all the measures that define the future of the European economy and society.*

Keywords: *. post-Covid recovery, climate-neutral economy, investments.*

JEL classification*: Q56.*

1. Introduction

In the current conditions, of the challenges caused by the coronavirus, it was necessary to support the EU member states for a long-term sustainable growth, as the Covid-19 pandemic has affected in a particularly serious way, Europe and the whole world – the health and protection systems social, economies, societies and the way we live. Supporting those affected by the crisis emerged as a common necessity, as well as investing in common European priorities as a primary orientation. The European Union needs action to create a better future for future generations.

Coherent support at the EU level, which ensures a faster pace of the double transition - green and digital, will boost the strengthening of resistance to shocks, competitiveness, as well as Europe's position as a world leader. Therefore, Europe must face both the current unprecedented environmental and climate challenges and the recovery from the economic and social impact of the COVID-19 pandemic.

These challenges call for the need to mobilize private financial and capital flows towards green investments. The measures taken prove the ambitions of the European Union and the European countries, by establishing long-term objectives with concrete targets and by creating new financial instruments that reflect the scale of the challenge we face.

The picture presented demonstrates the need for massive investment and funding, even if at this stage, definitive figures on investment needs cannot be presented. Efforts are being made to keep investments on the upward trajectory. The investment at EU level will be a common good for our future and thus attests to the real value that the countries belonging to the Union have.

At the same time, the aim is to lead to the achievement of a sustainable, healthy, strong and egalitarian economy, which requires taking into account all the measures that define the future of the European economy and society.

[59] Centre of Financial and Monetary Research „Victor Slăvescu”, e-mail: georgiana_chitiga@yahoo.com

2. The current situation

Given that the COVID-19 pandemic has drastically changed the context of international/European/national funding for climate change, it is a moment when in order to understand how to act correctly and concretely, it is necessary to have a clear and real picture of the situation in which we are positioned.

We need to look at the COVID-19 crisis and the climate crisis simultaneously. - the climate changes of recent years, which are of an unprecedented magnitude in the context of the entire history of mankind, and climate risks are now appearing more rapidly and becoming more and more accentuated.

We are in a critical decade for decisions, investments, and ways to substantially limit future damage, risk, and loss in the face of irreversible climate change, and to enable multiple options for adaptation, given the limited time frame in which we can act.

The current imperative in the recovery is to "build back better", placing the EU on a sustainable, inclusive and resilient growth path. The European Commission has collaborated intensively with the European Parliament and the European Council in order to finalize the Agreement on the future framework and the related sectoral programs.

In order to mobilize the necessary instruments, the European Commission proposed:

- the Next Generation EU (NGEU) - instrument, aimed at stimulating the EU budget through new financing collected from the financial markets in the period 2021-2024;

- the consolidation of the long-term budget of the European Union for the period 2021-2027.

NextGenerationEU, together with the long-term EU budget, formed the largest stimulus package funded in Europe, supporting Europe's reconstruction in the post-Covid-19 pandemic. (Table 1)

Table 1

Multiannual Financial Framework 2021-2027 and NextGenerationEU

(billion euro*)

Areas	**MFF** -billion euro-	**NextGenerationEU** -billion euro-
Single market, innovation and digital	149.5	11.5
Cohesion, resilience and values	426.7	776.5
Natural resources and environment	401	18.9
Migration and border management	25.7	
Security and defence	14.9	
Neighborhood and the world	110.6	
European public administration	82.5	
	1 210.9	*806.9*

Source: European Commission

Note: *at 2022 prices

Although the crisis represented a threat at the global level, it can also be considered a unique opportunity to restructure economies at the pace and scale that the climate crisis requires, by integrating climate actions into the economic recovery due to COVID-19.

Climate finance will have a key role to play in supporting a better recovery and transformation towards low-carbon and climate-resilient growth.

Numerous intense discussions took place regarding the need for global actions in the field of development, promoting the need for balance between the three dimensions of sustainable development - economic, social and environmental. These have materialized in documents and programmatic strategies - the Sustainable Development Goals (SDGs) of the 2030 Agenda for

Sustainable Development, adopted by all United Nations Member States, respectively the Paris Agreement - action plan to limit global warming.

As the implementation of the Paris Agreement entered its first five-year cycle, the focus had to shift immediately to securing a major collective boost of climate finance to support strong and green recovery packages and increased ambition for determined contributions at national level (NDCs).

Regarding the European framework, it proposes an intersectoral vision that aims to move from a low-carbon economy to a higher stage, to achieve climate neutrality, which will allow the member states to identify and solve, in a unitary way and in a real time horizon of climate problems. The year 2050 is considered to be the year of reaching climate neutrality at the level of all EU member countries, being an example to be followed by the other States Parties to the Paris Agreement.

Given the complexity of the climate neutrality goal, it requires joint, not just individual, efforts. While the measures and actions included in the Strategy for adaptation to the consequences of climate change of the EU actively contribute to the achievement of the objective of climate neutrality, the member states are supported to continue the efforts to increase the adaptation capacity, limit vulnerabilities and ensure resilience in relation to the effects of climate change .

The 2021 year was a critical year – to maintain trust between developed and developing countries, to create a new consensus on the necessary action on climate change and the ambition to achieve carbon neutrality by mid-century. A significant increase in climate finance is needed in the coming years and will need to be mobilized from all sources.

The foundations are called for for a more robust climate finance architecture in the period leading up to 2025, when a new ambitious collective target must be set.

Mobilizing resources commensurate with needs will effectively require a sustained and coordinated effort for all financial flows, public and private, to be "consistent with a path to low greenhouse gas emissions and climate-resilient development," as is provided for in the Paris Agreement.

The greatest responsibility lies with developed countries to end their own fossil fuel subsidies worldwide, developing countries must also transform their development paths and create the right conditions for public and private finance to invest consistently in sustainable, inclusive, resilient and transformative infrastructure for socio-economic growth in line with the collective long-term goals of the Paris Agreement.

Every financial decision should take climate risk into account and the entire climate finance system needs to be scaled up urgently.

3. Climate neutrality financing - vision, plan and decision

The collective objective must be to scale up finance in the coming period to accelerate the drive towards net zero carbon and climate resilient growth.

Investment at EU level will be a common good for our future. The financing of the objective of climate neutrality is achieved through several instruments both at European and national level.

Funds raised thanks to the Next Generation EU instrument, as well as the new EU budget, are channeled through EU programs, with a view to making every euro invested available for Europe to recover, to intensify the double transition, both the green and the digital, with the ultimate goal of combating climate change, building a fairer and more resilient society. (Table 2)

Table 2

Breakdown of NextGenerationEU

(billion euro*)

Recovery and Resilience Facility	723.8 to invest in reforms and projects	
	in loans 385.8	in grants 338.0
REACT-EU	50.6	
Horizon Europe	5.4	
InvestEU Program	6.1	
European Regional Development Fund	8.1	
Just Transition Fund	10.9	
RescEU	2	

Source: Eurostat data; Note: *at 2022 prices

Recovery and Resilience Facility - use: investments and reforms, including for the green and digital transition until 31 December 2026; - mechanism: grants and loans through the implementation of the national energy and climate plans of the Member States, integrated with the objectives of the European Semester, including in terms of the green transition and the digital transition and the resilience of national economies; made available to all member states, especially the most affected countries. (Table 3)

Table 3

Recovery and resilience mechanism - allocation of grants at EU level (billion euro*)

Countries	Allocations of 70% of the available amount	Allocations of 30% of the available amount	Total
Belgium	3.6	2.3	5.9
Bulgaria	4.6	1.6	6.3
Czech Republic	3.5	3.5	7.1
Denmark	1.3	0.2	1.6
Germany	16.3	9.3	25.6
Estonia	0.8	0.2	1.0
Ireland	0.9	0.1	1.0
Greece	13.5	4.3	17.8
Spain	46.6	22.9	69.5
France	24.3	15.0	39.4
Croatia	4,6	1.7	6.3
Italy	47.9	21.0	68.9
Cyprus	0.8	0.2	1.0
Latvia	1.6	0.3	2.0
Lithuania	2.1	0.1	2.2
Luxembourg	0.1	0.0	0.1
Hungary	4.6	2.5	7.2
Malta	0.2	0.1	0.3
Netherlands	3.9	2.0	6.0
Austria	2.2	1.2	3.5
Poland	20.3	3.6	23.9
Portugal	9.8	4.1	13.9
Romania	*10.2*	*4.0*	*14.2*
Slovenia	1.3	0.5	1.8
Slovakia	4.6	1.7	6.3
Finland	1.7	0.4	2.1
Sweden	2.9	0.4	3.3
EU 27	**234.5**	**103.5**	**338.0**

Source: Eurostat data; Note: *at 2022 prices

To support the transition to climate neutrality, additional financing is provided through the funds from the Next Generation instrument:

- The Just Transition Fund (JTF) (an important component of the European Green Deal) - to mitigate the socioeconomic impact of the transition in the most affected sectors based on fossil fuels/in the industrial processes with high GHG emissions, to ensure the support of a just transition, a low carbon, climate resilient and circular economies. An important aspect to mention is that the JTF is financed from the Multiannual Financial Framework, with an allocation period of 2021-2027.

- The financing offered through the consolidated InvestEU Program is added - the flagship investment program of the EU, made available to all member states; - use: investment in sustainable infrastructure, digitalisation, SMEs and mid-caps, social investment and skills development to help combat climate change. In addition, within InvestEU - the Strategic Investment Mechanism - a new instrument, made available to all member states; - use: to develop independent value chains such as: critical infrastructures - sustainable energy, green and digital technologies such as renewable and energy storage technologies, clean hydrogen, batteries, carbon capture and storage, etc.t

- The European Battery Alliance will accelerate the work and the new Clean Hydrogen Strategy and Alliance will guide and drive the rapid development of clean hydrogen production and use in Europe. Proposals will also be made to stimulate the use of energy from offshore renewable sources and better integration of the energy system.

- Agricultural policy is financed through the European Agricultural Fund for Rural Development (EAFRD), which targets an allocation of 95.5 billion euros for the period 2021-2027; in order to support rural areas in carrying out those necessary structural changes, in accordance with the European Green Deal, as well as achieving the ambitious targets of the Biodiversity Strategy and the "Farm to Fork" Strategy.

- The European Regional Development Fund (ERDF) aims to strengthen economic, social and territorial cohesion at the EU level for the period 2021-2027; has for financing the key areas for achieving a smart economy.

In line with the objectives of the European Green Deal, new funding sources have been proposed through the Connecting Europe Facility - the role of supporting the decarbonisation of transport. It will ensure investment in modern, high-performance transport infrastructure to facilitate cross-border connections with an additional €1.5 billion, as well as in alternative fuels.

- The Modernisation Fund – EU Climate Fund targets energy efficiency projects; between 70% and 100% non-reimbursable financing can be attracted for energy sector modernization investments, starting in 2021.

- The Innovation Fund targets investments in innovative equipment and technologies that can generate significant emissions limitations.

- The LIFE Program - the EU's action against climate change, being the only program that deals exclusively with the environment and climate change. For the period 2021-2027, the program provides a budget of 3.5 million euros for the environment and 1.9 billion euros for combating climate change.

All these funding sources, along with other initiatives:

- Horizon Europe Programme – the focus on the massive orientation of investments in clean technologies and value chains;

- The Neighbourhood, Development Cooperation and International Cooperation Instrument to better support our global partners;

- EU Humanitarian Aid Instrument for the most affected areas of the world aims to support the transition process towards a fair climate neutrality, including the social dimension of this aspect must be given priority, especially through the implementation of the European Pillar of Social Rights.

At the national level, the following programs are available:

- National Recovery and Resilience Plan (NRRP) (Table 4)

Table 4

The structure of Romania's PNRR

No. crt.	Pylons	Components
1.	Green transition	Water management -Forests and biodiversity protection - Waste management - Sustainable transport - Renovations - Energy
2.	Digital transformation	Digital transformation
3.	Economic growth, smart, sustainable and inclusive	- Fiscal reform and pension system reform - Support for the private sector, research, development and innovation
4.	Social cohesion and territory	- The local fund - Tourism and culture
5.	Health, and resilience institutional	- Health - Social reforms - Good governance
6.	Policies for the new generation – education and skills	- Education

Source: Ministry of Investments and European Projects

- Just Transition Operational Program (JTOP) - funding national priorities aimed at just transition, ensuring special attention to sectors affected by climate transition; in accordance with the aspects included in the European Semester, The 2021-2030 Integrated National Energy and Climate Plan, Country Specific Recommendations, as well as regional/local development plans and strategies;

- The programs carried out by the Environment Fund Administration, which can contribute to the climate transition, among which we mention: the Rabla Program and the Rabla Plus Program, the Public Water Supply and Sewerage Act 2023- water supply networks, sewage networks, water treatment plants , water distribution networks; also, the Green House Program aims at the purchase of heating systems that use renewable energy; Green Public Lighting Program - the use of more energy efficient technologies; "The program regarding the installation of photovoltaic panel systems - financing is 90% of the total value of the system, the remaining 10% being covered by the beneficiary;

At the end of the investment period, European economies and societies will be better prepared for the challenges and opportunities of green transitions.

4. Conclusions

The climate crisis deepened even before the COVID-19 pandemic, so a simultaneous approach to the post-COVID-19 crisis and the climate crisis is required. The underlying causes of both crises overlap, and the ways to address them are also intrinsically linked.

The economic recovery from COVID-19 must “build back better” in a way that can address underlying systems and set a course for long-term transformation to a new form of growth and development that includes climate alignment, recognizing that the dangers posed by climate change are greater than those caused by the systemic shock of the COVID-19 pandemic.

Responses to the two crises must be coherent, coordinated and mutually reinforcing. Initially, the focus was on controlling the pandemic and ameliorating its social impact, then countries established recovery plans that could restart growth and boost employment, with the quality of recovery programs being crucial to the strength and sustainability of the economic recovery, but also for restoring savings to achieve climate and sustainable development objectives.

Improving synergies between different international agendas will promote greater effectiveness and impact in the use of limited financial resources.

Strategies aimed at multiplying benefits must be pursued. In the context of the Decade of Action, improved coordination in the implementation of the Paris Agreement is also needed.

There is only one way forward: to fully integrate climate-aligned structural change – particularly by accelerating the transition to low-carbon and climate-resilient infrastructure – with a strong post-COVID economic recovery. This will require a fundamental change in the entire financial system and a massive increase in funding.

A new climate economy needs to be built – different from that 20th century growth model based on fossil fuel dependence, the degradation of natural capital and ecosystem services. Thus, a large part of the European/global capital stock will have to be redeployed, forgoing investments in coal, for example, by channeling funding to urgent needs. A major investment boost is needed to meet the climate goals set out in the Paris Agreement – to accelerate the replacement of aging and polluting capital, and to adapt to the already evident effects of climate change.

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INFLUENCE OF BUSINESS ENVIRONMENT AND SUSTAINABILITY ON FOREIGN DIRECT INVESTMENT

Ibadete DAKU[60]

Egla MANSI[61]

Abstract:

The purpose of this research paper is to analyze the influence of business environment and sustainability on foreign direct investment in European Union countries. Our focus is based on the improvement of business regulations to enable an environment for investors that offers security and prosperity but makes allowances for the investors' sustainable choices. Beside our main purpose which is the impact indicators of Doing Business on inward foreign investment of the host country, a comparison between two groups of countries is also conducted their business environment. Dealing with construction permits and resolving insolvency are seen to have a strong positive relationship, while paying taxes and starting a business impact positively FDI but were found insignificant. In addition, investors' attention is drawn more to economies whose carbon emissions are lower, which underlies the sensibilization for a "cleaner" environment.

Keywords: *Foreign direct investment, Ease of doing business, Sustainability*

JEL classification: *F21*

Introduction

As the main focus of many investors and policymakers, the environment of investment with its dynamic features, due to the advent of globalisation, compelled organisations to succeed in better business models. The intersection of human resources, materials, and external ones, allows businesses the persistence in operations, but also, this complexity attracts the need for better business model policies and strategies (Oginni, 2010). A business climate characterised by an extension of corruption and inadequate policies is thought less pleasurable for business people to put money into it, thus, it harms influencing foreign direct investment. As it is mentioned, FDI can be defined as the purchase of an interest in a company by an investor located in another country (Rathburn, 2023). Improvement in the business climate to attract more domestic investors and foreigners are crucial for the economy, and a way to make beneficial changes is by comparing the business environment with other economies (Svejnar, 2015). Therefore, researchers have conducted studies related to the regulatory environment and foreign direct investment, as it is thought that better legal systems accompanied by preferable policies in the simplicity of documents to start and operate a business in foreign countries draw foreign investors' attention.

Great attention has been addressed to projects who embedded the idea of sustainability, and also, the focus of many authors is the outperformance of those traditional investments whose main intention is to get the high profit due to the rise of business ideas with the aim of more sustainability and better regulatory environment (Lingnow et al., 2022). Amidst the yields of investments, reliable

[60] *Bachelor's degree in finance, Banking and Finance Department, Epoka University, Tirana, Albania. Email: Idaku20@epoka.edu.al.*

[61] *Master of Science in Economics Business Administration Department, Epoka University, Tirana, Albania*

procedures are seen to allocate the funds through the low-carbon economy and more inclusive ones (Popescu et al., 2021,13). As a role of catalyst in economic development, foreign direct investment initiates technological advancement, better contribution to resources of the host country, integration in international trade, and enhancement in human capital (Olival, 2012). The determinants of attracting foreigners to invest in the host country and analysis on their impact have been conducted for the past decades, by considering mostly the macroeconomic variables Many of those authors concluded inflation as a negative coefficient while explaining FDI, as higher prices in host countries imply a lower value in the currency of foreigners. Also, gross domestic product per capita results in the rise of economic scale, influencing more foreigners to invest in host countries (Dornean et al., 2021). Their intentions were conducted by using explanatory variables such as exchange rate, as it is thought organisations buy cheaper goods in countries where their home currency is highly appreciated. As time evolves, many authors have changed their attention mostly to business regulation and sustainability, as a consequence of business people's preferences for more simplicity and security where they put money in the host country. Besides the fact that macroeconomic factors play a key role in attracting more inward FDI, also the regulatory system and sensibility of people towards more "clean" environments have drawn attention to project managers.

We intend to analyse the influence of the regulatory environment and sustainability in inward foreign direct investment, by using the Doing Business indicators and Carbon dioxide per capita as variables of our interest. There are arguments that the key role of institutions is the rise of security and reduction of uncertainty, by implementing all the rules and regulations that define property rights (North, 1990, 4). The World Bank provided the report of Doing Business, which can be defined as an explanation of understanding the business climate of a country. This research paper considers areas of regulation such as Starting a Business, Dealing with construction permits, Paying taxes, and Resolving insolvency. We aim to provide the impact of these areas in inward foreign direct investment, therefore, perceiving some conclusion for better decision-making related to countries where investors tend to invest their money. Also, a comparative analysis of developed countries and developing ones, particularly in the European Union, is conducted to achieve one of our aims, that the developed economies represent an improvement in the regulatory system, encouraging more investment compared to the developing countries. The overall ease of doing business score is taken as the variable of our interest, also with the proxy for sustainability which is the carbon dioxide emission per capita. In addition, our research paper is a contribution to the literature for very important characteristics of business models, also it helps for a better understanding of reforms undertaken by governments during the time we have studied, and their impact on the attractiveness of more foreigners. These research papers consist of several chapters. The second chapter summarises the theoretical background and empirical work conducted by other authors. The third chapter describes the way of data collection and methodology we used. The fourth chapter reports all the diagnostic tests, and the interpretation of the results. Then the last chapter refers to some conclusions related to the policy implication and limitations.

2. LITERATURE REVIEW

This part of this paper summarises the relevant literature conducted by other authors in this topic of study. It has evaluated most of the literature related to the ease of doing business and the macroeconomic determinants of FDI in host countries. The first part of this is related to theoretical background, and the second part summarises empirical evidence based on research papers written by other authors.

2.1 Theoretical framework

The theory of internationalism of products, as the basic idea of it, is penetrating foreign markets to capture the interest of the foreign demand by producing beyond their domestic market to reach the habits and tastes of all their customers. Through diversification, the supply of new product lines or activities has been growing over the last few years. In economic literature, and as the purpose of many research papers, Ownership, Location, and Internationalisation, have become the theory that is mostly used. As it is one of the most accepted ones, the OLI model has its roots in the advantages of companies due to its ownership benefits and the convenience of the location of products produced (Dornean et al., 2021). To prove the significance of ownership and location-specific variables on the sales of U.S. companies, Dunning (1980) aimed to seek empirical evidence for the eclectic theory of international products. Proxies used for the OIL components were the institutional variables that highlighted that for a good economy, with more sustainability and more social well-being, the need for good governance is crucial. A study conducted using OLI models in emerging countries and developed ones concluded that investors are attracted more to an environment with a better business climate and to an effective regulatory system (Donaubauer et al., 2016).

2.2 Empirical evidence

Institutional variables of Doing Business have shown an important growth in explaining the inward foreign direct investment, as their report expresses the business environment in a country. A better-rate business environment attracts more innovation, and more FDI, especially in developing countries (Olival, 2012). The author analysed 144 developing countries and 33 developed countries, trying to get a link between a business environment and FDI. He found that institutional quality and better business practices promote investment, as a result, it increases the economic growth of the country, helping in more employment opportunities, and a better standard of living. The second conclusion retrieved from this study is that explanatory variables have a greater impact on explaining FDI, especially in emerging countries, maybe due to the possibility that raw materials are cheaper and less strict regulation attracts more profitability (Olival, 2012). Piwoski (2010) researched the impact of Ease of Doing Business on FDI and came to the conclusion that if the ease of doing business's rank is increased by one level, the foreign direct investment is increased by 44 million USD. He used a multivariate regression model, and found a strong positive relationship between FDI and rankings of countries taken as measure of doing business. An insignificant impact of EoDB ranking is shown in Sub-Saharan African countries and OECD countries, whereas a considerable difference of impact is seen in developing countries across the globe (Gillanders, 2022). According to another study, improvement in ease of doing business, particularly in developing countries, do attract more foreign investors. A better record of doing business, determining a higher FDI, is seen in developing countries while a drop of FDI is seen in developed countries. A compassion between these two groups of countries, has concluded that the increase in FDI in emerging countries has come as a consequence of better implementation of doing business variables (Bayraktar, 2023). Better institutional variables play an important role in FDI and have a positive impact on it, but when these are combined with poor macroeconomic variables, create a negative influence on FDI. The deterioration of institutional indicators will result in a bad regulatory environment, creating insecurity for foreigners about their investments (Azan et al., 2010).Described as efforts from the government to simplify business regulation, doing business indicators are essential to create a decent business climate (Anggraini & Inaba, 2020). Anggraini and Inaba researched the impact of ease of doing business indicators in separate samples based on the country's income, and concluded that EDB score ranking from the worst to best has a positive significant impact on inward direct foreign investment in all the groups. Starting a business, in high-income countries, is the most important indicator of Doing Business explaining FDI, while paying taxes has the most significance in middle-income countries. In low-income countries, where funds to finance the investment are very scarce,

getting credit is the most significant factor (Anggraini & Inaba, 2020). Dealing with construction, has been included as an explanatory variable in many papers, to show if there is a relationship with FDI. According to the study, if construction permits increase by 1%, the inward foreign direct investment will increase by 0.34%, influencing in a positive way (Mahmuni & Bonga, 2017). According to research done in EU countries, using three categories of countries, developed countries, frontier and emerging ones, dealing with construction permits is seen to have a positive and a strong significant impact on inward FDI in all three categories (Dornean et al., 2021). Investors with innovative and new business ideas, must consider taxes as their crucial role in evaluating the profitability of investment (Fahmi, 2012). According to middle income countries, paying taxes is the most significant indicator explaining FDI, which increased by 1.2% for each percent increase in paying taxes (Anggraini & Inaba, 2020). Paying taxes in developed countries have sought no influence on FDI (Dornean et al., 2021), while in a research paper conducted in the transition economy of the EU, this variable has a negative impact (Haliti & Merovci, 2019). In agreement with a study conducted in 6 emerging European countries, using panel data with a time frame of ten years, fiscal policy plays a great role in attracting foreign direct investment as it creates a friendly business environment, with less tax fraud and tax avoidance, and more transparency (Göndör, 2022). Social media, as part of people's free time, has been promoting in general the healthy lifestyle during those last years. As the consequences of local pollutants and global ones have gotten worse, traffic noises creating hypertension, cardiovascular disease, risk of losing hearing whereas carbon dioxide, NOX and sulphur dioxide destroying the beautiful nature, investors are looking for investment with more sustainability development (Chipalkatti, 2022).Attention to the growth of sustainability of investment has influenced business performance, to cut down carbon emissions, while promoting a clean environment for people to live in more economic development and opportunities (Wang & Zhang, 2022). According to an article made by one of the greatest banks in the world, JP. The Morgan pandemic has been a forewarning hint for sustainability development since pollution created mostly by the business environment has increased producing many infections, risking people's lives, and destroying the environment for the new generations (Morgan, 2020).

Even though there are few studies conducted regarding the relationship between carbon emissions and foreign direct investment, a strong relationship is found to influence foreign direct investment to be more responsible for the environment. A research paper conducted in three samples of European countries, based on the economies of countries, stated that an increase in pollution will decrease the FDI stocks by 29 units in emerging countries, 62 units in developed countries, and 36 units in developing countries ceteris paribus (Dornean et al., 2021). Environmental degradation, as a concern for economic growth, has shown a significant negative impact on private and public investment in Pakistan. Not only this variable but also, technological innovation, trade openness, and real GDP growth rate reduce the environmental quality, increasing the degradation of the habitat of many human lives (Chunling & Memon, 2021).

Hypothesis 1: *Better business climate attract more investors as it provides more technical, institutional assistance for investment;*

Hypothesis 2: *Countries with the concern of sustainability are more likely to captivate more investors, due to sensibilization for a "clean" country.*

Hypothesis 3: *Developed countries are expected to attract more foreign direct investment compared to developing ones.*

3. DATA AND METHODOLOGY

3.1 Data collection

This study uses annual data, consisting of a period from 2010 to 2020, to analyse the inward FDI in the host country, because of the business climate and sensibilization for "clean" activities with more sustainability. Based on the FTSE classification of countries, we cover panel data for 12 developed countries, part of the European Union. Hence, the developed countries to be investigated will be Austria, Denmark, France, Belgium, Germany, Italy, Luxembourg, Finland, Netherlands, Italy,

Ireland, Sweden, and Spain. Also, to make a comparison between developed and developing countries of the EU, we have retrieved secondary data for countries such as Estonia, Cyprus, Slovenia, Romania, Bulgaria, Hungary, Greece, Czechia, Poland, and Portugal (FTSE Russell, 2023). To begin with, our study intends to analyse if non-resident companies are attracted more to those countries where sustainability awareness is higher, so their activities will less harm the environment. Taking this into consideration, one of our independent variables is going to be carbon dioxide emissions per capita (CO2PC) extracted from the World Bank. Due to regulations taken by the government concerning the quality of the business environment, such as obtaining a construction permit, time to prepare and pay taxes, obtaining a worker's contract, number of procedures to start up a business, may influence the decisions of a company to invest in the host country (Djankov et al., 2002). A questionnaire to 10.000 legal practitioners was distributed due to their experience with regulation routinely. The EDB has ten indicators since 2019, and part of this research will be four indicators, which will be used as explanatory variables in explaining the business regulatory environment's impact on inward FDI.

3.2 Empirical strategy

As it is mentioned before, the aim of our empirical study is to investigate the relationship between Ease of Doing Business indicators and sustainability with inward FDI stock. The estimation will be carried out by using R statistical software. A relevant econometric method to investigate this relationship will be by making allowances for some country-specific characteristics that can drive variation in FDI stock, causing our regression of some endogeneity problems (Olival, 2012). Those country-specific variables can be unobservable and can be correlated with the regressor, and one of the key assumptions in regression analysis is that the covariance of the error term and regressors is equal to zero. Therefore, the best method to fight these problems is using a fixed-effect model. Besides this, a method such as random-effects is always more efficient. Nonetheless, despite their efficiency, fixed effects give more consistent results (Olival, 2012). On the other hand, pooled OLS can't be considered an appropriate estimation model because it estimates an inconsistent coefficient and does not give a specific effect once the fixed-effect model is available. Thus, the Haussman test is conducted to guide us for the appropriate method to be used, as also the random-effect model can be a choice.

Hausman Test

Hausman Test	*Coefficient*
Chi-square test value	112.74
P-value	2.2e-16
Degree of freedom	8

Along with this, another assumption must be considered besides the one of the maximum efficiency possible of the coefficients, such that the idiosyncratic error should have a constant variance (Olival, 2012). Breusch-Pagan test is conducted to test for the assumption with the null hypothesis of homoscedasticity. Rejecting the null hypothesis, allows us to fix this problem by using two methods: fixed effects with the robust standard error or the one with clustered standard error. As well, the assumption of no autocorrelation of the idiosyncratic error is tested by using the Breusch-Godfrey test. If we fail to reject the null hypothesis, we can conclude that there is no serial correlation, but unfortunately, in most cases, this assumption does not hold (Wooldridge, 2002, 910). This issue can be solved the same as the problem of heteroscedasticity with robust standard error.

Breusch-Pagan test

Degree of freedom	8
p-value	2.362e-06

Breusch-Godfrey test

Degree of freedom	1
p-value	2.2e-16

Furthermore, the Maddala-Wu Unit-Root Test is conducted for the stationarity of variables. In case of non-stationarity, we can adjust our econometric model by transforming it into a log form. The alternative hypothesis implies stationary, meaning in case the p-value is greater than 0.05, we fail to reject the null. Non-stationarity data are the ones that change over time, and are unpredictable and can't be modelled or forecasted.

Unit root test for all variables

Unit root test			
Variables	Alternative hypothesis	p-value	
Fdi stock	Stationarity	0.998	Non-stationary
EDB	Stationarity	0.1291	Non-stationary
Start	Stationarity	0.087	Non-stationary
Constr	Stationarity	1	Non-stationary
Taxes	Stationarity	0.967	Non-stationary
Inflation	Stationarity	1.872e-09	Stationary
Labor	Stationarity	0.348	Non-stationary
Per Capita	Stationarity	0.897	Non-stationary
CO2	Stationarity	0.995	Non-stationary

***** Alternative hypothesis: Stationarity**

4. EMPIRICAL EVIDENCE AND DISCUSSION

4.1 Descriptive statistics of variables

Table 4.1 represents the summary of our variables in developed countries by showing the average for each variable, the maximum and minimum, and also the standard deviation. FDI inward stock measured in millions of USD has seen the maximum in the Netherlands in 2019 according to our sample. Not surprisingly, as the Dutch policy is defined by a strong international orientation and a liberal policy towards the foreign direct investment, the value reached 2.7 trillion dollars. Most Dutch companies are multinational, creating a country characterised by a very competitive fiscal policy, advanced infrastructure and a strategic location (Standard Bank, 2023). Finland, on the other hand, registered the lowest FDI stock value, with around 72 billion dollars in 2018. A typical country regarding our sample has 520 billions USD total value in inward FDI stock. The ease of doing business score with the highest value of 85.29 is seen in Denmark in 2020.
A fact about Denmark is that it is recorded among the European countries as the easiest economy to operate a business and ranked fourth in the world (Ministry of Foreign Affairs in Denmark, 2020).

The lowest score for ease of doing business is recorded in Italy, at the beginning of our period, as expected, because Italy is one of the European countries that is still below the EU average score (CT Corporation Staff, 2020).
The average score for the 12 countries of the EU part of this sample, is 76.10. The four indicators of EDB vary also in countries. Resolving insolvency has the lowest value of 35.42 in Luxembourg in 2017, while the highest value is recorded in Finland in the same year with a value of around 93.89. A typical country will have a value of resolving insolvency of about 77.68.
A significant variation in paying taxes is recorded with a minimum of 56.08 in Italy, in 2010 and a maximum of 94.62 in Ireland in 2016. Dealing with construction permits, a key indicator of doing business, has a minimum of its value 64.21, in Ireland in 2012. The country with the highest score in construction permits is Denmark in 2019. On average, in our sample, a country has a score of 75.21 corresponding to procedures, time, cost of building a warehouse, licences, and permits.

The biodiversity of Luxembourg experienced a depressing situation during the beginning of our chosen period, consequently of the density of transportation infrastructure, and urban and suburban development, resulting in higher carbon dioxide emissions (BIDOLI, 2015).
Therefore, the highest carbon dioxide emission was detected in Luxembourg, in 2010. Despite the sensibilization for lower emissions growing, and many countries are following policies to reduce pollution, Sweden is one of the EU countries that has always considered the value of the ecosystem, and as expected, the lowest carbon dioxide emission was seen there with a value of 3.405. A typical country has on average 7.957 carbon dioxide emissions per capita. The country with the highest prices in general is Belgium in 2012, while the lowest inflation rate is seen in Italy, in 2012. On average, the inflation rate is -0.90221. The highest value in the labour force is 83.13 while the lowest is 73.91. The gross domestic product per capita varies from 25,754 to 123.679, with an average of 52.478 in general. In total, in this investigation, there are 120 observations.

Table 4.1

Summary table of variables

Variables	Mean	Min	Max
FDI	**520,223**	**72,072**	**2,719,474**
EDB	**76.10**	**65.81**	**85.29**
Insolvency	**77.68**	**35.42**	**93.89**
Start	**68.69**	**88.74**	**94.67**
Taxes	**82.61**	**56.08**	**94.62**
Construct	**75.21**	**64.21**	**87.91**
Carbon dioxide	**7.957**	**3.405**	**21.757**
Inflation	**-0.9221**	**1.2478**	**3.5321**
Labour force	**73.91**	**62.02**	**83.13**
Per capita	**52,748**	**25,754**	**123,679**

4.2 Results and discussions

Table 4.2 shows the results using business indicators, the proxy for sustainability, and macroeconomic factors as explanatory variables to investigate the variation in the inward total value of FDI stock. The conduction of the Hausman test resulted in a p-value lower than 0.05, therefore rejecting the null hypothesis that the random-effects model is preferred. On account of this, the Hausman test leads us to conclude that a fixed estimator will be used to interpret the results against

the random effects. The Hausman test is represented in Table A.1. Moreover, the Breusch-Pagan test was conducted to test for homoscedasticity in Table A.3. With a p-value lower than 0.05, the use of a fixed-effect model with robust standard error is necessary. Also, to fix the problem of serial correlation, this method is the most appropriate way to get the most efficient coefficient for our regression analysis. Unit root test is presented in Table B.2 leading us to a transform in logarithmic form and no correlation between the explanatory variables in Table A.2 was found. A more detailed explanation regarding the coefficient results is interpreted below:

Resolving insolvency shows a positive significant impact on FDI, at a 1% level of significance. According to the empirical study, an increase in resolving insolvency by 1 percent, will increase the FDI by 0.635 percent ceteris paribus. This coefficient and its significance justify that the legislative system related to bankruptcy by getting improved lowers the cost of the resolution process, also the burden of charges taken as a cause of failure, giving companies more opportunity to figure out the liquidity problems and helping the extension of daily operations (Lee et al., 2011). The results are consistent with previous studies such as Anggraini and Inaba (2020) and Gillanders and Corcoran (2015).

Starting a business, an indicator of ease of doing business emerges to harm FDI but is insignificant at any level of significance. As a consequence, in this investigation, we may conclude that there is no influence of such variables in a variation of our dependent variable. It was expected that advancement in procedures, and documentation of obtaining a licence would encourage investors to put money into ideas that are easy to produce. But the results did not meet our expectations, also it opposed the results of Olival (2012); Bayraktar (2023) which stated that better policies in procedures and lower cost and time to start a business influence foreigners to invest in the host country. On the other hand, Corcoran and Gillanders (2012) stated foreign direct investment is not influenced by better institutional variables.

Table 4.2

Regression analysis for developed countries

Dependent Variable	**FDI stock**			
Variables	***Estimate***	***Std. Error***	***T-value***	***P-value***
log (insolvency)	*0.635*	*0.209787*	*3.0283*	*0.0031****
log (start)	*0.4925*	*0.475016*	*-1.0370*	*0.3022*
log (construct)	*1.8018*	*0.541688*	*3.3264*	*0.0012****
log (taxes)	*0.1567*	*0.394831*	*0.3971*	*0.6921*
Inflation	*-0.0331*	*0.012026*	*-2.7537*	*0.0070****
log (CO2)	*-1.5772*	*0.154470*	*-3.7371*	*0.0003****
log (labour)	*-1.4625*	*1.137707*	*-1.2856*	*0.2015*
log (per capita)	*0.3388*	*0.154958*	*2.1868*	*0.0310***
F- statistic	*11.4679*			
Observation	*130*			
R- squared	*0.47847*			

***p ≤ .01. **p ≤ .05. *p ≤ 0.1

Also, advancement in regulations and procedures to start a business is a good indicator for an economy, but is not one of the main influences on attractiveness of foreigners (Independent Doing Business Report Review Panel, 2013), but, contrarily, Zhang (2007) stated that if the cost of starting a business are decreased especially in heavily regulated countries, than more inward investment from foreigners will be conducted. Dealing with construction permits shows a significant and a positive link in relation with FDI, by increasing it by 1.802 %, for each percentage increase of construction permit. As the quality of construction is strengthened, being evaluated as a strong secured building, with insurance regimes and professional certification requirements, it attracts investors more to invest in the host country (TheWorld, 2020). Many researchers have concluded that a better index of construction permits has always increased foreign direct investment in host countries. This strong impact on FDI was found by many other authors such as Junior et al., (2016), Anggraini and Inaba (2020).

Another sub-indicator showing a positive impact on FDI is paying taxes but is statistically insignificant. Based on our regression analysis, we may conclude that there is no impact of this indicator on explaining the variation of our dependent variable. Improvements in tax incentives were thought to charm business people with higher profits due to tax deductions. According to Hassan et al., (2018), the insignificant impact of taxes on inward FDI can be explained by corruption and its influence on the economy. If we take into consideration the global average corruption index is around 43, implying that two-thirds of the world has been impacted by corruption. Corruption not only reduces the collection of tax revenue but also hinders economic growth and impacts future tax collection (Transparency International, 2017). The coefficient regarding paying taxes was found to have the same results as (Dornean et al., 2021), (Olival, 2012) for their specific chosen samples.

As mentioned, the concern of economic growth, municipal waste, and carbon dioxide emissions, has led to broadening the education of people for less harmful activities. If the carbon dioxide emissions are increased by one percent, we expect the foreign direct investment to fall by 1.57 percent ceteris paribus. In other words, if the host country abuses its environment, resulting in degradation, business people's satisfaction to invest there is decreased. We can prove our hypothesis, countries with the concern of sustainability are more likely to captivate more investors, due to sensibilization for a "clean" country. This results that many projects are leading towards green movements for lower pollution emissions to save the place for future generations.

Regarding the macroeconomic variables, inflation and gross domestic product per capita has a significant impact while labour force participation seems to not influence at all. A general increase in prices in host countries, while causing the foreign direct investment to fall by 0.031 percent ceteris paribus. Appropriately, investors seek to invest in places with lower costs of production, recording more profits on their investments. On the other hand, if the gross domestic product per capita increases by 1 percent we expect the FDI to increase by 0.34 percent ceteris paribus. Overall, as the standard of living increases, more investors are willing to put money to have better quality because FDI is attracted as citizens of the host country live more comfortably and they become more educated and better at helping in the production of new products and investment. Overall, with an R-squared of around 47 percent, we can conclude that our explanatory variables explained the variation of FDI.

CONCLUSION

5.1 Overall conclusion

The enhancement of reforms regarding the regulatory system of a business environment implies the establishment of security of organisations to invest in the host country. Using panel data for the European Union countries, this research paper concludes that the overall ease of doing business has a great impact on attraction of inward foreign direct investment in the host country. In addition,

dealing with construction permits and resolving insolvency, can be concluded as strong sub-indicators on impacting the FDI. Based on the sample used, starting a business and paying taxes were thought to have a positive effect in our dependent variable but found to be insignificant in any level of significance. In general, based on the first regression model, we can conclude that improvement in the reforms of regulations drives more foreigners to invest in the host country.
Secondly, the relationship between sustainability and inward foreign direct investment was another aim of this study. As the global temperature has risen in the last two decades, the sensibilization of people to prevent this global issue has been injected to people in early ages. As a result many organisations are aiming for projects that do not harm the environment. The proxy used for sustainability, was found to have a negative impact on driving more inward FDI. If the carbon dioxide emissions are increased by one percent, we expect the foreign direct investment to fall by 1.57 percent ceteris paribus. This results in that overall, carbon emissions are not preferable while investing in foreign industries. Also, **Table 4.1** represents the minimum and the maximum of carbon emission. Based on the period of time from 2010 to 2020, the carbon emissions have been falling in almost all countries of our sample. Many governments have taken responsibility for putting restrictions on activities of citizens so they can reduce the carbon footprint.

5.2 Policy implementation

As it was mentioned, not all the sub-indicators of Doing Business had an impact on the dependent variable. However, the centre of attention for each economy must be all the indicators, so there will be an improvement even in other sub-indicators that were found insignificant. Based on the Doing Business report, it takes into account all its components, therefore, a decrease in one of the indicators results in a reduction in the overall ease of doing business score. Governments should attempt to advance the regulation of all components, sending signals to investors for investing in their country.

Starting a business in a host country is a process requiring many steps. For better implementation of this indicator, a reduction in the minimum capital requirement, also the execution of documentation online simplifies the inescapable process. The case of Austria can be mentioned, for its contribution to lowering the minimum capital required to start a business, while Belgium chose to eliminate the whole of it (TheWorldBank, 2020). Concerning the process of paying taxes, an organisation would not like to invest in countries with dual taxes but prefers simplification of this process having the possibility of online access to fill and pay the taxes. Finland was one of the first countries to allow online access to each business for paying taxes (TheWorldBank, 2020). Besides this, decides to lower the overall income tax. Also, procedures for setting up a business and the release of whole documents, and licences should be reduced so the companies who are putting money in the host might find fewer difficulties. Denmark helped the investor by removing the fees for building permits, by making it cheaper to invest, while Norway lowered the time needed to obtain a building permit (TheWorldBank, 2020). Dissemination of information about the reforms in the business environment and regulations is crucial, especially for new investors. Governments should give more opportunities to business people, and educate them more, especially the new ones, as they are not aware of the investment climate and the impact on what they yield.

5.3 Limitation of the study

As it was concluded, most of our explanatory variables were found significant and positively influencing the dependent variables. Even though the results were as we expected, still they might be considered. Each economy has its characteristics, some might be wealthy due to their natural resources, while others to human capital. This characteristic defines the economy of a country and might influence foreign direct investment. Although a country might be known for the best regulatory system and with the awareness of sustainability, it still may not be the desired destination for investors to invest due to some specific features of itself.

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DETERMINATION OF THE ECONOMIC VALUE ADDED USING ECONOMETRIC MODELS WITHIN THE ECONOMIC ENTITY

Cristina Mihaela IONESCU (HARALAMBIE)[62]

George Alin HARALAMBIE[63]

Abstract:

Determining the economic value added is a permanent concern among the actors participating in the market through the prism of efforts made to maximize shareholder wealth. The benefits brought by this modern management tool significantly contribute to the existing correlation between the objectives of the management and those of the shareholders, in order to perform a complex financial analysis of the performance with a high degree of responsibility. The study aims to evaluate the relationship between the dependent variable Economic Value Added (EVA) and a set of independent variables Net operating profit after tax (NOPAT), Earning per share (EPS), Return on equity (ROE) and Return on capital employed (ROCE).The time period considered for the analysis covers 6 financial years related to the period 2017-2022, the necessary data being extracted from the annual financial statements of ROMGAZ SA. As a result of the analysis perform, we could find that there is a strong correlation between Return on capital employed (ROCE) and Earning per-share (EPS) and between Return on equity and Net operating profit after tax (NOPAT). Regarding the existing correlation between Economic Value added (EVA) and Return on equity (ROE) we can see that it is a moderate measure.The results of the present study are in line with other research in this field, with the indicators used as a reference for determination of the value economic.

Keywords: *Economic value added (EVA), Net operating after tax (NOPAT), Earning per share(EPS),Return on equity(ROE),Return on capital employed(ROCE)*

JEL Classification*: G31, M21, M41*

Introduction

The current competitive economic environment requires the use of advanced managerial tools and techniques to facilitate the adoption of the most rational managerial decisions regarding the optimal allocation of resources. In this regard, emphasis is placed on the ability of managers to act to maximize the newly created value through clear and easy-to-follow targets in shaping business strategies based on plans drawn in terms of accounting budgets linked to the objectives set at economic entity level in order to achieve encouraging economic results.

The correction of managerial errors due to the analysis of accounting data is achieved by using techniques and tools to quantify managerial performance in close relation to organizational elements.

Promoting value-based management brings additional benefits for shareholders but also for other interest holders with positive effects in performance evaluation, a process that many companies operating in the economic environment go through.

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[62] *PhD Student "Valahia" University of Târgoviște, Doctoral School of Economic and Humanities, No. 35, Lt. Stancu Ion Street, Târgoviște, Dâmbovița, Romania. E-mail: cristinaionescu91@yahoo.com.*

[63] *Associate Professor Faculty of Economic Sciences from Petroleum-Gas University of Ploiești, Romania*

The perception of economic participants in terms of capital structure and dividend policy is that they need to be adapted to how they generate new value created for shareholders. This entails a number of motivational challenges by encouraging a change in the personnel system for the successful implementation of this value-based management concept.

Managers' reward is aligned with the long-term contribution to creating newly created value for shareholders on performance criteria by identifying opportunities that arise.

Literature review

Starting from the idea of maximizing the value created for shareholders, we have at hand the decision-making variables with which we base our strategy at the entity level through financial analysis techniques that encourage performance, promoting organizational culture. (Arnold & Lewis, 2019)

The massive rise of information technology has brought innovative methods and possibilities for predicting stock exchange assets using mathematical models. (Fialova & Folvarcna, 2020)

Closely in line with the process of implementing the company's strategy is the decision to invest resources, which according to economist Stern Stewart (2019) is achieved through EVA that leads to the adoption of managerial decisions with an optimal allocation of strategic resources. (Stern, 1994)

In the opinion of Khiari Z. and Djaouahdou R., economic value added is described as an indicator in quantifying performance, as it helps optimize the decision-making system from a dual perspective, maximize the wealth of owners and the expectations of investors on the future gains it will generate. (Khiari & Djaouahdou, 2017)

A similar approach is found in Ismail I.(2011) , which argues that the EVA indicator is a blend of accounting, economic and market information that translates it into a complex and comprehensive performance measuring instrument. (Ismail, 2011)

Literature review (Kliestik, Valaskova, Lazaroiu, Kovacova, & Vrbka, 2020) considers that an important factor in profit growth is the increase in economic value.

The information provided by the annual financial statements is the main tool to guide management at economic entity level to diagnose financial condition using financial analysis, using a set of economic indicators to measure economic performance. (Savova, 2021) (Siekelova, Belas, Podhorska, & Durana, 2020)

The main advantage of using the EVA indicator is that it provides relevant information to shareholders in terms of profit taking into account the cost of capital employed. (Robinson, 2020)

The Economic Value Added is a measure of a company’s financial performance based on the residual wealth calculating by deducting its cost of capital from its operating profit ,adjusted for taxes on a cash basis. (Hammer & Siegfried, 2022)

Research Methodology

The aim of the research was to test the multiple linear regression model as well as to explain the statistical-mathematical relationship and the influences between the dependent variable (Economic Value Added) and the independent variables (Net operating profit after tax, Earning per share, Return on equity and Return on capital employed, etc.).

In analyzing the financial results, we studied the correlation between EVA, Net operating profit after tax, Earning per share, Return on equity and Return on capital employed).

The next step was to test the correlations between these indicators and establish the regression equation.

The economical-mathematical modeling was done using the SPSS statistical program version 17.0. For the correlation analysis, we determined both the average and standard deviation in the early phase, establishing the correlation level with the Pearson Index.

The SPSS program (Statistical Package for Social Sciences) is used in statistical data analysis in experimental research. Compared to other similar programs, it is distinguished by the rigorous structure of the analysis performed and the ease of use.The method used is simple multiple regression.

The regression equation is of the form:

Y=aX_1+bX_2+cX_3+α

Where: α0 = the constant term; the free term of the model;

a,b,c= slope parameters; obtained by the method of least-squares are functions of the selection data (from the sample);

ROMGAZ SA recorded during the period 2017-2022 the following financial data that were extracted on the basis of the annual financial statements in order to determine the EVA dependent variable (Economic Value Added) and can be seen in the table below:

Table no. 1

Dynamics of Economic Value Added (EVA) indicator in 2017-2022 at Romgaz SA

Indicators	2017	2018	2019	2020	2021	2022
Average capital employed(1)(Active totale-Datorii totale)	9.391.839	8.975.440	7.101.494	7.746.265	8.981.153	10.076.565
Total Assets	10.983.557	10.918.589	8.171.639	9.216.154	11.292.973	14.328.059
Total Liabilities	1.591.718	1.943.149	641.640	542.289	2.311.820	4.251.494
Weighted Average Cost of Capital WACC(2)	0,988	0,993	0,991	0,992	0,994	0,908
Cost of Capital Employed(1*2) COCE	9.279.137	8.912.612	7.037.581	7.684.295	8.927.266	9.149.521
NOPAT Net Operating Profit After Tax	1.314.929	1.939.278	1.451.576	1.386.537	4.394.378	3.019.511
EVA (COCE-NOPAT)	7.964.208	6.973.334	5.586.005	6.297.758	4.532.888	6.130.010

Source: own processing based on the financial statements of ROMGAZ SA in 2017-2022

The determination of the Economic Value Added (EVA) indicator assumes the calculation of the weighted average cost of capital using the formula

$$CMPG = \frac{CP + R_{CP+}D_f x\ d\ x\ (1-i)}{CP + D_f}$$

CP equity

R_{CP+} rate of return on an investment security
D_f financial liabilities
d interest rate
i = profit tax rate

Table no. 2

Dynamics of the weighted average cost of capital (CMPG) in the period 2017-2022 at Romgaz SA

Indicators	2017	2018	2019	2020	2021	2022
Equity	9.391.839	8.975.440	7.101.494	7.746.265	8.981.153	10.076.565
Financial liabilities	128.520	68.001	73.411	68.083	60.320	1.187.178
Rate of return on an investment security (R_{CP}) $R_{CP} = \frac{(C_1 - C_0 + D_a}{C_0)}$	0,52	0,15	0,42	0,16	0,51	0,21
Interest rate	0,01	0,02	0,19	0,47	0,00	-0,02
Weighted Average Cost of Capital	0,988	0,993	0,991	0,992	0,994	0,908
Dividends per share (D_a)	6,852	4,170	1,61	1,790	3,800	3,420
Course at the beginning of the period (C_0)	25,10	27,8	27,35	25,75	28,35	34,05
Course at end of period (C_1)	31,30	27,80	37,10	28,10	39,00	37,75

Source: own processing based on the financial statements of ROMGAZ SA in 2017-2022

A further step in this analysis is the presentation of the variables used in the econometric model (Table 3).

Table No 3

Variables used in empirical analysis

Indicators	2017	2018	2019	2020	2021	2022
EVA	7.964.208	6.973.334	5.586.005	6.297.758	4.532.888	6.130.010
NOPAT	1.314.929	1.939.278	1.451.576	1.386.537	4.394.378	3.019.511
EBIT	1.853.000	1.531.900	1.237.100	1.378.700	2.098.900	4.532.400
ROCE	0,20	0,17	0,17	0,18	0,23	0,45
earnings per share (EPS)	4,79	3,54	2,83	3,24	4,97	6,60
ROE	0,09	0,12	0,10	0,09	0,20	0,16

Source: own processing based on the financial statements of ROMGAZ SA in 2017-2022

Findings

To ensure the accuracy of the data, a descriptive analysis of the variables was performed as detailed in the table below. As we can see, in the econometric analysis, the distribution of the variables used is characterized by a positive asymmetry (skewness), because it registers positive values, except for the variables Earning per-share (EPS) and Return on equity (ROE). Kurtosis provides information about the distribution of variables. Considering the results presented in table no. 4, we can see that Economic Value Added varies between 4.532.0888 and 7.964.208.

Table no 4

Descriptive statics

	N Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Deviation Statistic	Skewness Statistic	Std. Error	Kurtosis Statistic	Std. Error
EVA	6	4532888	7964208	6247367,17	1171983,017	,021	,845	,353	1,741
NOPAT	6	1314929	4394378	2251034,83	1228369,076	1,342	0,845	0,882	1,741
ROCE	6	0,17	0,45	0,2333	0,10857	2,221	0,845	5,063	1,741
Earning per-share (EPS)	6	2,83	6,6	4,3283	1,40259	0,755	0,845	-0,159	1,741
ROE	6	0,09	0,2	0,1267	0,04457	1,062	0,845	-0,171	1,741
Valid N (listwise)	6								

Source: authors'own processing using SPSS

To analyze the correlation between the variables, we used the correlation matrix, presented in table no. 5 The correlation matrix is used for multicollinearity analysis. Usually:

- value of the coefficients between 0 and 0.30 marks a weak correlation;;
- between 0.30 and 0.70 a moderate correlation;
- between 0.70 and 1, a high correlation.

Analyzing the data presented in the table, we can see that there are:

- strong correlation between Return on Capital Employed (ROCE) and Earning per-share (EPS) of 0.890;
- a strong correlation between return on equity and Net Operating Profit After Tax of 0.994;
- a moderate correlation between Economic Value Added(EVA) and Return on equity(ROE) of 0.695;

Table no 5

The correlation matrix

		EVA	NOPAT	ROCE	Earning per-share (EPS)	ROE
Pearson Correlation	EVA	1	-0,71	-0,132	-0,026	0,695
	NOPAT	-0,71	1	0,46	0,589	0,994
	ROCE	-0,132	0,46	1	0,890	0,507
	Earning per-share (EPS)	-0,026	0,589	0,89	1	0,611
	ROE	0,695	0,994	0,507	0,611	1

Source: authors'own processing using SPSS

Table no 6

Model Summary

Model	R	R squared	Adjusted R square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
1	,969a	,939	,694	,647912,513	,939	3,840	4	1	,363	3,610
	a. Predictors: (Constant) Net operating profit after tax(NOPAT),Earning per share(EPS),Return on equity(ROE) and Return on capital employed(ROCE)									
	b. Dependent Variable: Economic Value Added(EVA)									

Source: authors'own processing using SPSS

The model was designed for regressors:ROE,ROCE,NOPAT,,EPS in relation to the dependent variable EVA

R squared indicates the percentage of the variance of the dependent variable that the independent variables collectively explain. R Square measures the strength of the relationship between your model and the dependent variable on a convenient scale from 0 to 100%. In general, a larger r-squared indicates a better fit for the model. In our case, 93.9% of the economic value added variation is explained by Net Operating Profit After Tax, Earning per share, Return on Equity and Return on Capital Employed.

Table no 7

Anova Test

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6447930335263,392	4	1611982583815,848	3,840	,363b
	Residual	419790623921,443	1	4197906223291,443		
	Total	6867720959184,835	5			

a. Dependent Variable: Economic value added(EVA)
b. Predictors: (Constant) Net operating profit after tax(NOPAT),Earning per share(EPS),Return on equity(ROE) and Return on capital employed(ROCE

Source: authors' own processing using SPSS

Another significant test is given by the ANOVA function. Of significant importance in ANOVA is the F-test, also known as Fisher's test. The higher the F, the higher the significance of the regression equation.

From the analysis of the data presented above we can say that the ANOVA demonstrates as a summary model a significant level of the regression equation, due to the fact that the value of F is 3.840 with an insignificant sig value.

Considering the fact that we have achieved a significant correlation level and at the same time the tests we performed have reinforced the significance of the regression equation. The coefficients of the regression equation is presented below.

Table no 8

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	2796540,789	3631924,828		,770	,582	-43351439,657	48944521,234
	NOPAT	-3,424	2,766	-3,589	-1,238	,001	-38,571	31,724
	ROCE	-12768519,781	7125419,948	-1,183	-1,792	,007	-103305564,473	77768524,910
	Earning per-share (EPS)	1358346,692	540841,070	1,626	2,512	005	-5513690,671	8230384,055
	ROE	65193449,472	77053261,481	2,479	,846	,003	-913861066,490	1044247965,435

a. Dependent Variable: EVA

Source: authors'own processing using SPSS

Starting from the coefficients presented in the table above, the regression equation is

$$EVA = 27.965.40{,}789 - 3{,}424\ NOPAT - 127.685.519{,}781\ ROCE + 1.358.346{,}692\ EPS + 65.193.449{,}72\ ROE$$

Following the analysis, we demonstrated that Net operating profit after Tax, Earning per share, Return on equity and Return on capital employed influence Economic Value Added (EVA).

Conclusions

At the level of an economic entity, the process of creating added value involves the adoption of an innovative vision, regarding the evaluation of investment strategies, current operations and the financing of a company's activity by selecting the optimal ones based on a rational and coherent judgment.

In the context of the capitalization of the financial performance, the key determining factors of the economic value must be identified by drawing clear and achievable coordinates to be followed by appropriate tools and techniques with the help of the relevant indicators in order to determine the results.Evaluating these results allows us to adjust possible deviations and to have an overview of the entire activity with the main objective of maximizing the newly created economic value.

In order to ensure the conditions of sustainable development at the economic entity level, it is necessary to analyze the reliable and relevant effects of decisions adapted to future economic consequences, contributing to the optimization of the entity's financial health.

The role played by this indicator is particularly important for employees and investors in terms of facilitating communication between them based on management reports.

EVA is often associated as an attribute of the shareholder wealth creation picture that contributes to the quality of managerial decisions under conditions of efficiency and effectiveness based on strategic thinking.

The multiple linear regression model reveals the economic-mathematical link between Net operating profit after tax (NOPAT), Earning per share (EPS), Return on equity (ROE) and Return on capital employed (ROCE) and Economic Value Added (EVA).

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THE MAIN TRENDS OF LOGISTICS IN THE CIRCULAR ECONOMY

Ivan LUCHIAN[64]

Traian DONCEV[65]

Abstract:

The important environmental problems at the planetary level require the global implementation of a new model of economic activity called the circular economy, which represents a regenerative business model in which resources are used as long as possible. Like any economic model, the circular economy needs an adequate logistic system to ensure its good functioning. Following the adaptation of logistics to the needs of the circular economy, new concepts such as green logistics (eco-logistics), sustainable logistics, and reverse logistics were developed. The application of these concepts involves the application of innovative strategies, technologies, and policies to reduce carbon emissions, energy consumption, waste generation, and other negative environmental impacts associated with the transport and logistics industries. These activities have led to important changes to ensure the sustainability of the entire component supply chain. Also, new concepts of logistics such as green logistics and sustainable logistics appeared, as well as the revision of the composition of reverse logistics.

Keywords: *circular economy; green logistics; sustainable logistics; reverse logistics*

JEL classification: *Q01, Q56*

Introduction

Since 2009, several experts have started sounding the alarm about the creation of a disastrous global ecological situation caused by human activity.

In relation to this, the author András Takács-Sánta (2022) stated: “The current ecological crisis (comprised of interwoven environmental problems such as global climate change, loss of biodiversity, soil degradation, smogs, toxic effects of synthetic chemicals etc.) is the result of excessive human transformation of the biosphere.”

The basic factors of the global ecological cataclysm are the growing pollution of the planetary environment, as well as the irrational expansion of the consumption of the planet's natural resources. (15 Biggest…, n.d.).

The World Business Council for Sustainable Development has calculated that if humanity does not abandon the linear model of economic development, by 2050 the ecological resources of 2.3 planets will be needed. (Hofman, 2023).

[64]*PhD, Moldova State University, 60, Al. Mateevici str. MD-2009 Chisinau, Republic of Moldova,. E-mail: luchian_ivan@mail.ru. ORCID:* https://orcid.org/0000-0002-8683-7228.

[65]*Most Organic, Cote d'Azur Residence, 82/508, Kv.Zornica, 8000, Burgas, Bulgaria, tdoncev@gmail.com.*

The global implementation of the circular economy, which in 2018 had a share of only 8.6% of the world economy, is considered by many specialists as a solution to the crisis situation. (Marino, 2022)

Therefore, the global implementation of the circular economy will require substantial efforts of a different kind.

Description of the Problem

Worldwide, an impressive development of the circular economy is expected for the coming years.

Research by Accenture shows that the circular economy could contribute to an economic development boost of USD 4.5 trillion by 2030 mainly by optimizing the consumption of natural resources. (The Circular…, n.d.)

Estimated revenues for circular economy transactions worldwide in the years 2022-2026 are set to increase from USD 338.9 billion to USD 712.7 billion. (Estimated…, n.d.)

According to the International Labor Organization, the application of circular strategies could lead to an increase of 6 million jobs by 2030. (ILO, 2023)

The global circular economy market size is expected to grow from USD 2.41 trillion in 2022 to USD 4.5 trillion by 2030. (*Unlocking*…, n.d.)

The development of the circular economy requires an important adjustment of the related logistics systems, which will be examined in this article.

This aspect is also confirmed by the information presented by DHL, according to which the global supply chain and logistics industry generates approximately 3.9 billion tons of CO2 emissions annually, which is approximately 8% of the world's total emissions, and supply chains considered in their entirety create more than half of all global carbon emissions. (*Supply*…, n.d.).

Methodology and Data

In order to perfect this article, the reports of some specialized companies were examined, as well as the publications of experts in the field addressed. Then the synthesis of these materials was carried out to form a complex picture of the logistical aspects of the implementation of the circular economy.

Results

Following the adaptation of logistics to the needs of the circular economy, new concepts were developed (Figure 1).

Source: developed by the authors

Figure 1. Recent trends in logistics development

It is about interconnected notions, such as green logistics (eco-logistics), sustainable logistics, and reverse logistics, as well as sustainability of the supply chain.

The common element that connects them is the fact that they support a circular economy and emerges from environmental, social, or corporate governance considerations as raw materials are taken, converted into products, and delivered to the market.

In the context addressed, Leonidas Milios (2018) mentions three policy areas:

(1) policies for reuse, repair and remanufacturing;

(2) green public procurement and innovation procurement;

(3) policies for improving secondary materials markets.

The notion of green logistics refers to the implementation of sustainable practices in logistics activities to reduce the impact on the environment. (*Green Logistics…*, n.d.)

The basic peculiarity of green logistics consists in placing emphasis on more ecological and sustainable processes in order to reduce the impact of logistics on the environment. Green logistics tends to minimize the environmental impact of logistics activities, including the activities of direct and reverse flows of products, information and services between the point of origin and the point of consumption. Green logistics implements innovative strategies, technologies, and policies to reduce carbon emissions, energy consumption, waste generation, and other negative environmental impacts associated with the transportation and logistics industries. (*Green logistics*, n.d.), (*Green logistics…*, n.d.), (*What is…*, n.d.)

In this context, the expert Hans Dekker (2023) states: “Also known as eco logistics, green logistics is a set of sustainable logistics practises and measures in supply chain management and transportation operations. It aims at minimising the negative impact of logistics operations such as transportation, warehousing, inventory management, and distribution on the environment. It encompasses various strategies and initiatives emphasising carbon footprint, energy consumption, waste generation, and resource depletion throughout the supply chain processes.”

After studying the forecasts related to the evolution of the global ecological logistics market, we can speak of growth from USD 1.0 trillion in 2021 and USD 1.3 trillion in 2022, to USD 1.5 trillion in 2028 and USD 2.9 trillion in 2032. market. (*Global Green…*, 2023), (*Green Logistics…*, n.d.)

At the same time, experts estimate the volume of the global logistics market at the level of USD 7.98-10.68 trillion in 2022 and expect it to grow to USD 18.23 trillion by 2032. (*Logistics Market*, n.d.), (*Logistics Market…*, n.d.)

This means that the share of the ecological logistics market has a share of 12.2%-16.3% in the total volume of the respective market in 2022, which will constitute 15.9% in 2032.

Implementing green logistics can bring a number of benefits (Dekker, 2023), (Champion,

2021), (*What are…*, n.d.):

1.*Reducing gas emissions* by following green best practices to reduce the carbon footprint of the supply chain. This includes everything from reducing energy consumption to streamlining logistics operations for greater efficiency.

2.*Optimizing the supply chain* by applying sustainability principles in the choice of suppliers, companies can choose partners with ecological practices and ethical sourcing policies.

3.*Mode shifting and route optimization* by changing the prioritization in the choice of long-distance transport solutions. For example, companies may prefer rail or sea transport over road transport, as these modes typically have smaller carbon footprints. In addition, optimizing delivery routes can reduce mileage, fuel consumption and emissions while improving on-time delivery performance.

4.*Reduced costs and losses in different ways*. One of the ways is the use of biodegradable or reusable packaging or materials. They are more expensive to buy than single-use materials and components, but recyclable materials can save companies money in the long run. These include: cardboard instead of wooden pallets, reusable plastic wrap, etc. It can also be about reducing losses of goods or raw materials in the warehouse. Avoiding throwing away unused raw materials by directing them towards recycling or reuse saves money on replacing raw materials.

5.*Technology integration*. Using real-time data tracking and analysis systems can help optimize fleet management, monitor fuel consumption and identify areas for improvement. In addition, implementing automated warehouse systems and using cloud-based logistics platforms can streamline operations, improve efficiency and reduce paperwork, resulting in significant resource and cost savings.

6.*Collaboration and partnerships*. Partnerships between green transport providers and logistics service providers can also help reduce emissions and promote sustainable practices throughout the supply chain.

7.*Promoting energy efficiency and the use of alternative fuels*. Companies can invest in energy-efficient vehicles and equipment, such as electric or hybrid trucks, and optimize fuel consumption through driver training and vehicle maintenance programs. Companies can also optimize warehouse activity to reduce energy consumption and improve space utilization. The use of alternative fuels (biodiesel, natural gas or hydrogen) can further reduce carbon emissions and dependence on fossil fuels.

8.*Continuous improvement and performance measurement* against indicators related to carbon emissions, energy consumption, waste reduction and cost savings should be established and tracked. By analyzing the data and comparing it to established standards, companies can identify areas for improvement and implement continuous optimization strategies.

9.*Regulatory compliance and certification*. Companies must ensure compliance with local and international environmental regulations, such as emission standards and waste disposal requirements.

10.*Employee involvement and training*. It is about increasing workers' awareness of the environmental impact of logistics activities and involving employees in finding innovative solutions can generate valuable ideas. Also of great importance are programs to train employees with the skills and knowledge to effectively implement green practices.

11.*A better business image*. Companies that have adopted green logistics present themselves in the market as eco-responsible, which is beneficial for their image in the eyes of suppliers, customers or stakeholders in general. In some countries consumers have become aware of

their carbon footprint. They want to know which brands align with their values and their ultimate environmental impact. When brands implement green logistics in their business, communicating this information to customers raises awareness and gives them guidance on how they can carry out their own sustainability efforts.

Green distribution is related to the notion of ecological logistics, which presents the totality of activities and practices of transporting goods from supplier to customer and vice versa in an ecological way, i.e. ensuring the minimization of damage to the environment. It's green improvements across the entire supply chain, including warehousing, order processing, packaging, and final-mile delivery. Green logistics reduce waste and emissions—ideal for businesses that hope to shrink their carbon footprint. (*Green Distribution…*, n.d.), (*What is…*, n.d.)

Likewise, as an important part of green logistics is *green packaging* (which is also called sustainable packaging or eco-friendly packaging), which provides for the important reduction of packaging on the environment and the ecological footprint. It is about ecological packaging (also called sustainable packaging), which uses materials and manufacturing techniques to reduce energy consumption and reduce the harmful impact of packaging on the environment. Green packaging solutions often include biodegradable and recyclable materials, which reduce the demand, energy, emissions and resources spent on materials that are ultimately wasted. (*Sustainable…*, n.d.) (*What is…*, n.d.)

The following can be mentioned as forms of green packaging (Nicasio, 2021):

1.Compostable packaging, which provides for the use of plant-based, renewable, and recyclable materials;

2.Recycled packaging, which is related to materials that can be used again, mostly after processing;

3.Corrugated packaging, which refers to box fibers made mainly from trees and old corrugated containers.

Sustainable logistics is the practice of integrating environmental concerns into logistics and consists in order to minimize their impact on the environment and promote sustainability.

It is a set of practices that look to limit the environmental impact of operations such as transport and warehousing. (*The road…*, n.d.)

The experts at Glaube Logistics presented the following vision: “Sustainable logistics is the efficient and environmentally friendly movement of goods and resources. It encompasses all aspects of the supply chain, from procurement and production to transportation and distribution. Sustainable logistics practices help businesses reduce their environmental impact while improving efficiency and lowering costs.” (Glaube Logistics, 2023)

On the other hand, Mecalux experts say: “The concept of sustainable logistics is key in the development of a circular economy, a production, distribution and consumption model that involves recycling and reusing materials to prolong their usefulness as far as possible and generate less waste.” (*The road…*, n.d.)

There are many benefits of sustainable logistics for businesses, including (Glaube Logistics, 2023):

•Reduction of greenhouse gas emissions by up to 50%;

•Improving overall business efficiency by up to 30%;

•Reduce shipping costs by up to 15%.

The main objectives of sustainable logistics are the following (*The road…*, n.d.):

•Quantifying the carbon footprint of logistics operations and implementing actions to reduce greenhouse gas emissions;

•Planning logistics and transport operations to optimize the use of fuel, vehicles and transport containers. Companies can reduce pollution caused by the movement of goods by integrating strategies such as intermodal transport and electric trucks into their logistics planning.

•Promoting sustainability throughout the supply chain. Sustainability should be applied in all phases: from product design and distribution of materials to delivery of goods to end customers.

Some authors promote the concept of *circular economy based reverse logistics*. (Fernando et al., 2022)

Reverse logistics includes (*Reverse Logistics…*, n.d.):

•Processing returned merchandise due to damage, seasonal inventory, restock, salvage, recalls, and excess inventory;

•Recycling programs, hazardous material programs, obsolete equipment disposition, and asset recovery.

According to some experts, the connection between the circular economy and reverse logistics is expressed by the following: “Reverse logistics in the circular economy is the process of collecting and aggregating products, components or materials at the end-of-life for reuse, recycling and returns. Reverse logistics also referred to as “aftermarket supply chain,” closes the loop. Take-back programs, warranties and product defect returns all require reverse logistics to get the product from the consumer back to the manufacturer.” (*Reverse Logistics…*, n.d.)

In the context of the implementation of reverse logistics, it should attract more attention. For example, as the volume of online shopping increases, there are more customer returns than in-store purchases, especially when using the "subscription box" business model of brands, which is based entirely on the concept of customers selecting from a wide range of delivered goods and returning whatever they decide not to keep. The global value of returned goods in e-commerce is expected to exceed one trillion dollars in the next decade. Additionally, shipping returned goods creates over 15 million metric tons of CO2 in the US alone each year. (*Green logistics…*, n.d.)

Supply chain sustainability means ensuring that all processes, activities and steps involved in the production, transport and delivery of goods and services within a supply chain meet ecological standards and are socially responsible. (*Supply Chain…*, n.d.)

Supply chain sustainability takes into account the environmental impact of sourcing raw materials, manufacturing products and transporting them to customers, as well as the impact of these activities on communities. This stems from environmental, social and corporate governance considerations throughout the supply chain, sourcing and logistics. (*Supply Chain…*, n.d.)

In the view of specialists from the United Nations Global Compact, the sustainability of the supply chain is broader than the notion of green logistics: “Supply-chain sustainability is the impact a company’s supply chain can make in promoting human rights, fair labor practices, environmental progress and anti-corruption policies.” (*Supply chain…,* n.d.)

Expert David Luther (2020) states: “Supply chain sustainability refers to companies’ efforts to consider the environmental and human impact of their products’ journey through the supply chain, from raw materials sourcing to production, storage, delivery and every transportation link in between. The goal is to minimize environmental harm from factors like energy usage, water consumption and waste production while having a positive impact on the people and

communities in and around their operations."

Focusing on supply chains is important in the context of circular economy implementation, as more than 90% of an organization's greenhouse gas emissions and 50% to 70% of operating costs are attributed to supply chains. (Alves, Steinberg, 2022)

Recent studies have demonstrated the main reasons for the acceptance of the concept of supply chain sustainability by companies (Alves, Steinberg, 2022): cost reduction (61%); compliance with regulatory requirements (51%); pressure from partners and suppliers (41%); increased revenue growth potential (28%); pressure from customers (26%); pressure from workforce (25%); awareness of ethical responsibility (21%).

Conclusions

Environmentalism, the concept of sustainable development and the implementation of the circular economy have become the basic progressive trends worldwide. The rational use of natural resources, the harmonious combination of the interests of business, society and the environment are their basis. A large part of the problems of the circular economy fall into the sphere of logistics. This is where the ideas of green logistics and sustainable logistics come from, which take care of transport efficiency, supply chain optimization, sustainable packaging and energy efficiency. Equally important are saving time, money and resources, increasing logistics efficiency and business reputation.

Future Directions

Due to the importance of the object of study, we consider it necessary to continue studies on the evolution of the circular economy globally and in the Republic of Moldova, as well as related logistical aspects.

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FINANCIAL INSTRUMENTS IN THE CONTEXT OF THE DIGITAL AGE AND OPEN INNOVATIONS

Otilia Elena MANTA[66]

Abstract:

Digital technology is a fact especially in the field of the financial industry, and in the context of this fact, by means of regulations at the European level, attempts are made to limit the risks as much as possible. The digital age has been regulated by the European Commission since 2018, with the emergence of the European Digital Strategy. However, in the financial field, innovations know a specific dynamism, and the risks are directly proportional to this dynamism, which is why two unique sets of rules were made, namely the Digital Services Act (DSA) and the Digital Market Act (DMA) to be adopted at the level of all member states.

The digital market according to existing data at the level of the European Commission knows "the size of the global market of the virtual world estimated to increase from EUR 27 billion in 2022 to over EUR 800 billion by 2030", which is why during this period a new strategy on Web 4.0 and virtual worlds on technological transition.

In this paper, we propose, starting from the purpose of these European strategies "to ensure an open, safe, reliable, fair and inclusive digital environment for EU citizens, businesses and public administrations", to inventory the existing regulations at the European level on the one hand in terms of the digital era with a direct focus on the financial field, as well as to identify innovative financial instruments with a direct impact on the development and sustainability of the national economy and in the context of open innovations.

Keywords: *financial instruments, open innovation, sustainability*

JEL classification: *G23, O360, Q5*

Introduction

Regulation (EU) 2022/2065 on a single market for digital services and amending Directive 2000/31/EC (Digital Services Regulation) and which will enter into force on 17 February 2024, will accelerate financial innovations, thus leading to a resettlement of the Fintech market at European and national level. Therefore, in addition to the elements of the conceptual type, it is necessary to know how fintech's are reflected in the specialized scientific literature and what are the financial innovations supported and promoted by the management of these fintech's.

The concept of Fintech can be found in scientific literature since the beginning of the 1900s, but the association between digital technologies and the financial industry can be said to have appeared after the 2010s, especially in the context of the definition of the transfer of financial services through technologies (Cai, 2018). The term Fintech is currently very well-known and is associated with a digital financial product (PwC, 2016). The acceleration moment is given on the one hand by the approval of the European Digitalization Strategy in 2018, as well as the approval in 2021 by the Commission of the plan towards Europe's Digital Decade. It is very evident that the acceleration of digitization has been reinforced by the outbreak of the COVID-19 pandemic.

[66] *PhD,Centre for Financial and Monetary Research "Victor Slăvescu", Romanian Academy, Bucharest, Romania*

In accordance with the papers published by Deloitte (2020), the pandemic led to a direct contribution to the development and emergence of new financial digital technologies in various sectors of activity, including traditional ones. The year 2018 was the year in which more and more fintech's appeared, and the analysis based on the performance indicators of the Fintech company showed for the first time that the performance indicators of traditional institutions were exceeded, the pandemic making this gap even wider visible (Deloitte, 2020) [3]. According to Statistica (2021), total investment in Fintech reached USD 33.9 billion by the first quarter of 2019. Additionally, nearly 75% of global consumers had some interaction with Fintech in 2019 (Statista, 2021), while Deloitte (2020) predicts that global revenues of Fintech companies will grow by 11.7% from 2019 to 2024.

This rapid growth of the Fintech industry was the date and result of the target segment addressed by this industry, namely the segment of the unbanked target group, which the existing financial institutions, because of regulatory norms and financial prudence, do not include in the desired target group. Moreover, because of the digitization of financial services, the Fintech industry has optimized the financial costs for the services provided, making them more affordable in terms of costs. At the same time, innovation and new business models have allowed Fintech to spread throughout the industry and enter the customer segment of existing financial service providers. Therefore, Fintech is an excellent illustration of the disruptive innovation theory introduced by Clayton, M. Christensen in 1995 (Christensen & Euchner, 2015). According to this theory, disruptive innovation is a process that occurs when a small firm with limited resources enters the market by targeting customers neglected by incumbents. By doing so, the small firm adopts innovative solutions and gradually expands its customer base in existing businesses (Christensen & Euchner, 2015).

Methodology and Data

The paper presents a bibliometric analysis with the subject of Fintech research in the context of the digital era. Bibliometric analysis is a relatively new research method that has gained popularity in several academic fields, including finance. It is part of the broader discipline of science-metrics, defined as the study of the quantitative features of science and scientific research (Biancone et al., 2020).

The methodology of bibliometric analysis involves the processing of bibliometric data, such as sources of publications or documents, using quantitative techniques (Donthu et al., 2021). At the same time, following the publication of research works in the open space, it is known that the publications are in an exponential growth, and the evaluation of the content of the relevant scientific literature has become an extremely laborious process. The different visualization techniques allow us to simplify the process of reviewing the related academic literature (Borner et al., 2003). Moreover, the bibliometric analysis allows us to better visualize and understand research on a relevant topic, by systematizing the academic literature directly oriented to the analyzed topic (Aria & Cuccurullo, 2017). Consequently, the researcher can efficiently sort information through the visual map of published literature. Thus, bibliometric analysis helps in finding and classifying relevant information (Borner et al., 2003).

To visually process the identified data, globally there are newly developed and specialized software that allows the comfort and efficient execution of the bibliometric analysis. For example, we used the bibliometrics open-source R Package, which allows data analysis and provides data visualization through different types of mapping (Aria & Cuccurullo, 2017).

VOSviewer is another software program that was used in this work, and which helps to visualize the results of the bibliometric analysis. This software works with different data sources and generates images that reflect data with various characteristics. The software organizes the data into clusters, represented by nodes and connected lines (Janik et al., 2020). The

clustering technique of VOSviewer is based on the local smart motion algorithm introduced by Waltman and Van Eck (Janik et al., 2020).

To perform the bibliometric analysis, the Scopus database was chosen, due to its academic reputation, as well as due to the multidisciplinary database of abstracts and citations. Scopus, part of the larger analytics and information company Elsevier, provides easy access to peer-reviewed academic publications, including books, journals, and conferences.

Metadata used in this paper can be defined as summarized basic information about the data (Open Data Soft, 2016). Publishers provide metadata, which includes author(s), affiliation(s), document title, year, electronic identifier (EID), source title, volume/number/pages, number of citations, source, document type, and identifier digital object identifier (DOI), among others. According to the Elsevier website, the Scopus content repository stores 3.7 TB of data, corresponding to 1.4 billion cited references. Considering the aforementioned information, Biancone et al. (2020) state that the Scopus database provides a high-quality and reliable basis for bibliometric analysis. The bibliometric analysis in the paper represents a snapshot of research data about Fintech in the context of the digital age. To collect applicable data, keywords were entered into the Scopus database, such as: "Fintech" or "FinTech" or "Financial Technologies" AND "Disrupt*" or "Transform*".

To answer the research question, the paper uses three types of bibliometric analysis techniques: performance analysis; scientific mapping and network analysis (Donthu, 2021).

Performance analysis defines the contribution of research factors (authors, journals, countries) to the subject of Fintech in the context of the digital age, based on the number of relevant publications and citations (Donthu, 2021). This technique defines the most cited or productive journals, authors, and papers. Citation and publication count help define the significance of the research topic, researchers, and journal (Shibata et al., 2008).

Applying the technique of scientific mapping, the paper demonstrates the relationship between different research factors on the given topic. This technique defines the relationship between publications, underlying themes, and relationships between topics, using citation and co-citation analysis and co-word and co-author analysis; among others (Donthu, 2021). And the third bibliometric analysis is network analysis, it allows visualization of different results through clustering and network metrics.

Results

The data collected are presented in table 1. and show us that most documents identified on the topic of Fintech in the context of the digital age, are articles (46% of all documents) and conference papers (33%). Books constitute only 2% of the total documents, which could lead us to the hypothesis related to the relative novelty of the subject.

Table 1.

Main data information, time frame 1984–2021

Description	Results
Document types	
Article	166
Book	9
Book chapter	39
Conference paper	120
Conference review	4
Editorial	6
Review	19
Document contents	
Keywords plus (ID)	1207
Author's keywords (DE)	1029
Authors	
Authors	896
Author appearances	970
Authors of single-authored documents	83
Authors of multi-authored documents	813
Authors collaboration	
Single-authored documents	91
Documents per author	0.405
Authors per document	2.47
Co-authors per document	2.67
Collaboration index	2.99

Source: Scopus, developed in Biblioshiny/ Aysan, A.F.; Nanaeva, Z. Fintech as a Financial Disruptor: A Bibliometric Analysis. FinTech 2022, 1.

Starting from 1984 until 2016, the number of publications was insignificant, after which their volume began to increase and reached its peak in 2020 (Figure 1). Moreover, the annual growth in the number of publications accelerated after 2016 and almost doubled in 2020 year-on-year, as can also be seen in the figure below.

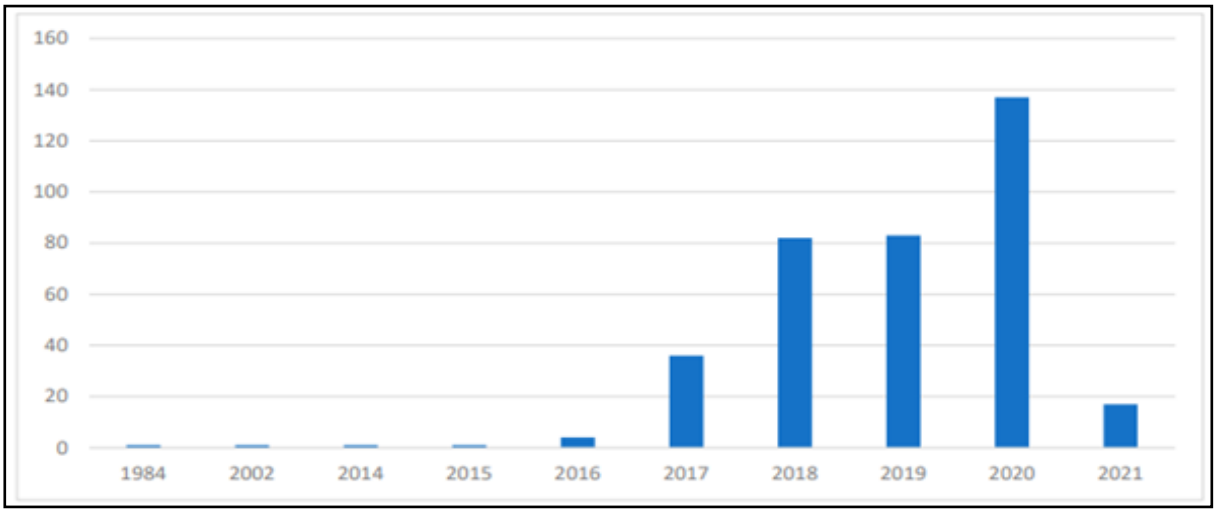

Figure 1. Presentation of annual scientific production between 1984 and 2021

Source: Scopus/ Aysan, A.F.; Nanaeva, Z. Fintech as a Financial Disruptor: A Bibliometric Analysis. FinTech 2022, 1.

The subject of Fintech is very varied, multidisciplinary and includes various thematic areas. Many publications (22%) are in the field of computing science, followed by the field of business, management and accounting (19%), and by a small margin the field of economics, econometrics and finance (13%). This distribution confirms PwC's definition of Fintech as a

combination of technology and financial services, where it is difficult to tell where technology ends, and financial services begin (PwC,2016).

Subject Area	# of Results	%
Computer Science	165	0.22
Business, Management and Accounting	144	0.19
Economics, Econometrics and Finance	98	0.13
Social Sciences	80	0.11
Engineering	77	0.10
Decision Sciences	51	0.07
Mathematics	31	0.04
Environmental Science	27	0.04
Energy	24	0.03
Biochemistry, Genetics and Molecular Biology	6	0.01
Earth and Planetary Sciences	6	0.01
Pharmacology, Toxicology and Pharmaceutics	5	0.01
Physics and Astronomy	5	0.01
Materials Science	4	0.01
Multidisciplinary	4	0.01
Psychology	4	0.01
Others	12	0.02

Figure 2. Presentation of the thematic areas of the publications between 1984 and until 2021

Source: Scopus/ Aysan, A.F.; Nanaeva, Z. Fintech as a Financial Disruptor: A Bibliometric Analysis. FinTech 2022, 1.

Figure 3 shows the twenty most cited sources of publications on Fintech, with dark blue defining the higher number of citations, and with the light shade the lower number of citations. The three most cited sources are the Journal of Management Information Systems, the Management Information Systems Quarterly (MIS Quarterly), and the Harvard Business Review, each with over 60 citations in this analysis.

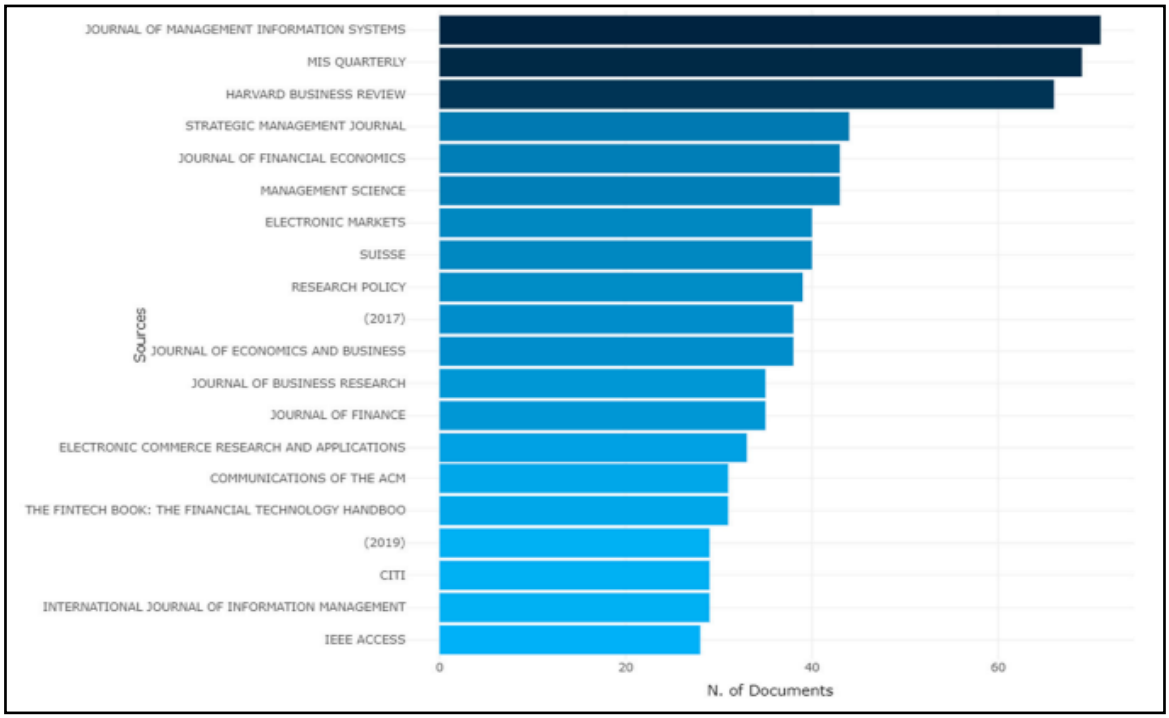

Figure 3. Presentation of the most cited publication sources

Source: Scopus, developed in Biblioshiny/ Aysan, A.F.; Nanaeva, Z. Fintech as a Financial Disruptor: A Bibliometric Analysis. FinTech 2022, 1.

Figure 4. presents the twenty most relevant sources of publications with the largest number of documents about FinTech. For example, the most cited source, the Journal of Management Information Systems, published only two papers on the given topic. However, it has been cited in 71 papers. On the other hand, the ACM International Conference Proceeding series published 11 articles on the chosen topic but was cited in only one paper.

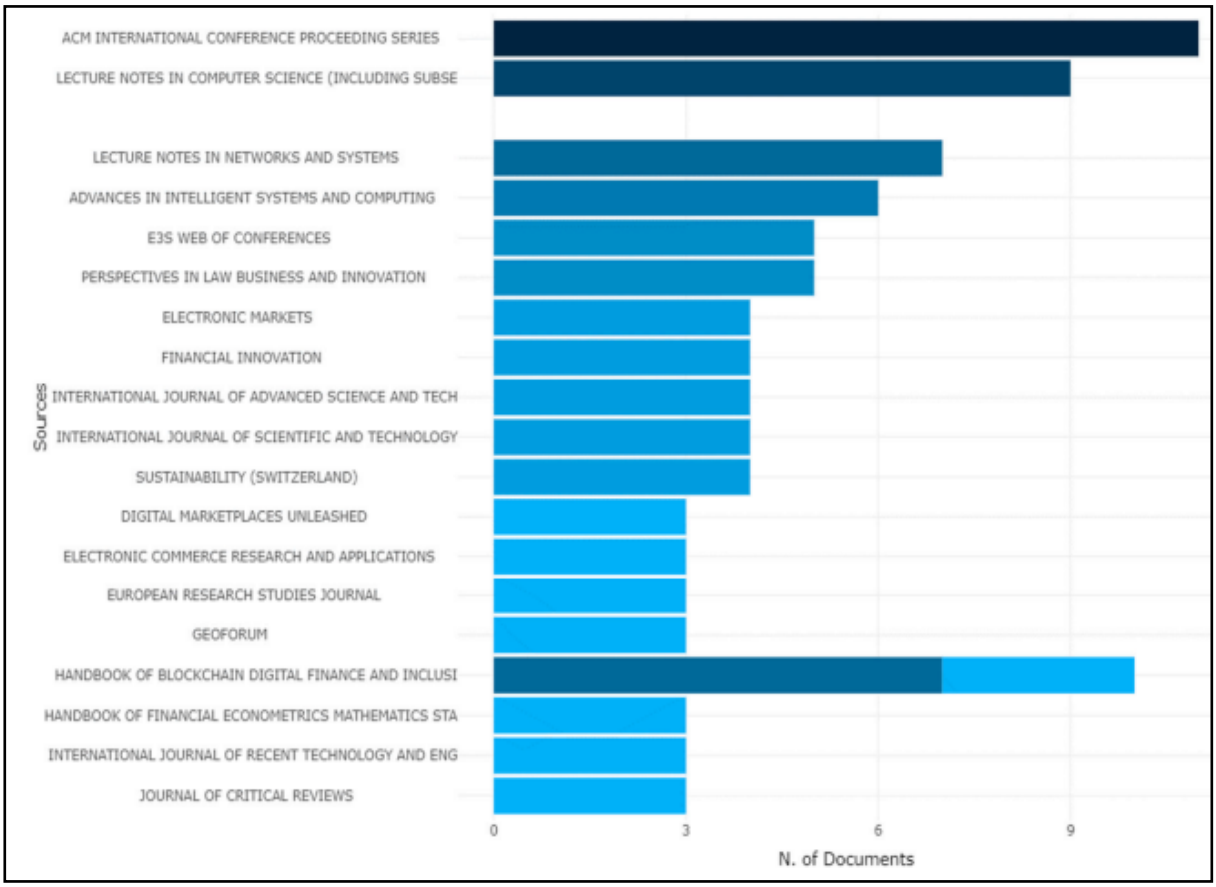

Figure 4. Presentation of the most relevant sources of publications

Source: Scopus, developed in Biblioshiny/ Aysan, A.F.; Nanaeva, Z. Fintech as a Financial Disruptor: A Bibliometric Analysis. FinTech 2022, 1.

Figure 5 shows the list of the most cited documents about Fintech. The most cited article was by Lee and Shin, "Fintech: Ecosystem, business models, investment decisions and challenges" (Lee & Shin, 2018). The article was published in 2018 in the journal Business Horizons and generated 128 citations. The article discusses different Fintech business models as well as the challenges facing Fintech startups and existing financial institutions. The second most cited article (with 126 citations) was “on the Fintech Revolution: Interpreting the Forces of Innovation, Disruption, and Transformation in Financial Services” by Gomber, Kauffman, Parker, and Weber (2018).

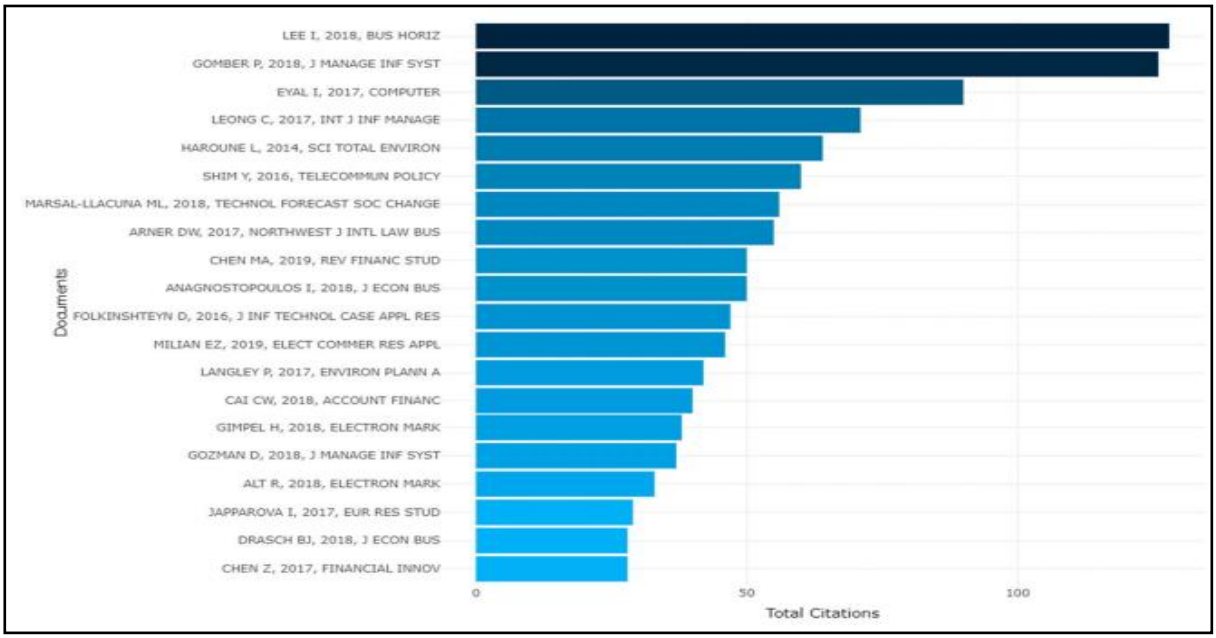

Figure 5. Presentation of the most cited scientific papers in the FinTech field

Source: Scopus, developed in Biblioshiny/ Aysan, A.F.; Nanaeva, Z. Fintech as a Financial Disruptor: A Bibliometric Analysis. FinTech 2022, 1.

Through the VOSveiwer program, the map of the citations of scientific works in the FinTech field is presented (Figure 6) and groups the 73 most cited published scientific works into 17 groups. The size of the bubble shows the number of citations. As mentioned earlier, the most cited papers by Lee and Shin (128 citations) and Gomber et al. (126 citations) were published in 2018, which allowed enough time to produce a large number of citations. The oldest of the most cited papers was “How Information Asymmetry Affects P2P Lending: Big Data Economics” by Yan, J. et al., which was published in 2015, generating 28 citations (Yan et al., 2015). The most recent of the most cited papers was "Blockchain disruption and decentralized finance: The rise of decentralized business model" by Chen and Bellavitis, which was published in 2020 in the Journal of Business Venturing Insights and has already accumulated 23 citations.

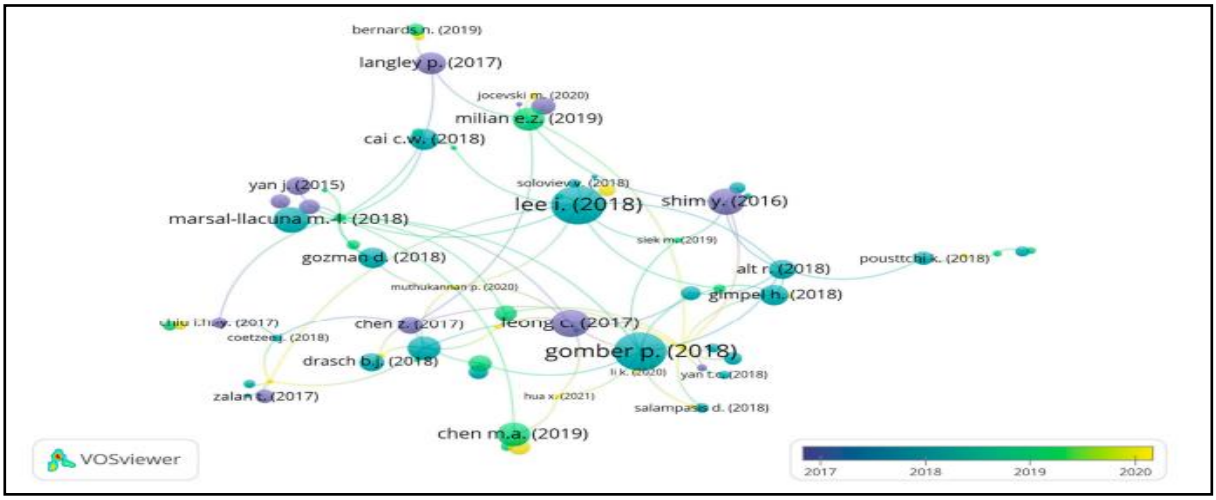

Figure 6. Presentation of citations of scientific papers in the FinTech field

Source: Scopus, developed in Biblioshiny/ Aysan, A.F.; Nanaeva, Z. Fintech as a Financial Disruptor: A Bibliometric Analysis. FinTech 2022, 1.

The presentation of the VOSviewer map with the appearance of the most frequently used keywords by the authors is presented in Figure 8, within which the 50 most popular keywords used by the authors are grouped. The words "fintech", "blockchain" and "digital transformation" are indicated as the most popular.

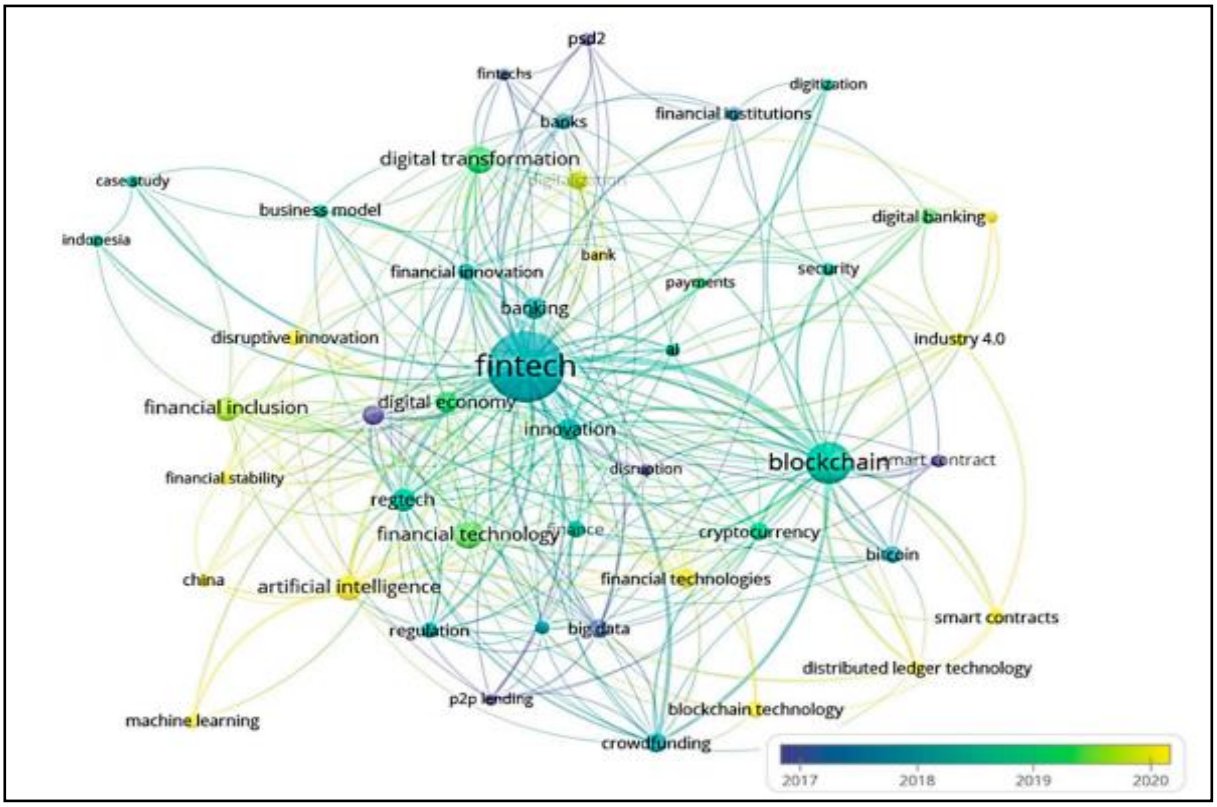

Figure 8. Presentation of the weighted occurrences of the words used by the authors of scientific works

Source: Scopus, developed in VOSviewer/ Aysan, A.F.; Nanaeva, Z. Fintech as a Financial Disruptor: A Bibliometric Analysis. FinTech 2022, 1.

In the context of multiple crises and scientific progress generated especially by artificial intelligence, we can say that in terms of financial innovations we are in an extremely fertile moment that generates financial innovations at every moment, depending on the two determining directions.

- The first direction is given by the existence of multi-crisis.

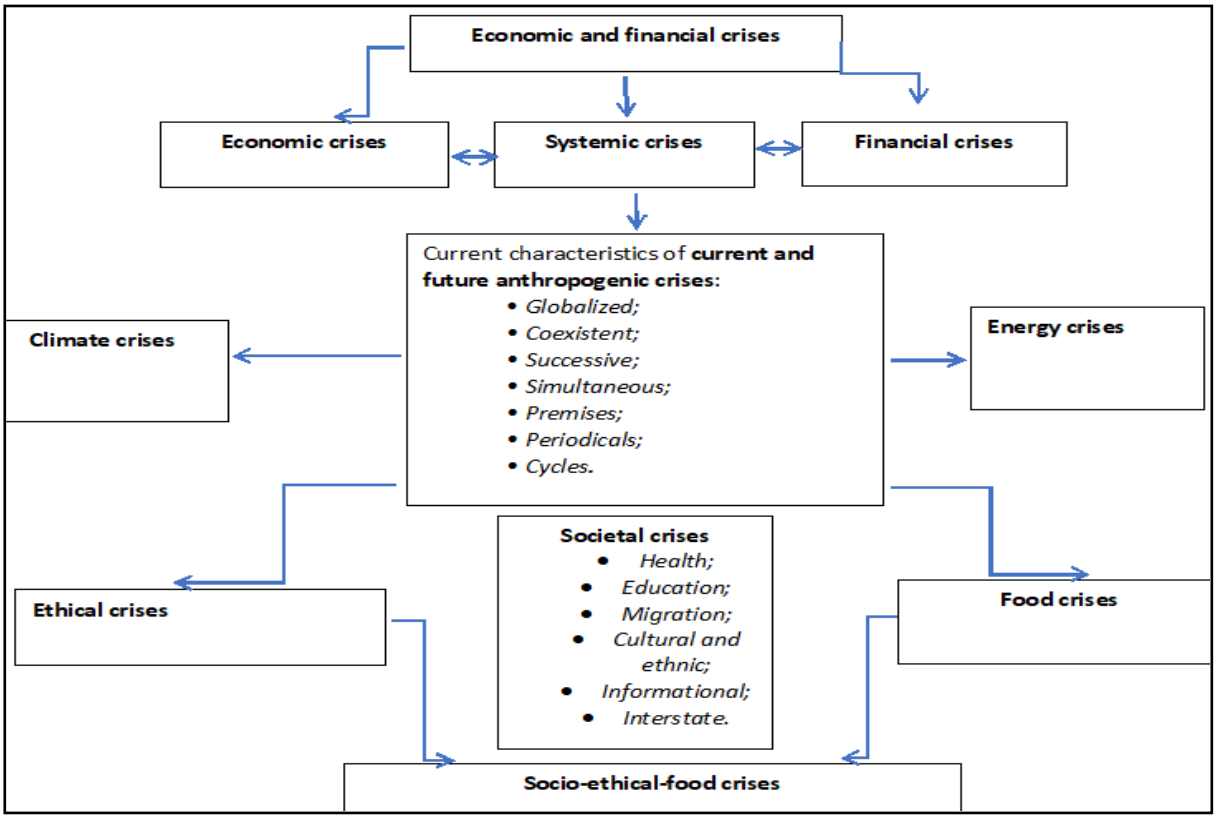

Figure 9. Presentation of multi-crises with direct impact on global financial innovations

Source: own contributions

❖ The second direction is given by the *implications of artificial intelligence in the dynamics of financial innovations.* One of the supporters of this direction is US-based research, innovation, and development group Accenture, with over 15 years of leadership in metaverse technology and experience capabilities and over 600 patents, bringing together over 800 of our skilled metaverse professionals and capabilities market leaders worldwide.

In developing innovative Metaverse Fintech applications, Accenture starts from:

❑ *Extended reality* **-** analysis and support of companies starting from the realities of the market in the current conditions (respectively of the digital and green eras, and of the multi-crises);

❑ *Digital identity* - it's a reality we're all part of. The optimization of processes, of resources, determines us to be more and more present in the digital world, to manage access to systems and data at an internal institutional level, but also at a global level, by means of security protocols.

❑ *Blockchain* **-** through technology access to complex networks, with the possibility of building supply and sales chains as complex as possible and directly oriented towards the optimization of economic and financial indicators, respectively their profitability.

❑ *Experience in customer service* **-** constantly re-adapting according to the constantly changing needs of customers, especially in the field of financial innovations such as FinTech's.

❑ *Technological innovation* **–** in the finance industry, designers of systems, products, and services, offer the right and oriented solutions to create competitive advantages and with a long-term strategic projection.

❑ *The transformation of technology* **-** causes company owners (especially financial ones) to turn

directly to the transforming technology, respectively to adapt their businesses to these extremely fast changes, the metaverse in fintech being one of the revolutionary changes of the innovative financial market**.**

In the context of the second direction regarding financial innovations, we could redefine one of the most famous formulas of the marketing mix, namely the one proposed by the father of marketing Philip Kotler, respectively the 4Ps of the marketing mix, we can redefine them in the context artificial intelligence for a FinTech. For example, regarding the product/service in the context of AI: it is defined at the level of a Fintech as a multidisciplinary set of services and products at the level of an AI application that serves the multiple needs of the consumer, banking financial services (including payments), health, management personal finance, etc.

Table 2.

The marketing mix- Fintech - proposal

The marketing mix - the formula of the 4Ps of marketing Philip Kotler	**The marketing mix - Fintech - proposal by author Otilia Manta**
***The product/service* offered to the consumer**	*AI Fintech application* - multidisciplinary services and products offered to the consumer through the application from different fields of activity (ex: finance, health, management, education, trade, etc.)
***Price* - the value of the product or service received**	*App cost* – transaction fee/monthly cost as a subscription
***Promotion* - classic channels**	*Promotion*- digital platforms, including metaverse applications, with optimized costs.
***Distribution* - the traditional value chain, with a clearly defined and limited time interval.**	*Distribution* - Global distribution in real time and with multiplier effect.

Source: own contributions

An example of digital financial innovation is Siam Commercial Bank (SCB), which reinvented itself at the level of technological infrastructure by using innovative elements (data migration to the cloud) and succeeding in becoming a digital bank. This strategic decision has enabled the bank to grow its digital app user base to over 13 million users in 2022, up from 2.5 million before the transformation program. Currently SCB has included in its reinvention strategy "fintech business group" - a technology company that offers customer-centric services, including banking services. Restructured into a new entity, SCBx, the firm plans to expand its reach to 200 million people. The company is investing in new technologies, including blockchain, metaverse and Web 3.0.

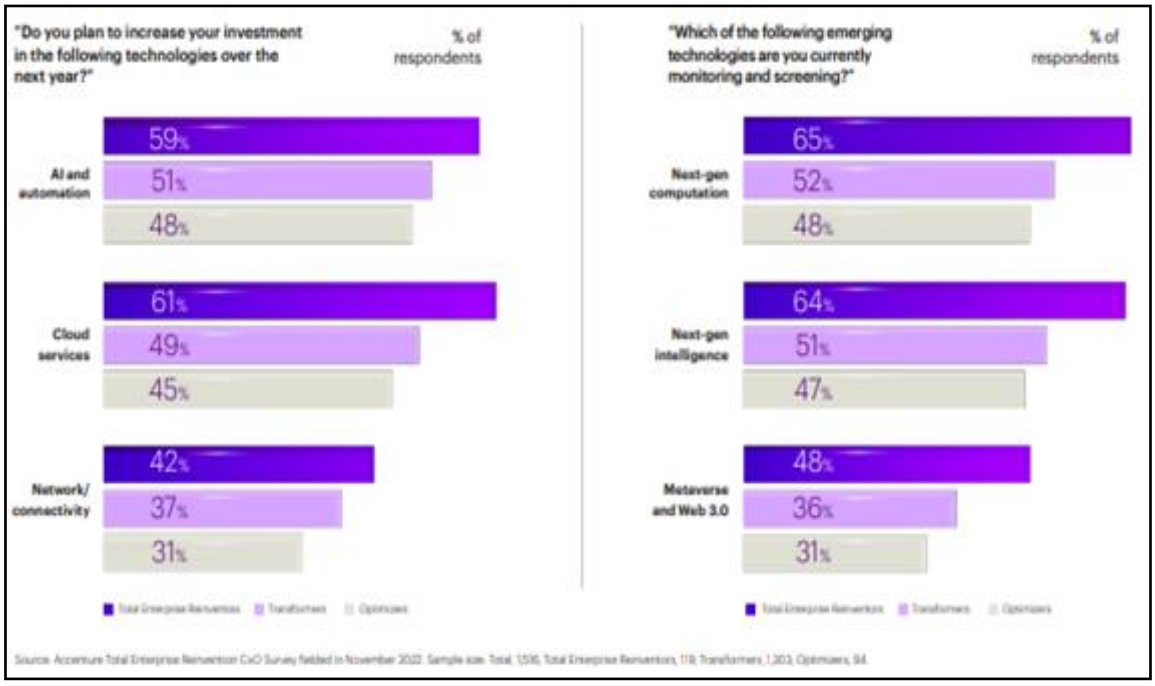

Figure 10. Reinventors continuously invest in their digital core

Source: Accenture Data, 2022

Conclusions and Future Directions

Bibliometric analysis on the subject of Fintech carried out in this paper, based on 363 documents identified in the Scopus database and published between 1984 and 2021, highlights the fact that the subject of Fintech is relatively new, but with a strong potential for further development.

Furthermore, according to the data presented, we can say that the growing number of publications in recent years, especially since 2020, demonstrates the growth in popularity of the Fintech topic. This popularity can be explained on the one hand by the transition to the digital age (see the European Strategy on Digitization), and on the other hand by the accelerated development of innovative solutions in the Fintech field, also accelerated by COVID-19. Publications in prestigious journals such as the Journal of Management Information Systems and the Harvard Business Review indicate strong academic interest. Analysis of the most frequently used words reveals that "Fintech", "blockchain" and "digital transformation" are the most popular keywords. The relative popularity of the keyword "blockchain" could be explained by the association of authors who study the financial disruption and advancement of blockchain technology. In addition, through the biblioshiny program, the term "digital transformation" was mapped among the primary themes that require further research. Similarly, a shift in trending topics such as "digital transformation" and "innovation" as seen in VOSviewer indicates relatively recent academic interest in the topic. Moreover, the bibliometric analysis revealed that Lee Kuo Chuen, Arner, D. and Buckley, R. are the authors with the highest impact as measured by the h-index. The fact that the most productive authors are affiliated with relatively unknown universities can be explained by the fact that "most productive" does not necessarily mean "most cited", as the analysis shows that a higher number of publications does not guarantee more citations.

A limitation of this study is that the analysis was based on a relatively limited number of publications, which is a potential shortcoming that can be attributed to the developing stage of

the subject. This limitation may affect the results of the bibliometric analysis compared to the potential results if it had been performed on a larger sample size. It is also possible that there were publications in languages other than English that were not considered. The progress of Fintech and its increasing impact on the financial system are expected to generate further academic interest and publications on the subject. Therefore, similar analyses can be performed at a later date, which could include a larger number of observations with which to compare the validity of the results presented in this paper, as well as the presentation of new trends and trends. The results of the analysis described in this paper represent an overview of the topic of Fintech as a financial disruptor. With this paper, the authors' goal and hope is to generate further interest and catalyze further research on this topic. The social and economic impacts of financial disruption caused by Fintech are particularly promising areas for future study.

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HIGHER EDUCATION REFORM IN THE REPUBLIC OF MOLDOVA: OPPORTUNITIES, CHALLENGES, AND IMPLICATIONS FOR SUSTAINABLE DEVELOPMENT

Dorina MIRON[67]

Dorina CASTRAVET[68]

"Education is the most powerful weapon which you can use to change the world. "
– Nelson Mandela

Abstract

Objective - In the global context of transformation with a focus on sustainable development, universities in the Republic of Moldova face significant macroeconomic challenges. They are prompted to adopt and adapt to various organizational strategies, akin to those in the corporate sector, such as mergers. Although there are numerous international examples of university mergers, managing these mergers within a suitable framework remains a relatively uncharted territory. The purpose of this paper is to examine higher education reform in light of sustainable development and to identify the main challenges and potential benefits.

Design/Methodology/Approach - This work relies on the Government Decision related to the reform and on the statistical data of Moldovan universities. In approaching this synthesis, sustainable development principles have been integrated, alongside the new public management techniques and public value governance proposed by the Government of the Republic of Moldova.

Findings - Potential long-term benefits of the reform, especially in the context of sustainable development, are highlighted. A model for periodic assessment is proposed to ensure ongoing adaptability and relevance.

Limitations/Implications of the Research - Given that the reform is recent, there is a limitation regarding long-term available data. However, negative perceptions portrayed in the media emphasize the need for a thorough discussion highlighting the long-term positive potential and its connection with sustainable development. It's suggested to validate the proposed model for university mergers through future studies, employing qualitative research and mixed methods.

Originality/Value - This study foregrounds the higher education reform in the context of sustainable development, offering an updated perspective on the long-term benefits it might bring to Moldovan society.

Keywords - Mergers, Strategic Management, Universities, Higher Education, Sustainable Development, Consolidation Processes.

[67] *PhD Student, Moldova State University, Chisinau, Republic of Moldova, dorina.miron1988@gmail.com.*
[68] *DEc., Moldova State University, Chișinău, Republic of Moldova.*

INTRODUCTION

In the current global context, university reform and sustainable development are closely interconnected, reflecting the pivotal role that higher education institutions play in shaping a sustainable future. Universities are not just centers of academic excellence and innovation but also catalysts for change, promoting concepts, values, and practices that align human development with the principles of sustainability. By integrating sustainable development into educational structures, curricula, and research, universities become driving forces in addressing current challenges, from climate change to inequalities, ensuring that future generations are equipped to build a more equitable, resilient, and prosperous world for all.

This field is marked by intense cross-border competition in educational services and research products, putting universities before a dual imperative: to collaborate and compete simultaneously. Universities strive for access to financial resources, attracting exceptional students, recruiting elite faculty, innovative research, building and maintaining a solid reputation, and achieving favorable positions in global rankings. The current global market dynamics encourage institutional mergers, making it a crucial strategic direction for many universities. Other tactics, highlighted by Harman and Harman (2008, p. 99), involve informal collaborations, business partnerships, strategic alliances, networks, and consortia at regional, national, and global levels, as well as combining academic and administrative departments within institutions. This study focuses on the strategic approach to university mergers, specifically on the case of the Republic of Moldova. Merging them poses a significant challenge, both theoretically and practically. This material aims to describe and explore the specialized literature on this topic.

Various theoretical concepts underlying the discussion on strategic university mergers fall into the theory of social identity, as well as strategic and procedural theories on mergers and acquisitions (M&A) (Cai, 2006; Cartwright and Schoenberg, 2006; Gleibs et al., 2013). In the public sphere, the analysis of the idea of consolidation is based on the principles of "New Public Management" (NPM) and "public value management" (Bryson et al., 2017; Hartley et al., 2017). Considering the developments in "New Public Management," university administration can be perceived as an inherently complex process, akin to the functioning mechanisms of a corporation (Dunleavy and Hood, 1994; Dunleavy et al., 2006).

University reform in the Republic of Moldova reflects the country's efforts to align with European education standards and ensure enhanced education quality for its citizens. In the context of globalization and the new status of our country pertaining to European integration, in 2022 Moldova recognized the need for a profound revision of its higher education system to effectively respond to contemporary socio-economic challenges. The reform aims to improve university structures, update study programs, promote research, and ensure a closer connection with the labor market. Moreover, this reform is directed towards greater institutional autonomy, encouraging universities to become more competitive and adaptable to the rapid changes of the 21st century. In an ever-evolving educational landscape, the Republic of Moldova aims to lay the foundations for modern, inclusive, and high-quality higher education.

Review of Literature Pertinent to University Mergers

Often, the term "education" is associated with what happens inside the classroom. However, "learning" in ESD (Education for Sustainable Development) takes place in a wide variety of social contexts. This encompasses what occurs within the education system and extends into daily life and even the professional realm (UNESCO 2004). Therefore, everyone can benefit from ESD, aligning with the vision of DESD (Decade of Education for Sustainable Development) (UNESCO 2005).

In relation to the discussed subject of educational reform in the Republic of Moldova, it is essential to define the concept of "strategic mergers". These are formal combinations of two or more organizations into a single entity, deliberately planned to more effectively address external challenges and opportunities (Harman and Harman, 2003). In the context of higher education, strategic mergers are described as strategies to "merge colleges for mutual growth" (Martin and Samels, 2002). When two institutions merge, terms such as M&A (Mergers & Acquisitions), consolidation processes, takeovers, mergers, acquisitions, and alliances are used. Although these terms should not always be treated as synonyms, they are often interchangeably used. In a merger, one company takes over another, including all assets and liabilities. Through consolidation, two or more companies unite to form a newer, larger organization. All assets and liabilities of each company become property of the new entity.

Diagnosing the trends regarding changes in higher education has been developed based on numerous studies and is described in detail in specialized literature. One of the clear major trends is the development of larger and more potent providers of educational services and research. Furthermore, in the sector of higher education institutions (HEIs), several trends anticipate strategic changes in universities:

a) The large and increasing diversity of universities; the educational sector comprises organizations that substantially differ in terms of their founding structure, activity, quality, specialization, and size. b) Internationalization, leading to increased mobility of students, researchers, programs, and institutions as a whole. c) Privatization and commercialization of global education, where higher education becomes a service in the realm of "private goods", and science becomes an intellectual product. d) Development of the "entrepreneurial university" model. e) Reduction of state participation in subsidizing or even co-financing universities. f) The new globally competitive educational environment creates strong incentives for competition among institutions, but simultaneously prompts many of them to decide to cooperate, following various partnership types.

For HEIs, the implementation of merger plans should lead to the fulfillment of their mission and the achievement of strategic objectives related to improving research and education, and/or implementing the third mission of universities. Entrepreneurial tendencies in university culture are reflected in the orientation towards innovation, scientific activities conducted in cooperation with the industry, the application of "quasi-business" and "quasi-corporate" organizational solutions, and revenue generation from educational and scientific activities. "Entrepreneurial" universities implement a market mission and create competitive strategies, use methods of accountability and governance, and make decisions based on a managerial model rather than a collegial one. Mergers can be seen as a manifestation of the development of entrepreneurial university formation and academic entrepreneurship, in relation to both public and private HEIs.

Educational and operational activities (Aula & Tienari, 2011; Tirronen & Nokkala, 2009) hold a central place in universities. Generally, European universities, for instance, struggle to compete with their American counterparts as they are relatively small and underfunded. Lang (2003), in analyzing the reasons for mergers among public universities, highlights that governments want new programs at relatively reduced marginal costs. Moreover, mergers can decrease the sunk costs of prior investments since facilities can be used more efficiently. Some studies have also confirmed the financial factors of many mergers in higher education institutions (Eastman & Lang, 2001), emphasizing that university mergers can lead to significant economies of scale.

Following the works of Pinheiro et al. (2017) and Sułkowski (2017), it is possible to point out several strategic objectives concerning university mergers:

(1) increasing the efficacy and efficiency of university operations;
(2) limiting the fragmentation of the higher education system;
(3) broadening student access to the educational network;
(4) strengthening the autonomy, responsibility, and accountability of the university;

(5) creating larger universities, expanding scientific, educational, and operational activities, achieving economies of scale and "critical mass";

(6) optimizing operational costs;

(7) bolstering the competitiveness of a specific university at the national level;

(8) supporting university competitiveness at the international level;

(9) enhancing the competitiveness and visibility of the entire country and its national education system on the international stage;

(10) satisfying the needs of various stakeholders, particularly students and employers, in a more efficient manner;

(11) implementing effective strategic management mechanisms;

(12) restructuring and rationalizing university management;

(13) transitioning the competitive model to oligopolistic or even monopolistic in the case of private universities;

(14) diversifying educational offerings; and

(15) expanding the market (primarily in the case of private universities).

All stakeholders involved in consolidating universities could benefit from a successful merger, as it implies a stronger institution, poised to compete better in the current global economy and become more efficient.

In the following section, the author will describe the primary issues that led to the merger reform of universities.

Main Issues Leading to the Need for Reform

The reform of higher education and research in the Republic of Moldova faces significant challenges that underscore the need for a deep change in the system. One of the primary challenges is adaptability to the EU rigors, with the aim of aligning the system with the standards and requirements of the European Union to ensure competitive and innovative higher education.

Another pressing issue is the lack of a strong link between research and teaching. Research-based teaching and teaching-based research are inadequately represented within universities, compromising the quality and relevance of the education provided. The situation is further exacerbated by demographic and economic challenges. Demographic decline, rising youth unemployment, and the economic implications of the worst health crisis of this century amplify pressures on the system. Additionally, the challenges of globalization and competition for resources arise. The higher education system in the Republic of Moldova competes to attract European and international funding, in a continually changing global landscape. This is heightened by the emergence of new technologies and teaching-learning methods that require adaptation and innovation. In conclusion, reform is essential in the face of these complex challenges to ensure a sustainable and competitive future for higher education and research in the Republic of Moldova.

The educational system in the Republic of Moldova has faced several significant difficulties recently. These include a substantial reduction in the number of students, frequent school dropout, especially among young people from disadvantaged backgrounds, and a noticeable lack of motivation to learn. Moreover, the existence of a large number of publicly funded university institutions raises questions about the efficient allocation of resources.

These observations are not just personal conclusions but are confirmed by the study "Comprehensive Assessment of the Educational Sector in the Republic of Moldova," as well as analyses of other reports focusing on the students' perspective on the education system.

The demographic decline, exacerbated by population migration and decreasing birth rates, has had a direct impact on the number of pupils and students. According to data provided by BNS, there has been a significant decrease at all educational levels, except for early education, which has seen a slight increase.

For the academic year 2021-2022, the number of students enrolled in higher education was approximately 59.7 thousand, representing a slight increase from the previous year. These students are distributed across 24 university institutions, most of which are public. Surprisingly, the majority of students in public universities pay for their education, with only a small percentage receiving free studies. This raises questions about accessibility and funding of higher education in the Republic of Moldova.

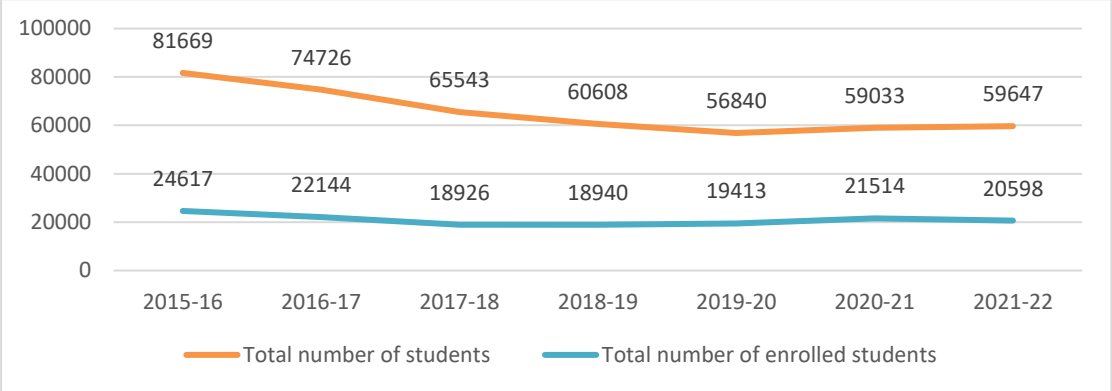

Figure 1: Dynamics of the total number of students and enrolled students (thousands) in higher education institutions.

Source: Impact analysis of the draft Government Decision on the reorganization by merger (absorption) of some institutions in the fields of education, research and innovation

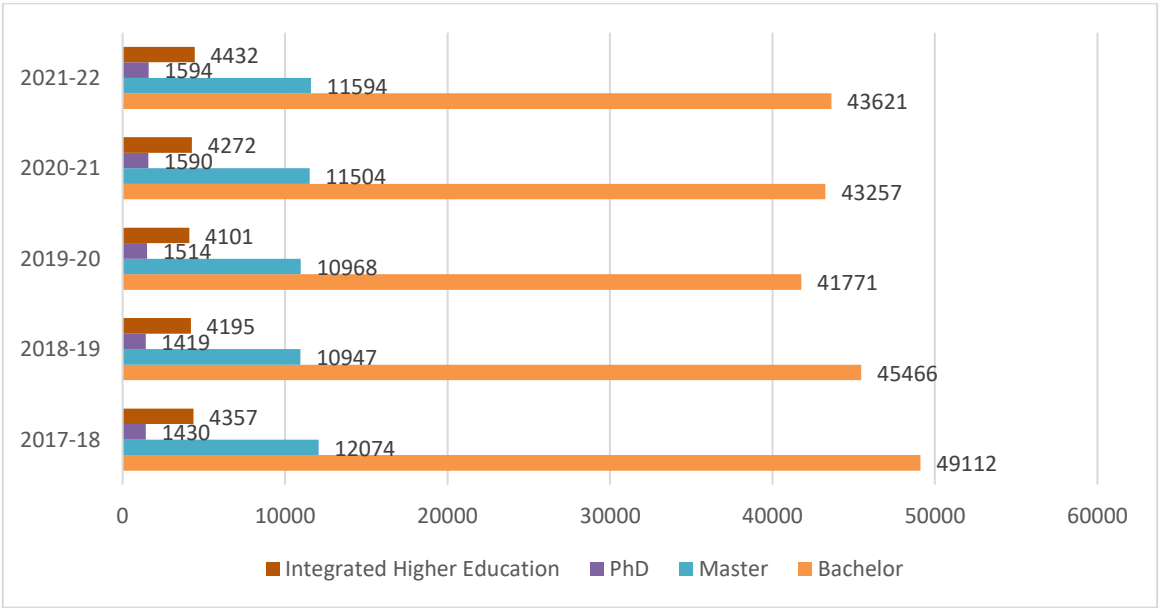

Figure 2: Dynamics of the total number of students at all cycles in public higher education institutions

Source: Impact analysis of the draft Government Decision on the reorganization by merger (absorption) of some institutions in the fields of education, research and innovation

The higher education system in the Republic of Moldova faces significant challenges. One evident aspect is the overpopulation of universities, with many institutions vying for a diminishing number of students. Many of these universities, mostly small in size, operate with an infrastructure and administration that have not adapted to demographic changes. This renders them inefficient, consuming resources without delivering commensurate quality education. Another collateral effect of university overpopulation is excessive spending. Every university requires its own administrative resources, regardless of whether it has 200 or 10,000 students. This leads to inefficient resource and funding utilization. Moreover, the smaller the enrollment capacity, the higher the costs per student.

An additional issue is the lack of efficiency in university research. The current system does not foster collaboration between research and education. This is compounded by insufficient research funding and a lack of modern infrastructure. In fact, research funding in Moldova is significantly below the European average, reflecting a diminished commitment to scientific advancement.
While the number of doctoral students has seen a slight increase, this doesn't reflect a rise in general interest in research. A research career does not appear to be appealing to Moldovan youth, which is evidenced by the reduced number of researchers relative to the total population.
Compared to other states in the region, Moldova struggles with efficiency and performance in higher education. According to international indices, such as the Global Competitiveness Index, Moldova lags behind many European countries, including its Baltic neighbors and Nordic nations.
In conclusion, the Republic of Moldova needs to address these issues if it aims to enhance its higher education system and become more competitive on the international stage. Consolidating universities and increasing research funding are essential steps in this direction.

Description of the reform and the main forms of university financing

The integration of sustainable development principles into educational strategies is a paramount priority set by the Government, as highlighted in the National Action Plan. This commitment is also emphasized in the Activity Program of the Republic of Moldova's Government, in the National Program for Research and Innovation (2020-2023), as well as in the projected "Education-2030" Strategy, which extends until the year 2030. This reflects a consistent and integrated approach across various public policy documents, underlining the country's long-term strategic vision for the education sector.
In this context, in 2022, the Republic of Moldova underwent a comprehensive restructuring of institutions in the fields of education, research, and innovation through Decision No. 485 dated 13-07-2022 regarding the reorganization by merger (absorption) of certain institutions in the areas of education, research, and innovation and the amendment of certain government decisions. This decision pertains to the reorganization of several institutions in the fields of education, research, and innovation in the Republic of Moldova. The restructuring took place through the merging (absorption) of some institutions into larger ones, as described:
a) The State University of Moldova absorbed 14 different institutions, including the Public Administration Academy, the "Andrei Lupan" Scientific Library, various research institutes, and the "Alexandru Ciubotaru" National Botanical Garden.
b) The Technical University of Moldova absorbed 4 institutions, among which are the State Agrarian University of Moldova and various research institutes.
c) The "Ion Creangă" State Pedagogical University of Chișinău will absorb 3 institutions, including the State University of Tiraspol.
d) The Academy of Economic Studies of Moldova will incorporate the National Institute of Economic Research.
The decision ensured the following significant aspects:

- The research structures of the absorbed institutions will remain autonomous until the end of 2023.
- The rights and obligations of the absorbed institutions will be fully transferred to the absorbing institutions.
- The founder status for certain institutions, such as the Academy of Music, Theatre, and Fine Arts, is transferred from one ministry to another.
- The Ministry of Education and Research will establish special committees for reorganization and asset transfer.
- The staff and students of the absorbed institutions will be transferred to the absorbing institutions in accordance with labor legislation and current academic provisions. The Ministry of Education and Research, in collaboration with the Ministry of Internal Affairs, will explore the possibility of merging two higher education institutions related to training personnel for national security.

The regulatory procedure defining the method of university financing is Government Decision No.343/2020 "Methodology for Budgetary Financing of Public Higher Education Institutions". It establishes the mechanisms for allocating funds to public higher education institutions. These mechanisms are based on a standard-funding, calculated based on a standard cost per student, adjustment coefficients, and the complexity of study programs. In addition to this funding, compensatory funds can also be allocated to encourage performance and complementary funds intended for infrastructure modernization.

Budgetary allocations focus on bachelor's and master's programs that are accredited or provisionally authorized by the National Agency for Quality Assurance in Education and Research or other similar international agencies.

The main expenses covered by these allocations include the salaries of staff involved in education and research, the purchase of necessary goods and services, and investments in equipment and technology for research and education.

The proposed financial structure distributes budgetary allocations as follows:

- 75% standard funding;
- 20% compensatory funding for performance;
- 5% complementary funding for modernization.

To calculate the allocations per student, institutions use a formula that takes into account the actual number of students, adjusted by specific coefficients for forms of education and study programs. These coefficients are stipulated in specific annexes of the methodology.

A crucial aspect of this methodology is the evaluation of institutional performance, which relies on specific indicators in areas such as the teaching-learning process, scientific research, internationalization, and social responsibility.

In conclusion, this methodology offers a comprehensive and detailed framework for financing public higher education institutions, combining performance criteria, operational needs, and incentives for development and excellence.

The assessment of public expenditures allocated to higher education for the period 2018-2022 indicates an upward trend in the financing provided to public higher education institutions. In 2018, the allocated funds amounted to 912.5 million lei, while in 2022, the amount increased to 1105.8 million lei, marking a growth of 17.5%. It's noteworthy that this budget increase occurred in a context where the number of students decreased by 3014 individuals, according to Table No.1.

Table 1

Expenditures on higher education institutions for 2018-2022

Years High Education Budget	2018	2019	2020	2021	2022
High Education Total Expenditures, mil. Lei	912,5	997,9	1093,3	1051,6	1105,8
Public financed enrolled students	27658	25107	24431	25821	24644
Medium costs per student, lei	32991,7	39744,8	44545,9	40700	44900

Source: Ministry of Finance

Research, development, and innovation in the Republic of Moldova face, like many other vital sectors, the challenge of limited institutional and human capacities. These are largely the result of a chronic lack of funding. According to data from Table No.2, the percentage of R&D expenditures relative to GDP for the period 2010-2018 recorded a decline of over 43%, as stated in the third biennial updated report of the Republic of Moldova on the Climate Change Convention of 2021.

Table 2

Expenditure and salaries in the field of research, development and innovation in Moldova

Years	Indicators		
	RDI expenditures, % from GDP	Researches salaries, % medium salary in economy	Expenditures on scientific, % from total RDI financing
2010	0.44	100.24	2.59
2011	0.4	98.09	4.86
2012	0.42	100.7	3.72
2013	0.35	105.33	3.74
2014	0.37	108.81	5.92
2015	0.37	104.27	4.32
2016	0.33	95.99	2.22
2017	0.26	86.28	3.55
2018	0.25		2.75

Source: *http://indicator.idsi.md/*

Given this context, it is vital to underline that the potential of research is not maximized for the benefit of the educational process, and students are often excluded from research activities. This narrows their ability to confront current topics and refine their research skills.
Additionally, we have observed inefficiencies related to the structure of academic programs. While the autonomy of higher education institutions is a crucial pillar and should be encouraged and optimized in the Republic of Moldova, the relevance of the curriculum should not be overlooked. Unfortunately, many of the Moldovan public universities channel their limited resources into programs that don't align properly with market needs or the interests of students and employers. Programs that don't have a clear impact are often more costly, given that funds are misdirected and facilities are not used efficiently. Furthermore, there's a risk that a conglomerate of smaller universities offers similar programs, creating redundancy in educational offerings.
Based on the Report on the rationalization process of expenditures in the educational systems and various studies from the Moldovan educational sector, this reform was proposed, outlining a clear direction for the revitalization of higher education and research.
The said reform considers reconfiguring the university network, enhancing the synergy between research and academia, and equitably distributing funds to support academic staff and researchers.
University Reconfiguration - By absorbing smaller universities, the goal is to maintain 11 foundational universities that meet the needs of the Republic of Moldova.
Research Revitalization - Aiming at integrating research institutions into universities, simultaneously ensuring separate research funding and strengthening the link between research activities and the educational process.
Efficient Investments - A key priority should be increasing the salaries of university faculty and researchers, aiming to raise the quality standard and competitiveness of universities nationally and internationally.
Focus on Academic Expertise - By 2030, the aim is for 80% of the teaching staff to have a scientific title, thus emphasizing high-quality teaching.
Research Boost - Encouraging an increase in research projects won by universities in national and international competitions, with a goal of 10% by 2030.
Similar reforms to those in the Republic of Moldova have been implemented in the Baltic States and Denmark, the latter particularly catching our eye. It's remarkable that the Danish higher education system ranks in the top five globally. Thus, seven of the eight universities in Denmark consistently place in the top 1,000 in the prestigious university rankings published annually by Times Higher Education.
According to the Ministry of Higher Education and Science of Denmark, the initiative began in 2003 with the strengthening of university autonomy. In 2007, a crucial phase was announced: the merger of universities with various research institutions. Before this reconfiguration, Denmark hosted 25 academic and research entities, of which 12 were universities. After the reform, the number dropped to eight universities and three research institutions.
This change was met with skepticism, especially from the academic community, similar to reactions in the Republic of Moldova. However, Danish officials emphasized that, through this restructuring, the new universities would experience professional synergies, thus optimizing the use of the country's research resources and increasing the chances of obtaining EU funding.
A notable effect of this reform is the rise of three universities – the University of Copenhagen, Aarhus University, and the Technical University of Denmark – which have ranked among the most prominent educational institutions in Europe. They now host two-thirds of the country's public research and academic activities. Moreover, all three were recognized in the QS World University Rankings 2023, which evaluates institutions based on various criteria, including reputation among academics and employers, citations, student-to-teacher ratio, and international attractiveness.

This reform, when properly implemented, will bring significant improvements to the educational and research sector in the Republic of Moldova. Through reorganization and focus, a higher quality and increased relevance of higher education can be achieved, marking a new and prosperous chapter for education in Moldova.

Conclusions:

In the context of increasing cross-border competition in education and research, universities face a delicate balance between collaboration and competition. This is highlighted by the need to attract financial resources, academic and student talent, and to maintain a trustworthy reputation. The global dynamic has led many universities to opt for mergers as an essential strategy, while various other tactics involve informal collaborations and global partnerships. The theoretical discussion regarding university mergers falls within social identity theory and strategic and procedural theories. The university reform in the Republic of Moldova comes in response to the need to align with European standards and to ensure the quality of education. Merger strategies are seen as ways to respond to external challenges, and specialized literature emphasizes the increase of educational and research service providers as a major trend. Additionally, various strategic trends in universities include internationalization, privatization, commercialization, and the "entrepreneurial university" model. University mergers can bring significant economies of scale and increased competitiveness. Successful mergers are expected to create stronger and more adaptable institutions in today's global economy.

The reform of higher education and research in the Republic of Moldova is imperative in the face of a series of complex challenges facing the country. Adaptability to European Union standards, the unsatisfactory link between teaching and research, as well as current demographic and economic pressures underscore the need for significant change. Moreover, global competition for resources, technological changes, and the need for innovation push the system to a tipping point. Demographic decline, migration, and the impact of the health crisis amplify these challenges, with a decreasing number of students spread across an excessive number of university institutions.

Inefficiency, excessive costs, and underfunding of scientific research are factors that exacerbate the situation and reduce the appeal of a research career in the Republic of Moldova. Compared to neighboring countries, Moldova lags in terms of higher education competitiveness. To address these challenges and create a competitive and innovative higher education system, Moldova must take decisive actions to consolidate and adequately fund the sector.

In 2022, the Republic of Moldova underwent significant restructuring in the realm of education, research, and innovation, marking an ambitious initiative to consolidate and streamline universities. Adopted measures, such as the absorption of smaller institutions by larger ones, aim at optimizing resources and harnessing the country's educational and research potential. This process was also supported by a detailed funding methodology that incorporates performance criteria, operational needs, and incentives for growth and excellence. However, it was noted that funding in the research and innovation sector remained a sensitive point, having significantly decreased over recent years. Despite this decline, the importance of maximizing research potential for the benefit of students and society as a whole was emphasized. The proposed reform, aiming at a clear direction for revitalizing higher education and research, provides a new framework through which the Republic of Moldova seeks to strengthen its educational system and address current and future needs more efficiently. Through this reform, Moldova expects to redefine its position on the regional and international education and research map.

Recommendations:

1. **Model after Successful Educational Systems:** The Republic of Moldova should draw inspiration from the successful models of other countries in higher education and research. For instance, Nordic countries like Finland and Sweden have implemented educational reforms that focus on research, innovation, and international collaboration.
2. **Periodic Assessment:** Implement a periodic evaluation, at 3-5 year intervals, on the reform's impact on education quality, research performance, and the system's adaptability to global changes. This will aid in identifying weak points and adjusting direction if necessary.
3. **Invest in Research Infrastructure:** Prioritize fund allocation for the modernization and expansion of labs, libraries, and other essential resources for research and innovation.
4. **Promote International Collaborations:** Encourage universities in the Republic of Moldova to establish partnerships with higher education institutions and research centers in Europe and other parts of the world.
5. **Review Funding Criteria:** Given the reduced research funding, the government should reevaluate how resources are allocated, emphasizing quality, innovation, and the social impact of projects.
6. **Continuous Training of Teaching Staff:** Launch ongoing training programs for teachers and researchers to keep them updated on the latest trends in their fields and to implement innovative teaching and research methods.
7. **Encourage Student and Faculty Mobility:** Offer scholarships and incentives for students and faculty to study, teach, or conduct research abroad.
8. **Interlink with the Private Sector:** Establish closer ties between universities and industry to align research with market needs and facilitate technology transfer.
9. **Transparency and Communication:** Ensure open communication with all stakeholders - students, parents, teachers, employers - about the goals of the reform and the progress made.
10. **Comparative Analysis:** Periodically study the position of the Republic of Moldova in international education and research rankings to assess progress and identify areas requiring further improvements.

In conclusion, for the Republic of Moldova to achieve its objectives in the realm of higher education and research, it is essential to adopt an adaptable, data-driven, and forward-looking approach that takes into account global trends and challenges. This reform must not only incorporate global trends and challenges but also the principles of sustainable development, thereby ensuring a sustainable and prosperous future for the nation.

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Hotărârea nr. 485 din 13-07-2022 cu privire la reorganizarea prin fuziune (absorbție) a unor instituții din domeniile educației, cercetării și inovării și modificarea unor hotărâri ale Guvernului

Analiza de impact la proiectul Hotărârii de Guvern Cu privire la reorganizarea prin fuziune (absorbție) a unor instituții din domeniile educației, cercetării și inovării

http://indicator.idsi.md/;

https://ufm.dk/en;

https://www.topuniversities.com/university-rankings/world-university-rankings/2023

Cheltuielile bugetului public național pentru perioada 2018-2020, Ministerul Finanțelor

Analysis of the Impact of Environmental Taxes on CO2 Emissions from the Energy Sector

Gabriela-Cornelia PICIU[69]

Abstract:

This article analyzes the impact of a carbon tax in a hypothetical high-growth and low-growth economy. Carbon taxes are found to increase the cost of CO2 emissions, which provides an incentive for CO2 emitters to use low-carbon fuels or take other measures to reduce CO2 emissions.
Carbon capture, use and storage technologies offer fuel producers another option for reducing CO2 emissions, leading to lower costs associated with carbon taxes. We assume that CO2 can be captured from some industrial processes and electricity generation and then sold to enhanced oil recovery operations.
Given the concerns about carbon pricing, it is important to know that more than 70% of greenhouse gas emissions are domestic, and trade and competitiveness issues are much less important in addressing these emissions sources.

Keywords : taxes, carbon, climate change, high-growth, low-growth

JEL classification **:** H23, Q53, Q57

Introduction

Carbon taxes are considered "the most powerful and effective of the various mitigation strategies to reduce CO2 emissions from burning fossil fuels" (IMF, 2019). They are taxes on the carbon content of fossil fuels and lead to higher prices coal and other fossil fuels There are some countries where these instruments are not cost-effective, for example fuel and electricity prices are set below cost recovery.

The most recent IMF estimates of the combined value of after-tax energy subsidies (for coal, oil, electricity, natural gas), also reflecting the environmental damage associated with global warming, pollution, traffic congestion, is 5.2 trillion of US dollars (over 6% of world GDP), of which 85% are represented by coal and oil.

[69] PhD., *2rd degree researcher, Romanian Academy, "Victor Slavescu" Centre for Financial and Monetary Research, Bucharest, 050711, Romania, email: gc.piciu@icfm.ro or gabriela_piciu@yahoo.ro*
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Methodology and Data

Carbon taxes are a policy mechanism designed to reduce the energy sector's contribution to anthropogenic climate change. In this analysis, we apply three levels of carbon taxes, which gradually increase over the projection period, with the values recorded in 2022 as the reference.

The analysis focuses on the impact of the three carbon taxes (at the level of a country's economy) on energy-related CO2 emissions, without quantifying the economic/social costs associated with a carbon tax policy and without assessing the social benefits of the reduction these emissions.

Choice of data

As of 2022, the World Bank Report indicates that 70 jurisdictions, including 47 national jurisdictions as well as subnational jurisdictions, were subject to some form of explicit carbon pricing, covering 23% of all global greenhouse gas emissions. greenhouse.

There is substantial variation in the implicit price of emissions, with many sub-national jurisdictions having values of $15/tonne in China, $25/tonne in most US states and Canada over $35/tonne. In contrast, Japan's tax is set at around $3/tonne and Mexico's at $1.5/tonne.

Also, in the European Union prices vary greatly and are considered among the highest in the world (Table 1). For this reason, we considered representative for the analysis the values of €16 (the value of the existing carbon tax in the countries of Latvia, Poland and Spain), €27 (Denmark, Portugal) and €38 (Austria, Germany implemented in 2021).

Given the large variations in carbon taxes across national jurisdictions, we proposed an analysis of how they, at the level of an economy, influence total, sectoral and fuel-specific CO2 emissions, as well as fuel prices.

Table 1

Carbon taxes, share of greenhouse gas emissions covered and year of implementation in EU countries (as of March 31, 2023)

	Carbon taxes (per ton of CO2)		Share of greenhouse gas emissions covered in jurisdictions	Year of implementation
	Euro	Dolars		
Austria (AT)	€32.50	$35.38	40%	2022
Denmark (DK)	€24.37	$25.43	35%	1992
Estonia (EE)	€2.00	$2.18	6%	2000
Finland (FI)	€76.92	$83.74	36%	1990

France (FR)	€44.55	$48.50	35%	2014
Germany (DE)	€30.00	$35.38	40%	2021
Iceland (IS)	€35.40	$36.33	55%	2010
Ireland (IE)	€48.45	$52.74	40%	2010
Latvia (LV)	€15.98	$17.25	3%	2004
Liechtenstein (LI)	€ 120.16	$ 130.81	81%	2008
Luxembourg (LU)	€44.19	$48.11	65%	2021
Netherlands (NL)	€51.07	$55.59	12%	2021
Norway (NO)	€83.47	$90.86	63%	1991
Poland (PL)	€16.27	$17.57	4%	1990
Portugal (PT)	€23.90	$26.01	36%	2015
Slovenia (SI)	€17.30	$18.83	52%	1996
Spain (ES)	€15.98	$17.25	2%	2014
Sweden (SE)	€ 115.34	$ 125.56	40%	1991
Switzerland (CH)	€ 120.16	$ 130.81	33%	2008
Ukraine (UA)	€0.75	$0.82	71%	2011
United Kingdom (GB)	€20.46	$22.28	21%	2013
	€44.49	**$48.56**	**37%**	
EU ETS (For Reference)	€88.46	$96.30	38%	2005

Source: World Bank, "Carbon Pricing Dashboard", last updated 31 March 2023, https://carbonpricingdashboard.worldbank.org/map_data

Because the majority of emissions reductions from carbon taxes come from the electricity sector, we will analyze the impact of carbon taxes using the model. In this analysis we do not quantify the economic or social costs associated with a carbon tax policy, nor do we assess the climate benefits, but instead focus on national CO2 emissions in three carbon tax cases.

Methodology

We will consider three carbon taxes with values of €16, €27 and €38, which we propose to introduce at the level of the entire economy of a country starting in 2023. We consider these taxes to grow by 5% per year, thus reaching in 2050 at values of €60.84, €100.80, €141.12 per ton of CO2.

Table 2, Table 3, Table 4, shows the three selections of taxes proposed to be implemented in the national energy system and how they evolve until 2050.

Fuel costs rise with the inclusion of carbon dioxide taxes, and these are reflected in the prices of petrol, diesel, natural gas and coal. These taxes also reduce consumers' disposable income for non-energy purchases.

Table 2

€16 tax on economy-wide CO2 emissions and their effects on energy product prices

Carbon tax €16 fee	Carbon tax in 2023 (€/physical unit of fuel)	Carbon tax in 2050 (€/physical unit of fuel)
benzine	+0,1404€	0,518€
DIESEL	+0,162€	+0,605€
natural gases	+0,896€	+3,337€
coal	+29,527€	+111,272

Source: data processed by the authors based on the Carbon Pricing Dashboard

Table 3

€27 tax on economy-wide CO2 emissions and their effects on energy product prices

Carbon tax €27 fee	Carbon tax in 2023 (€/physical unit of fuel)	Carbon tax in 2050 (€/physical unit of fuel)
benzine	+0.227€	0.864€
DIESEL	+0.27€	+1.015€
natural gases	+1.490€	+5.562€
coal	+49.216€	+185,436€

Source: data processed by the authors based on the Carbon Pricing Dashboard

Table 4

€38 tax on economy-wide CO2 emissions and their effects on energy product prices

Carbon tax €27 fee	Carbon tax in 2023 (€/physical unit of fuel)	Carbon tax in 2050 (€/physical unit of fuel)
benzine	+0.324€	1.210€
DIESEL	+0.378€	+1.415€
natural gases	+2.084€	+7.787€
coal	+68.904€	+259.2€

Source: data processed by the authors based on the Carbon Pricing Dashboard

Referențialul din 2022 arată o scădere , dar și o revenire a cererii de energie legate de COVID-19 în 2020 și a emisiilor de CO2 aferente în 2021.

Results

In the three cases where we add carbon taxes to the 2022 (Table 5) baseline case, energy-related CO2 emissions decline before leveling off in the last 10 to 15 years of the projection period, despite tax increases. This phenomenon occurs because many CO2-reducing actions, such as replacing coal-fired electricity generation with lower-CO2 natural gas or emission-free renewables, occur early in the projection period.

	2020	2025	2030	2035	2040	2045	2050
Tax in 2022 per metric ton of CO2	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual CO2 emissions	4.941	5.085	4.991	4.908	4.925	5.001	5.117
(million metric tons)		144.72	-93.96	-82,08	16.2	76.68	114.48
Five-year change in CO2 emissions (million metric tons)							
$16 fee	0.00	17.863€	22.798€	29.095€	37.130€	47.390€	60.48€
Tax in 2022 per metric ton of CO2	4.941	4.716	4.389	4.199	4.180	4.239	4.262
Annual CO2 emissions (million metric tons)		-225.72	-327.24	-189	-18.36	58.32	23.76

Five-year change in CO2 emissions (million metric tons)							
$27 fee	0.00	29.764€	37.99€	48.492€	61.884€	78.980€	100.807€
Annual CO2 emissions (million metric tons)	4.941	4.575	4.231	4.064	4.061	4.087	4.093
Five-year change in CO2 emissions (million metric tons)		-365,04	-345,6	-166,32	-3,24	25,92	14,04
$38 fee							
Tax in 2022 per metric ton of CO2	0.00	41.67€	53.19€	67.88€	86.63€	110.57€	141.12€
Annual CO2 emissions (million metric tons)	4.942	4.501	4.155	4.006	3.973	3.991	4.013
Five-year change in CO2 emissions (million metric tons)		-439.56	-345.6	-149.04	-33.48	18.36	21.6

Source: data processed by the authors based on the Carbon Pricing Dashboard

The decrease in CO2 emissions also occurs due to the increase in actions taking place at the beginning of the projection period to reduce CO2 emissions, such as replacing coal-fired electricity generation with lower CO2-emitting natural gas or renewable sources without CO2 emissions.

Other mitigation strategies that may be more expensive, such as reducing CO2 from chemical production or increasing the number of alternative fuel vehicles, because they require taxes that are generally higher than those obtained in this analysis.

Conclusions

Applying the three cases of hypothetical carbon taxes of €16, €27, or €38 on fossil fuels in a country's economy starting in 2023, and increasing these taxes by 5% each year until 2050, we obtained estimated energy prices, fuel consumption, carbon capture and sequestration, carbon intensity and overall energy-related CO2 emissions relative to the 2022 reference case.

Assuming that a tax on fossil fuels is proportional to their carbon content, we observed significant differences in estimated energy prices, fuel consumption, carbon capture and reduction, carbon intensity and overall energy-related CO2 emissions.

Analyzing energy-related CO2 emissions projections, we find that they are lower when a carbon tax is applied to fossil fuels, and higher taxes result in larger CO2 emissions

reductions compared to the baseline case. Total energy-related CO2 emissions in 2050 are progressively lower for the €16 tax (17%), €27 tax (20%) and €38 tax (22%) than the 2022 baseline.

In each of the carbon tax cases based on the 2022 baseline, CO2 emissions decline at the beginning of the projection period before leveling off in the late 2030s. The electricity sector is the most responsive to carbon taxes. In this sector, coal is losing market share to natural gas and zero-carbon generation sources faster than in the 2022 baseline.

Future Directions

The presented case study can be a guide for the introduction of a carbon tax in Romania, where the energy mix is still largely based on fossil fuels, mainly oil and gas. A coal phase-out target has been set for the year 2032, but no phase-out dates have been set for gas and oil.

Gas is used as a transition fuel, therefore many fossil gas investments are still planned in various strategic or programmatic documents. These investments consist in the expansion of the gas distribution system and the new fossil gas-based units included in the decarbonization plan of the largest coal producer Complexul Energetic Oltenia (OEC). Specifically, two new gas-fired power plants are planned to come online in 2026, and an offshore gas project began production in 2022.

The decarbonisation process of the nue OEC is very transparent and also all relevant mine closures and rehabilitation timelines are not made public.

Regarding renewable sources, although the green certificate support scheme ended in 2016, no similar mechanism has been implemented to stimulate investments in renewable energy, despite Romania's considerable potential. Progress has been made on a state aid scheme for investments in wind and solar capacity. Under the Recovery and Resilience Plan, approved by the European Commission in March 2023, direct subsidies will be awarded to wind and solar projects selected through a tender process.

In the National Energy and Climate Plan (PNEC), Romania does not specify an objective to reduce greenhouse gas (GHG) emissions for the transport sector. The Environmental Fund Administration has several programs to support the replacement of old vehicles with electric and low-emission vehicles and a program to increase the number of charging points for electric and plug-in hybrid vehicles.

There is much controversy surrounding one of these existing national support schemes that allows funds to be allocated to internal combustion engine vehicles, which does not help reduce GHG emissions.

The energy efficiency of buildings in Romania still needs to be improved. While the Environmental Fund Administration has implemented several programs to increase efficiency, methodological standards are still needed for proper enforcement of the Energy Performance/Emissions Standards Act.

Romania's performance is mixed, with low ratings in the Climate Policy and Renewable Energy categories, average in energy use and high in GHG emissions.

To improve Romania's climate policy, more ambitious climate and energy targets for 2030 and 2050 and more development of the offshore wind sector are needed. It is scheduled to use gas as a transition fuel; therefore, many fossil gas investments are still planned through various strategic or programmatic documents. Also, energy efficiency in all energy-consuming sectors should be improved and a concrete plan to alleviate energy poverty should be implemented.

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PERSPECTIVE AND DEVELOPMENT CHALLENGES OF ECOLOGICAL AGRICULTURE IN THE REPUBLIC OF MOLDOVA

Viorica POPA[70]
Sergiu ȚIRIGAN[71]
Oleg FILIMON[72]

Abstract:

The sustainability of the agricultural system has become a concern in the Republic of Moldova, a country with one of the highest rates in Europe of the share of agricultural land in total and of the role of the sector in the economy and external trade balance. Although the agricultural sector of the country registered important growth and potential based on the application of green revolution technology, the adverse impact on the environment, erosion of natural resources, and vulnerability to climate represent a challenge that is affecting the country's social and economic development perspectives. Organic agriculture plays an important role in the extension of the application and promotion of sustainable production practices, and the extension of this production scheme is a determinant for the achievement of the sustainable development objectives of the agricultural sector of the country. The study explores factors that are limiting and factors that are facilitating the development of the organic food sector in the Republic of Moldova. Comparative qualitative analyses covering EU and Moldova are summarized into analyses of co-variation between policies, regulations, institutional setup and organic sector development trends, focusing on the determination of the key milestones and driven factors. The authors also used a qualitative approach based on focus group interviews with agriculture producers, mostly focused on organic producers or producers who are evaluating the opportunities to initiate conversion to organic agriculture, to evaluate the factors influencing farmers' willingness and limiting factors from their perspective. This study was developed within the framework of Subprogram 030101 „Strengthening the resilience, competitiveness, and sustainability of the economy of the Republic of Moldova in the context of the accession process to the European Union", institutional funding.

Keywords: *sustainability, agricultural land, natural resources.*
JEL classification : *Q01, Q42, Q53*

Introduction

Organic farming gracefully combines our environment, our health and the food we eat. International Federation of Organic Agriculture Movement (IFOAM): "Organic agriculture is a production system that supports the health of soils, ecosystems and people. It is based on ecological processes, biodiversity and cycles adapted to local conditions, less on the use of practices with adverse effects. Organic farming combines tradition, innovation and science to

[70] *PhD, Coordinator Researcher, National Institute for Economic Research, ASEM, Republic of Moldova*
[71] *PhD Student, National Institute for Economic Research, ASEM, Republic of Moldova*
[72] *PhD Student University of Political and Economic Studies "C. Stere", Moldova*

benefit a shared environment and promotes equitable relationships and a good quality of life for all involved."

The importance of organic agriculture worldwide has grown over the past two decades, driven by an increase in awareness of the progress of resource degradation and climate change, as well as consumer demand for healthy food alternatives. The Republic of Moldova, like many other countries that rely heavily on agriculture, recognizes this global trend and tries to adapt to it by creating the necessary conditions to address the problems related to conventional agriculture, as well as to increase its value exports to established markets and penetration of new markets (Ministry of Agriculture, 2020).

The promotion and development of ecological agri-food production require the involvement of two types of factors: quantitative - by increasing the areas cultivated in an ecological system and qualitative - the positioning of ecological agri-food products at the centre of agriculture, as the foundation of its sustainable development.

The purpose of this paper is to analyze the development potential and contribution of organic agriculture in the Republic of Moldova in the context of sustainable development, as well as the trends and challenges for this sector.

The research presents the results of some theoretical investigations of the concept of ecological agriculture, as a basic element of sustainable development. The results of the analysis are applied to examine the development of organic agriculture in the Republic of Moldova and the options for integration into sustainable development models and projects. The study is based on open data, on data collected by interviewing agricultural producers. Analysis, synthesis and comparison were used as research methods.

Research methodology

The article presents the results of some theoretical investigations of the concept of ecological agriculture, as a basic element of sustainable agricultural development. Are explored determinant factors in the development of the organic food sector in the Republic of Moldova, applying comparative analyses of policies and tendencies in EU and Moldova. Data interpretation is performed considering the results of interviews with agriculture producers, to consider factors influencing farmers' willingness and limiting factors from their perspective. The quantitative analysis is carried out on the data selected and processed by the authors based on the statistical yearbooks of the Republic of Moldova and other official information of the institutions in our country and in the European Union.

The results of research and discussions

Sustainable development has become a central objective in national and international policies for development and the environment. A certain role for the extension of approaches based on this concept was ensured by the adoption of the UN Agenda 2030 for Sustainable Development and the process of nationalizing the objectives. One of the first and key conection of the concept with the agricultural sector as an economic branch and to the rural area as a functional space was performed within the framework of the FAO conference in Rome (1989), the Rio Declaration and Agenda 21 (1992), which established the connection with all three dimensions of sustainable development (social, economic and environmental protection) based on the established priorities: food security; decent income, standard of living and work; conservation of natural resources and environmental protection. The documents also integrate

another related process, "multifunctional rural development" which focuses on the functions of the rural space: social (employment, services for local communities, rural culture), ecological (preservation of the landscape and biodiversity, water management, assimilation of pollutants), production, regional (settlements, infrastructure), touristic. Keeping the right proportions between different functions of rural areas and the agricultural sector represents a challenge for the development of regulations and support policies (Kociszewski, 2018).

Although integrated into policy systems and development objectives, the concept of "sustainability" retains an ambiguity, fuelled by the knowledge gap, lack of standardization, methodological differences and approaches, including based on their and some analyses' biased nature (Trigo, 2021). In the case of the Republic of Moldova, the approaches are related to specific development problems and challenges, being correlated to the country's international commitments, especially to EU policies in the context of the objective of European integration.

In the context of the programming framework for the period 2023-2030, the main strategic planning documents with an impact on the agricultural sector are the National Development Strategy "European Moldova 2030" (SND), the National Strategy for Agricultural and Rural Development 2023-2030 (SNADR), and the Strategy of the Food Security of the Republic of Moldova for the years 2023-2030. SND is focused on improving the quality of life, increasing people's living standards and strengthening demographic resilience through a series of objectives, including economic diversification, modernization of technological processes, economic inclusion, sustainability of natural resources through their responsible use, minimization of the impact on the environment, etc.

The sustainability of the development of the agri-food sector, which has strategic socio-economic importance for the Republic of Moldova, is affected by a multitude of interrelated factors and risks that require the implementation of an integrated set of measures in multiple areas: the development of an effective institutional and regulatory system based on the system and EU requirements; preventing, combating, adapting and increasing the resilience of agricultural producers and the rural population to climate change; promoting the use of beneficial practices for the climate and the environment, including conservation of natural resources; strengthening competitiveness and developing sectors with high added value and market access, strengthening the organization of producers, etc.

SNDAR establish interconnections between the challenges that the agricultural sector is facing and measures with a potential impact. Promotion of the organic production systems is examined not only as a priority but as a direction of intervention with a high degree of complementarity and multiplier effect providing a basis for the implementation of an integrated and balanced approach within multiple key priorities. Achieving the SNDAR objectives, priorities for connecting the national agricultural system to the community one and continuing the integration process on the European market by adjusting to changes in consumer preferences, facilitating investment interest in the development of processing as well as strengthening the competitiveness of ecological value chains, imposes the need for an accelerated extension of the ecologically certified surface.

The development of the national organic system tends to be aligned with the EU ones. According to the European Commission (EC, 2023), organic farming is an agricultural method that aims to produce food using natural substances and processes. Therefore, it has a limited impact on the environment, because it encourages the responsible use of energy and natural resources, preservation of biodiversity, preservation of regional ecological balances, increasing soil fertility, and maintaining water quality. Thus, organic farming rules encourage a high standard of animal welfare and require farmers to meet their specific behavioral needs.

The objectives of the EU policy in the field of organic agriculture aim to provide a clear structure for the production of organic products throughout the EU. The regulations are designed to meet

consumer demand for green products they can trust while ensuring a fair market for producers, distributors and traders (EC, 2023).

In the European Union, organic farming is experiencing a rapid rise, as a direct result of increasing consumer interest in organic products. To find solutions to the challenges generated by this rapid rise and to ensure an effective legal framework for the sector, the EU adopted new rules that apply from 1 January 2022. The development of ecological agriculture is a priority in the context of strengthening the political and legislative approach to the Common Agricultural Policy of the European Union and ensuring a synergistic framework for the European Green Pact, particularly focused on the objectives of the "From Farm to Consumer" Strategy and The EU Biodiversity Strategy for 2030. Thus, the EU establishes that 25% of the agricultural land in the intra-community space will be used for ecological agriculture by the year 2030 (Jităreanu, Mihăilă, Robu, Lipșa, & Costuleanu, 2022).

In Moldova, despite the challenges faced, insufficient use of beneficial practices for the climate and environment, including conservation of natural resources, is registered. During the previous programming cycle, the lower level of achievement of the objectives and targets was registered in the case of relevant measures for this area of intervention (Decision, 56/2023).

This tendency was also registered in the case of the promotion of organic production. In 2022, 28616.07 ha of agricultural land were registered in the organic system, 1102,86 ha less than in 2021. Of the total area in the organic system, 23756.81 ha (approx. 1.6% of the total agricultural land) are already certified, 1100 ha in the conversion period year 1,4477 ha were already in the second year of conversion and 383.7 ha are in the last year of conversion. Despite the moderated growing trend of the number of certified organic producers from 49 in 2015 to 151 in 2021, according to the data of the registration bodies, 12 producers exited organic farming during the period 2021 – 2022, after a period of stagnation of the areas and number of agriculture producers involved (2017-2021), (Yearbook, 2023).

A high diversity of categories of organic crops proves the potential interest, and initiative of producers that assume risks and test production methods even if they are facing insufficient knowledge, the area covered with organic area is mainly dominated by field crops. The type of activity of the economic entities included in the value chain of organic agriculture is production, processing, animal husbandry, trade and collection. The country exports mainly raw material. In 2022 has increased the interest in the type of processing up to 21.5%, (compared to 2021 - 12.8%). Nevertheless, the actual level of production does not support the development of complex value chains and cross-border integration could be a solution.

Interviews performed in the framework of the meetings with the organic producers and farmers interested in organic farming, performed in the context of the meetings organized by Moldova Organic Value Chain Alliance, demonstrate a high degree of scepticism of the producers when referring to their vision about future perspectives. The interviews were performed in the context of the crises that have affected producers of Moldova due to the increase in production costs and drop in the prices for key agriculture products. Referring to the aspects affecting farmers' activity as organic producers or interests, barriers could be structured as follows:

-Inappropriate regulatory framework, cost of certification, supportive measures and access to inputs.

The delay in the approximation of the national legislation the EU one, and recognition of the equivalence of the national organic system to the European one. Farmers were affected by the need to perform both categories of certificates, the national one in case they opt to apply for the subsidy and the European one when they are interested in exporting to the EU. It decreased the efficiency of the subsidies, considering their symbolic value until the year 2023. Even if the value of the subsidies was increased significantly in 2023, regulatory barriers are limiting access to them. The access to plant protection products, suitable for organic agriculture

is limited by the condition to perform national registration of the EU-approved ones.

-Access to market and price.

In the case of small producers, only a limited number informed that can sell their products at a higher price than conventional products. Usually are sold at the same price as conventional ones, and are in direct competition. Farmers were unable to identify if there are any state-supportive measures for market access, except the possibility of applying for funding of up to 20% of the value of the products sold if they can provide confirmative documents. Larger farmers operate based on local aggregators and support companies and mainly export their products. The drop in the prices affected them. Key concerns were to identify new categories of products to increase revenue and consider it important to perform the primary processing locally.

-Nutrient supply, plant protection and knowledge.

The drop in productivity represents the main challenge for farmers interested in organic agriculture, being related to insufficient knowledge in the area of plant protection. Some market operators assume the support for the farmers that are producing under their umbrella, but this applies in the case of producers of field crops and almonds. Access to organic fertilizers is limited due to the limited application of vegetal compost and insufficient animal waste due to a decrease in the number of cattle. Only one farmer is applying the principle of circular economy by ensuring integrated management of cattle and field crop farming, reporting higher yields than in the case of conventional production.

-Lack of qualified and responsible labour force.

The interest of the young generations towards agriculture is constantly decreasing, young people prefer to work abroad, which creates a pressing problem for farmers. Organic productions need more qualified workers. Farmers mentioned that are lack access well well-trained agronomists or are not able to cover the costs.

Development of organic agriculture is associated with an increasingly better organization of ecological systems. The registered growth is largely determined due to the support of development partners such as the Global Environment Facility (GEF), Donau Soya, USAID, People In Need, Czech Development Agency. The Republic of Moldova is advantageous, having all the climatic conditions for the development of ecological agriculture. However, the share of agricultural areas cultivated in an ecological system is well below the European average. Delays in the approximation of the national system to the EU ones, caused the vulnerability of the country and involvement in cross-border frauds due to uncontrolled activity of certifiers, and atypical fluctuations of the certified areas.

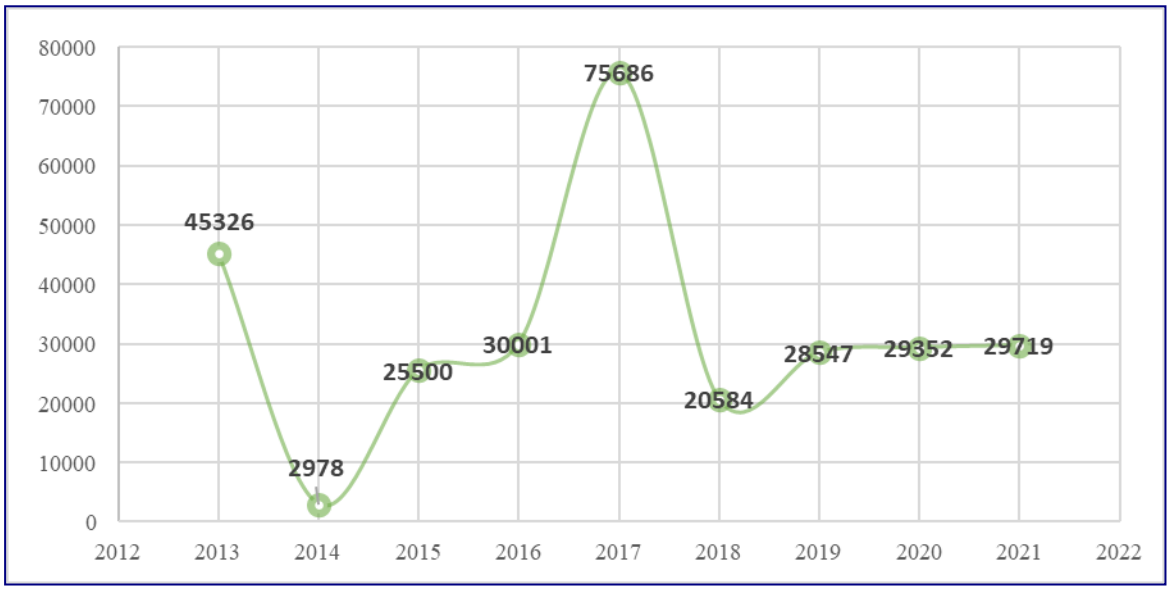

Figure 1. Dynamic of the organic certified area in the Republic of Moldova

Source: developed by authors based on the data of the Ministry of Agriculture.

During 2023 an important switch of the state policies in the area of organic agriculture was registered. It was approved the new sectoral Law (No. 237/2023 "On ecological production and labelling of ecological products"), represents an important step for the approximation of the national system to the EU ones. The new Regulation on advance subsidy measures and the specific eligibility conditions (GD 464/2023) has increased the support during the conversion period, and the limits of the total support to be requested. The new Regulation, despite procedural barriers to accessing the subsidies, has doubled the total amount of requested funds in 2023 compared to 2022 (based on the date of the Agency for Intervention and Payments in Agriculture).

Conclusions

Achieving the objectives of SNDAR, the priority of connecting the national agricultural system to the community one and continuing the integration process on the European market by adjusting to changes in consumer preferences, facilitating investment interest in the development of processing as well as strengthening the competitiveness of ecological value chains, imposes the need to achieve a share of ecologically certified agricultural land of at least 10% of the total, or about 200 thousand ha by the year 2030.

The most important barriers to the development of the ecological agriculture system in the Republic of Moldova:

- Delays in establishing a regulatory framework according to that of the European Union
- Insufficient support measures (low value of support, lack of support for the post-conversion period)
- High costs determined by regulatory barriers (eg: the requirement to register fertilizers and plant protection products in national registers)
- Lack of a policy and measures to promote the consumption of organic products
- Lack of an adequate protection system for the terms associated with organic production

•Distrust of producers in the efficiency of organic production methods, especially regarding plant protection solutions.

•Deficiencies regarding the development of the livestock sector.

Deficiencies in the regulatory system, policies and the system of support measures have led to an insufficient development of organic agriculture in the Republic of Moldova. These are correlated with the difficulties of establishing a regulatory, institutional framework and effective support measures connected to that of the EU, the insufficient expansion of both practices beneficial to the environment and conservation of natural resources as well as knowledge regarding these practices, difficulties in the organization and consolidation of value chains, integration on the internal and western markets, the insufficiency of communication and awareness measures regarding the importance of ecological agriculture and the benefits of organic products, etc.

•The importance of the development of organic the agriculture is correlated with several challenges the country is facing: Vulnerability to climate change and degradation of natural resources (soil, whater, biodiversity) – contribution to preventing, combating, adapting and increasing the resilience of agricultural producers and the rural population and promotion of beneficial practices for the climate and the environment;

•Reduced revenues - Strengthening competitiveness and developing sectors with high-added value;

•Securing access to the market – Corresponding to changing trends in requirements and preferences on the EU market (main market);

•Limited resources to support the development of the agricultural sector - ecological agriculture: a direction of intervention with a high degree of complementarity and multiplier effect;

•Corresponds to the EU integration priorities.

So, the main objective of organic farming is to obtain healthy and safe agricultural products for consumers, taking into account the protection of the environment.

For a long period, the support measures were rather symbolic, the average annual value of payments for ecological agriculture being about 300-400 thousand Euros at the level of the country. The lack of protection in case of unfair competition with conventional products, as well as the lack of promotion measures, reduces the attractiveness of investments in production and certification. The development problems of the livestock sector reduce the availability of natural fertilizers. It is important to mention that the insufficient development of ecological agriculture is also correlated with the deficiency of the rural extension system, which is practically absent in the case of the Republic of Moldova. Its functions are taken over by donors through the implemented projects, but they have a limited impact in terms of time and territorial coverage.

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THE IMPACT OF THE INNOVATION PROCESS IN PUBLIC PROCUREMENT ON SUSTAINABLE DEVELOPMENT STRATEGIES AND POLICIES

Elena RUSU[73]

Abstract:

In this article, the author presents innovative public procurement as a instrument of a voluntary nature at the EU level, which denotes that the Member States and, respectively, the public authorities have the right to decide the extent to which they are implemented. Innovative public procurement plays a key role in the EU's efforts to become a more resource-efficient economy. Implementing innovative procurement also helps stimulate greater demand for more sustainable goods and services that would otherwise be difficult to bring to market. Also, innovative public procurement is an important tool of boosting the economy through innovation. The author presents the system of innovative public procurement, the fundamental aspects of public procurement in the field of innovation. In the given context, he approaches the concept of innovative public procurement (IPP Innovative Public Procurement) as a process through which public entities procure goods, services, works and utilities in relational conditions optimal: price - quality, so that they generate innovative benefits for entities and society, but with minimal negative impact on the environment.

To carry out the study, the author applied traditional research methods: monographic method, document analysis, comparison, trend analysis, etc. The objectives of the article denote: clarification of the concept of public procurement in the field of innovation, its global dimension and its added value. policy framework, illustrates how public procurement can be opened up for innovators, including start-ups and innovative SMEs. The overall aim is to support public purchasers to contribute more to the economic recovery, the twin green and digital transitions and the resilience of the EU.

Keywords: *innovative public procurement, pre-commercial procurement, sustainable procurement, social benefits, environmental benefits, entrepreneurial initiatives, economic needs, social responsibility*

JEL classification: O30, O31, Q01

Introduction

Today there is a prevailing strategy based on competitiveness and sustainability, which is shared by nations, international organizations and companies around the world. That is, there is a sharing, understanding that today's society is immersed in a complex process of globalization, growing unevenly, and therefore faces a period of great challenges and opportunities that must be addressed, at least in part, by placing innovation and sustainability at the center of the agenda, competitiveness no longer being the only determining factor the world economy. All forms of technological innovation, that can lead to sustainable

[73] *PhD, Doctoral School of Economic Sciences Moldova State University Republic of Moldova. Email: gogolnicencoe@mail.ru. ORCID ID: 0000-0001-8593-0079*

development, such as: innovative processes, product innovations, organizational innovations, market, must be taken into account. Sustainable development can be supported by the innovation process at different levels: national, regional and international, where it manifests itself in a special way.

Innovation Public Procurement (IPP) is an important tool to drive the transformation of our economy towards a green and digital economy. Adopted in the context of the communication on "A new European agenda for research and innovation - Europe's chance to define its leadership position in technology" and the contributions of the informal leaders' dinner in Sofia on 16 May 2018, the present guidelines are updated following the adoption of the European industrial and SME strategies[2] and the Recovery and Resilience Mechanism[9].

DESCRIPTION OF THE PROBLEM

Public procurement of innovative solutions facilitates the wide diffusion of innovative solutions in the market. The IPP provides a demand to incentivize the industry to invest in broad commercialization to bring innovative solutions to the market at the quality and price needed to implement them in the market. Thus, in the public sector, public services will be modernized with solutions for added value for money and better growth opportunities will be offered to companies[4].

METODOLOGY AND DATA

The research method resides, first of all in the analysis of the factual and theoretical material regarding the definition of the concepts of innovation and sustainable development in the contemporary economy. The literature study was used and the synthesis of its results was presented, the analysis of the researches in the field for the formulation of the theoretical argumentation, as well as the application of the comparison method in the process of realizing their own visions. The informational support is the specialized literature in the field of management. To carry out the study, the author applied traditional research methods: monographic method, document analysis, comparison. Conclusions resulting from the analysis of documents, reports and case studies confirm the assumption that public procurement is an important lever in the implementation of Innovative Development Strategies and Policies.

RESULTS

Public authorities that support the innovation process or the purchase of innovative goods and services are directly granted improved services at optimized costs. For this reason, the introduction of innovation becomes efficient and effective in the direction of modern, more competitive, more sustainable societies. In the case of companies innovating from a sustainable development perspective, a combination of innovative processes, product innovations, organizational innovations and market innovations must be implemented, these priorities being pragmatically set, taking into account opportunities and constraints.

In the prospect of dematerializing the economy [6]***, large companies*** have decided to combine services with their products in order to increase the value of what they offer by complementing their content with services. This policy helps them reduce the production of goods, which

typically creates waste and increases the production of services, to better meet customer demand and increase customer loyalty. This additional contribution requires skills that are not easy to standardize, so, it becomes easier to avoid competition for manufactured products. The environment is clearly an argument for this strategy. The implementation of communication strategies is a marketing innovation. Not only that the company informs the general public about its efforts to reduce the impact on the environment, but it also listens to its customers and tries to gain the dedication of its employees. A sophisticated form of the communication strategy consists in the direct participation at the development of restrictive measures (emission standards, branch agreements, etc.). This effort seems to show a proactive approach of companies on the environment issue, but, on the other hand, it could also be a way to hinder environmental progress through a lobbying policy.

In ***small innovative companies***, these are often found in relatively small niche markets, but they are convinced that their products directly correspond to prospect of sustainable development. They are anxious about public authorities, on the global strategy implementation progress to combat the greenhouse effect and to promote the protection of the environment. Their small size prevents them from having an effective lobbying policy, but this does not mean they are passive. These companies develop strategies to ensure they are maintaining or growing on current market. Although they are aware of their small size on world market, these companies do not feel restrictive in terms of technological innovation. They believe that they can develop sufficient knowledge to stay in competition, at least in some very specific niches. They pay close attention to their employees and create a favourable climate for research and development. Innovation is their belief.

In other companies, the environment harmful effects are not threats to their activities. Sustainable development is not a strategic component, but an aspect that must be considered. When developing sustainable development strategies in each country, the weight of these three companies' categories in the total national economy should be taken into consideration. The results of innovations have an impact on sustainable development, but they can be both positive and negative. The characterization and classification of these results is based on the use of certain criteria[7]:

- The first criteria set takes into account the objectives of innovations: prevention, processing to the end, rehabilitation, monitoring, substitution, saving resources.
- The second criterion concerns the distinction between complementary and integrated technologies. Complementary technologies are added to existing processes or products to reduce the environmental damage associated with production or consumption. In case of integrated technologies, is the opposite, the environmental characteristics are incorporated in the concept of process or product.
- The third criterion refers to the distinction between incremental and radical innovations. Incremental innovations are improvements to technical products or production to improve quality, productivity or diversity. On the other hand, radical innovation produces entirely new solutions for systems, processes, products or services, which develop into a new business, can cause major changes in an entire industrial branch, or lay the foundations of a new industry, accompanied by the creation of new markets. Radical innovations ensure substantially greater customer value, the latter being a novelty dimension. Examples of radical innovations are: laser, fibre optics, computer industry, radar, etc[8].

For the purposes of Directive 2014/24/EU, Article 2(22) defines "innovation" as "the creation of a new or significantly improved product, service or process, including but not limited to manufacturing, building or construction, of a new method of marketing or a new method of organizing business practice, the workplace or external relations, among others, with the aim of contributing to solving societal challenges or supporting the Europe 2020 strategy for smart growth , ecological and favorable to inclusion"[1].

In the Oslo Manual 2018[5], the OECD defines innovation as "a new or improved product or process (or a combination thereof) that differs significantly from the establishment's previous products or processes and that has been made available to potential users (as a product) or put into operation by the unit (as a process).

By definition, innovative public procurement is the purchase of a new or better product or service that improves the productivity, quality, sustainability and impact of the public sector. In innovative public procurement, the object can be represented by results, effectiveness, performance, quality or operational requirements[10].

Public procurement of innovative solutions takes place when the public sector uses its purchasing power to act on innovative solutions that are not yet widely available[4]. The first step in using PPI is to build demand-side purchasing power (a large enough buyer or several smaller buyers in a group of buyers), one that can stimulate industry to expand production to bring solutions to market with the demands of price and quality for large-scale implementation. For the second stage, acquirers make an early announcement of innovation needs (with required functionality or performance and possibly also price requirements)[4]. They express their intention to buy innovative products if the industry can bring them to market with the price/quality requirements by a certain date. Buyers can perform conformity testing of solutions from suppliers who have already submitted potential solutions by the pre-set target date to verify that there are solutions that can meet their needs, before actually procuring the innovative solutions.
The third step is the public procurement of innovative solutions through one of the already existing public procurement procedures (eg open or negotiated procedure, competitive dialogue, etc.).
IPP is therefore complementary to pre-commercial procurement (PCP), as IPP can enable the larger scale implementation of solutions that were developed in small quantities in a previous PCP. IPP can be used to bring to market innovative solutions that do not result from research and development, but from organizational or process innovation.
By creating a stable demand for innovative solutions through public procurement we derive the following advantages[9]:
- Modernization of public services with higher quality and more cost-effective solutions;
- Stimulating a new niche market for innovative solutions, helping innovative companies achieve economies of scale to grow their business.

The innovative part consists in the optimal choices of the procedure, the criteria and the evaluation method, the sustainable encouragement of innovation, the establishment of long-term partnerships with the providers of innovative solutions, goods or services, the organization of extended purchases for several beneficiaries (among -one area/national level/cross-border level), use of SEAP and DUAE, organization of procurement, award and contracting procedures [9].

The innovative procurement procedure must be:

1. optimized according to the specifics of the initiated purchase,

2. optimized from the point of view of society's requirements,

3. well organized from the point of view of respecting the basic principles and al

procurement legislation,

4. completed with optimal long-term benefits for society.

Innovation procurement empowers public authorities to obtain pioneering, innovative solutions customised to their specific needs. It helps local and central governments to provide tax payers with the best possible quality services, while at the same time saving costs. The European

public sector faces significant public interest challenges, like health and ageing, climate change and energy, and resource scarcity.

Therefore, strengthening investments in the development of a more strategic public procurement policy framework in the field of innovation in Europe could contribute to increasing the competitiveness of the European economy[4].

Human capital is the key strategic tool for ensuring success in the global economy. But Europe is considerably behind in the race to a knowledge economy. Recovering the gap will require a coordinated effort. Member States must mobilize the resources they have agreed to invest with the help of the private sector and reform all aspects of education, including vocational training. The Union must also act through its own revised budgetary instruments, while making better use of the European Investment Bank and the European Investment Fund. Finally, we must consider the possibility of initiating new sources of revenue, for example by imposing a carbon tax.

Innovative public procurement is a license to ensure a sustainable socio-economic development both at the local/national level and at the global level.

The Republic of Moldova is making considerable efforts to reform the public procurement system, by introducing an improved e-procurement system and an online Guide, which provides a set of tools and models to help authorities go through the entire public procurement cycle more efficiently. The representatives of our country must already put the innovation reform of public procurement at the center of their objectives, considering that this is the key to success in order to obtain quality and sustainable results. Procurement innovation is critical to maximizing all sustainable procurement outcomes.

CONCLUSIONS

In modern economies there seems to be a positive relationship between sustainability and innovation, which, although extremely difficult to define and measure, is implicated in the competitiveness of some key factors. Innovation seems to be one of the processes that can help a company to integrate sustainability into core business processes. At the same time, sustainability seems to be one of the processes that favour innovation, thus generating an innovation cycle. Companies face various contradictions when trying to implement innovation and sustainability strategies simultaneously. Managing paradoxes inherent in sustainability by encouraging innovation-oriented firms is beneficial, as it seems to generate creativity and the wellbeing of all society members.

Thus, innovative public procurement addresses aspects of how they bring the greatest added value in terms of quality, cost efficiency, social and environmental impact, and whether they bring opportunities for the supplier market. We therefore lead the way to higher quality, more efficient solutions that appreciate social and environmental benefits, improve cost-effectiveness and bring new business opportunities.

FUTURE DIRECTIONS

In the future, in order to fully understand the positive impact of innovations on the sustainable growth process, the following major issues should be considered:

→Emphasizing the technological dimension of innovation, including digital and ecological technologies. Their rapid progress would lead to a more sustainable society; − Promoting and supporting sustainable development, in interaction with technological innovations;

→Using sustainable emerging alternatives and replacing conventional models or in some cases. Just interconnecting and co-evolving with them;
→Defining the institutional changes that are necessary to promote sustainable development innovation;
→The promotion by the Governments and corporations of the innovations and the widening of the geographical area of the innovations. There are different ways to integrate sustainability into innovation processes.
Regarding the development of innovative public procurement in the Republic of Moldova, we recommend:

✓Updating the Law on public procurement, no. 131 of 03.07.2015;
✓Organization of pilot tenders for selected categories of innovative products;
✓Updating the instructions regarding purchases;
✓Organization of training for suppliers regarding compliance with sustainability and certification criteria, as well as designation of best practices for the implementation of directives adopted by the European Union;
✓Development of a monitoring and evaluation system regarding the implementation of contracts concluded following the implementation of innovative public procurements;
✓Elaboration of a manual on innovative public procurement;
✓Modifying the web page of the Public Procurement Agency and completing it with the innovative public procurement component;
✓Elaboration of technical specifications for the most widespread ecological products.

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PECULIARITIES OF ASSESSING THE SUSTAINABLE DEVELOPMENT OF TOURISM ENTITIES THROUGH KEY PERFORMANCE INDICATORS

Silvia ZAHARCO [74]

Abstract:

Nowadays, entities are increasingly aware of the need for sustainable balanced development in all fields of activity, which has as its final goal the preservation of natural resources for future generations. Entities tend to create a balance between three components: financial, social and environmental. Sustainable development does not focus on increasing the volume of production, but on improving the quality of the entity's activities for long-term development. That is why, it is necessary to evaluate these activities based on indicators that characterize the entity's sustainable development. This article reflects the issues associated with the analysis of the sustainable development of entities, explaining the concepts of economic, social and environmental sustainability of a tourism entity. At the same time, the indicators that can be used to evaluate the performance of entities within the three types of sustainability are suggested.

Keywords: *environmental sustainability, financial stability, key performance indicators, tourism industry.*

JEL classification: *L83, M14, Q56*

Introduction

The tourism industry contributes to the growth and development of the national economy of countries through the economic connections it generates in relation to other economic sectors, by creating jobs and contributing to the GDP. Each state evaluates the field of tourism both from the perspective of the ability to attract tourists and as an opportunity for economic growth and sustainable development.

Tourism depends on the consumption of natural resources that are available in a particular location, directly or indirectly affecting the environment. During the construction of recreation areas, natural habitats with their riches are destroyed. The negative environmental results also include overcrowding, traffic congestion, air pollution, noise pollution, environmental degradation and damage to landscaping for the local community and tourists (Sunlu, 2003, pp. 264-266).

Beneficial socio-economic impacts for the local community are represented in the form of jobs and business opportunities, improved living standards and infrastructure development in the area (Rath & Gupta, 2017, pp. 51-52).

Thus, the tourism industry determines for the local community and, also for tourists, the following benefits (Baloch, et al., 2023, p. 5919):

- generating income for the population in the area and the community;
- improving local infrastructure and quality of life, including job creation;

[74] *PhD, Associate Professor Moldova State University, 60 Alexe Mateevici Street, Chisinau, MD 2009, Republic of Moldova, Email: silvia.zaharo@usm.md / s.zaharco@gmail.com.*

▪awareness and understanding of different ethnic cultures, social values and traditions, interconnecting them and preserving traditions;

▪rehabilitation and preservation of socio-cultural and historical heritage, including archaeological objects and natural landscapes;

▪establishment of natural parks and scenic spots;

▪conservation of nature, biodiversity and endangered species by controlling poaching;

▪improving water and air quality through afforestation, land and soil conservation and waste recycling.

Tourism has immense potential to sensitize society's attention to the environment and also to spread awareness of various environmental issues when it brings people into closer contact with nature. This interaction definitely increases awareness of the value and importance of nature among the community and leads to environmentally conscious behavior. Thus, we can state that tourism creates both positive and negative economic, social and ecological effects. Their prevention can be achieved through professional management, which involves in the decision-making process all the actors involved in the development of tourism: central and local authorities (which have legislative, economic, social instruments), economic agents that offer tourist services, people who promote environmental protection and preservation of cultural heritage, local tourism service providers, tour operators and travel agencies and, obviously, tourists (Miron, et al., 2017, p. 8).

The sustainability of the tourism industry takes into account three important aspects (Word Tourism Organization, 2023):

1) balance – tourism ensures a balance between the needs of the tourism industry, the environment and the local community, produces economic and social benefits, fairly distributed to all actors involved;

2) continuity – tourism ensures the optimal exploitation of the natural resources it uses, the preservation of the community's culture;

3) quality – tourism provides a valuable experience for visitors, while improving the community's quality of life, its cultural identity, reducing poverty and protecting the environment.

In this context, we can say that the implementation of sustainability criteria in the tourism industry has the effect of increasing the attractiveness of tourist destinations, offering new authentic experiences for tourists.

Description of the Problem

Among the economic sectors of the states, tourism contributes 10% to global GDP, 7% to global exports and creates one of 10 jobs worldwide. Its ability to attract significant investment, generate employment, increase exports and adopt new and emerging technologies presents the tourism industry as an important pillar for economic growth, especially for underdeveloped and developing countries. At the same time, tourism affects the environment through the consumption of natural resources – energy, water, land, minerals and the generation of waste, loss of biodiversity, greenhouse gas emissions. According to UNEP, tourism would generate a 154% increase in energy consumption, 131% in greenhouse gas emissions, 152% in water consumption and 251% in solid waste disposal by 2050 (UNEP: Tourism, 2023). The consequences are significant, which is why a series of measures have been taken to stop this degradation (UNEP: Sustainable consumption, 2023).

Under these conditions, sustainability must define the development of tourism in the future. The tourism industry must reassess its development through the approach of sustainability to become an important factor in achieving the goals of the sustainable economy. Thus, there is a need to measure and monitor the resilience of tourism on the environment. For this purpose, work has been started to establish a set of indicators for evaluating the impact of tourism activity, at the international level inclusively.

Tourism sustainability indicators focus on four aspects: economic (tourism's direct share of economic activity, tourism's direct share of total employment, visitor diversification, employee retention and workforce shortages, tourist yield – average spend per tourist, etc.), social (tourism wage compared to national average, level of tourism job security, measure of visitor satisfaction, travel openness and facilitation, workforce inclusiveness etc.), ecological (existence of sustainable tourism policies, level of CO2 emissions, number of recognized natural heritage sites, share of total annual energy consumed which is from renewable sources etc.) and institutional (existence of a disaster action plan, tourism's proportion of government spending, level of trust in government, digital infrastructure etc.) (OECD, 2022, p. 76).

Methodology and Data

In preparing the article, the author used traditional research methods, such as fundamental and qualitative research. The fundamental research allowed the elucidation of current trends in the field of sustainable tourism, reflecting the Key Performance Indicators used to evaluate the activity of tourist entities on three dimensions: economic, social and environmental. In the framework of this research, various theoretical studies were investigated that formed the basis of the final conclusions. The qualitative research aimed to understand and raise awareness of the importance of evaluation through the lens of Key Performance Indicators, which can directly influence the practical activity of tourist entities.

The purpose of the research is to study and reflect the composition of Key Performance Indicators for the evaluation of the activity of tourist entities under three aspects - economic, social and environmental. The theoretical-methodological support of the researched subject was provided by the works of researchers in the given field.

Results

The sustainability of a tourism entity is manifested by its state of equilibrium as a socio-economic system, which signifies the entity's ability to fulfill its vital functions at the moment, while maintaining its dynamic stability. The priority objective of the development of the tourist entity, as an element of the national economy, aims to contribute to the implementation of balanced management decisions in three areas: economic, social and ecological, which correspond to the provisions of the Sustainable Development Concept (Sustainable Development, 2023).

Sustainable development includes a set of indicators such as financial, environmental and social. Financial stability is one of the most important descriptors of the financial position of a tourism entity and is evaluated using a set of indicators (Table 1).

Table 1

System of financial performance indicators of a tourism entity for the implementation of the sustainable development strategy

Reference criteria	Indicators	Calculation methodology
Asset Valuation	Net Asset Value (NAV)	The total value of the entity's assets minus the total value of the liabilities, divided by the number of shares outstanding
Inventory Valuation	Inventory Coverage Ratio	The normative sources of finance (working capital and short-term liabilities) divided by the entity's inventories. The ratio value measures the share of inventories, which are covered by the normative sources of finance (stockholders' equity, short-term and long-term liabilities, etc.)
Resource Efficiency	Asset Turnover Ratio	Net sales divided by the total or average assets of the entity
	Equity Turnover Ratio	The ratio of the net sales of a company and the average stockholders' equity of the entity
	Capital Turnover Ratio	The ratio between the entity's net sales and the average shareholders' equity across a specified period
	Debtors Turnover Ratio	The net credit sales divided by the average accounts receivable. This ratio measures the efficiency of the entity in managing and collecting the credit issued to the customers
Profitability Analysis	Profitability Ratios	Profitability ratios assess the entity's ability to earn profits from its sales or operations, balance sheet assets, or shareholders' equity (profit is divided by an indicator on the basis of which profitability is estimated)
Equity Analysis	Equity Growth Rate	The net income minus stock dividends, divided by the stockholders' equity assets

Source: developed by the author based on Tretyakova, et al., 2023, p. 246

In the process of carrying out the analysis of sustainable development through traditional methods, such as analysis of balance sheet liquidity, calculation of solvency indicators, cash flow analysis, etc., tourism entities may have the problem of the absence of relationship between the main business processes and indicators of sustainability assessment. For greater accuracy of the results, it is necessary to constantly adjust the set of performance indicators according to the type of tourism activity (recreational, cultural, sports, commercial, medical, business, rural, complex, etc.).

There is a positive correlation between the economic and social performance of an entity, and social involvement brings a series of benefits that cover and exceed the costs induced by it. At the same time, between the entity's social responsibility and its profitability there is a direct and reciprocal relationship of determination: a socially responsible entity will be perceived by customers as good and will record substantial profits. Similarly, a financially sound entity can afford to promote and invest in socially responsible behavior, which will attract more customers and greater prosperity. The relationship between the profitability and the social responsibility of a tourism entity follows a circular trajectory: social responsibility – customers – profitability – social responsibility.

The social performance of a tourism entity can be evaluated according to several criteria. Figure 1 highlights the main indicators by which social conditions can be assessed.

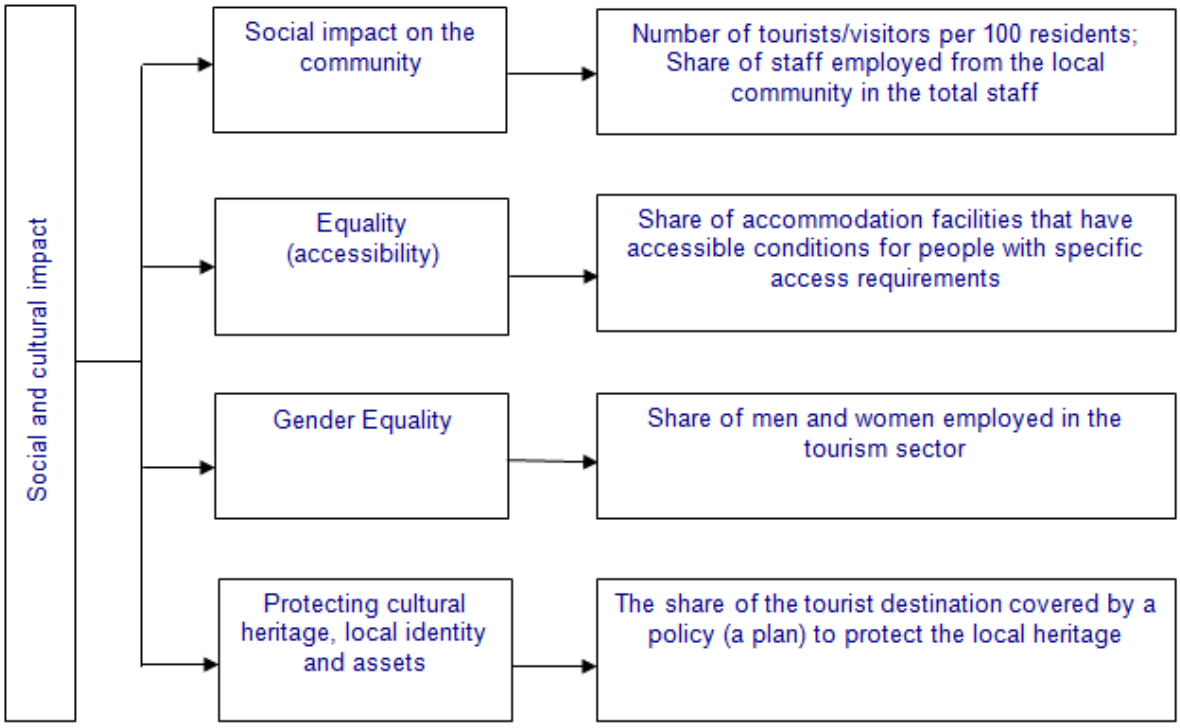

Figure 1 – The system of social performance indicators of the tourism entity

Source: developed by the author based on Guide on the European System of Tourism Indicators for Sustainable Destinations, 2013, p. 20

The evaluation of the performance of tourism entities must also take into account the ecological aspect. As mentioned in the previous paper, the tourism industry is a branch of the national economy that significantly affects the environment, most tourist destinations being an integral part of it. The disadvantage of this aspect of evaluation is that the used indicators are more difficult to determine and the information is less available.

At the same time, the high costs of operating tourism entities from an ecological point of view are often affordable only to large and multinational companies. The financial insufficiency and inability of small tourism entities to meet the strict standards and criteria set by environmental protection schemes, as well as their inability to absorb the costs associated with them, discourages their participation in environmental protection (Erdogan & Tosun, 2009, p. 413).

The basic indicators that represent the starting point for assessing the level of sustainability of entities in the tourism industry are presented in Table 2.

Table 2

Environmental Impact Core Indicators in the tourism industry

Reference criteria	Indicators	Characteristic
Reducing Transport Impact	Percentage of tourists and same day visitors using different modes of transport to arrive at the destination (public/private and type)	Transport contributes to greenhouse gas emissions and local air pollution generated by tourism. Tracking visitor distance travelled and mode of transport encourages improvements in the use of environmentally-friendly transportation for tourism.
	Average travel (km) by tourists to and from home or average travel (km) from the previous destination to the current destination	
Climate Change	Share of tourism entities involved in climate change mitigation activities, such as: CO2 offset, low energy systems, etc.	Climate change mitigation (reducing the impacts) and adaptation (responding to some of the inevitable impacts) strategies need to be considered in tourism sector, because many businesses are located in areas vulnerable to flooding, drought and other impacts.
Solid Waste Management	Waste volume produced by destination (tones per resident per year or per month)	Tourism activities contribute significantly to solid waste. Waste reduction initiatives include various economic incentives, recycling and reuse programs.
	Volume of waste recycled (percent or per resident per year)	
Sewage Treatment	Percentage of sewage from the destination treated to at least secondary level prior to discharge	Tourism contributes heavily to pressure on sewage treatment stations, especially, in the destinations dominated by beaches, lakes, and rivers. This can cause severe environmental and health problems and create a negative image of the tourist destination if not properly treated.
Water Management	Fresh water consumption per tourist compared to general population water consumption per person	The tourism sector is a significant water user. This is a particular issue for tourist destinations where water is in short supply, because increased water usage may result in hardship for existing residents.
Energy Usage	Energy consumption per tourist compared to general population energy consumption per person	The tourism sector is a key energy user. Tracking energy usage helps guide energy conservation programs.
Landscape and Biodiversity Protection	Share of tourist destination (area in km^2) that is designated for protection	Protected areas are a key asset of a destination's tourism product. High biodiversity helps ensure the sustainability of natural areas and benefits the image of the tourist destination, making it more attractive to tourists.
Light and Noise Management	Policies to minimize light and noise pollution	Light and/or noise pollution may be a significant source of disturbance for resident communities and stress on wildlife in some touristic destinations. Policies for lighting and noise-levels need to be considered at planning of the touristic activities.

Source: developed by the author based on European Tourism Indicator System, 2013, pp. 28-29

To generalize what has been presented, we can conclude that one of the key concepts of the activity of entities in the tourism industry is the concept of sustainable development. The economic development of tourist entities must ensure the achievement of both economic and social and environmental indicators. Therefore, instead of unlimited economic growth, balanced sustainable development is needed. The system of indicators that characterizes the sustainable development of tourism entities is oriented towards meeting the needs of customers, as well as other interested parties (investors, the local community, etc.). It can serve as a basis for the development of a system of performance indicators in the field of management of the sustainable development of entities in the tourism industry in order to substantiate, select and further develop an appropriate strategy (Salimova & Gudkova, 2017, p. 157).

Thus, the organization of efficient tourism activity requires the development and implementation of a comprehensive system of regulatory mechanisms that contribute, firstly, to the economic development of the entity and the community, secondly, to increasing the level of social stability, thirdly, to reduce the level of impact on the environment during the implementation of economic activities. A balanced management of these three dimensions can be achieved by respecting the respective conditions:

$$\sum_{i=1}^{N} KPI_i = \sum_{a=1}^{M} F_a = \sum_{b=1}^{L} S_b = \sum_{c=1}^{G} E_c \quad (1)$$

where: KPI – key performance indicators;

F_a – financial development factors;

S_b – social development factors;

E_c – ecological development factors.

The balance between the three dimensions (economic, social and environmental) is achieved when the growth rates of natural and anthropogenic regeneration of the natural environment under minimum conditions are equal, or exceed the growth rates of the use of natural resources (Polyanskaya & Yurak, 2018, pp. 853-854).

Conclusions

In the current context of phenomena globalization and the growing awareness of the interdependencies between nature and the economy, there is a growing conviction that the social responsibility of economic agents and sustainable development are an integral part of the business environment, being oriented towards ensuring a balance between economic growth, social progress and natural resource reserves.

Sustainable tourism activities minimize the impact of tourism on natural resources in the area of a specific destination, including physical, social and psychosomatic impacts. Sustainable tourism also demonstrates a positive and responsible attitude of both tourists and community towards protecting and conserving environmental resources. The sustainable development of tourism reflects a thinking oriented towards taking responsibility for local environmental, economic and social issues.

Operational elements related to the way the activity of the tourist entity is carried out to achieve the desired results are evaluated by means of Key Performance Indicators. These indicators are essential for entities in the tourism industry because they reflect the efficiency of their activity. Having a clear and measurable set of indicators, entities can more easily identify the

needs and wishes of tourists and visitors, and also the impact of the activity on the local community, cultural heritage, and the environment.

Key Performance Indicators are an effective tool to track the progress of economic, social and environmental activity and to identify directions in which certain adjustments are required. Key Performance Indicators help identify the most profitable courses of action, retain loyal customers, measure customer satisfaction, follow the effectiveness of sales policies and environmental strategies.

Future Directions

The study made it possible to present the implementation and inclusion of the concept of sustainable development within the entities of the tourism industry, emphasizing the relevance of the assessment of the environmental factor for the formation of strategies aimed at achieving sustainability for tourist destinations. The proposed methodological tools can be further refined and supplemented with indicators specific to tourist entities in accordance with the activities carried out by them, with the location of the entity, with the segment of tourists or visitors, etc.

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