

## **KNOWLEDGE ECONOMY AND FINANCIAL RISKS IN BUDGETARY AND FISCAL RELATIONS**

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**Abstract:** This article examines the ways in which financial risks in budgetary and fiscal relations are managed within the framework of the knowledge economy. It draws on the comparative experiences of the Republic of Moldova, the European Union, and selected international practices, highlighting both convergences and divergences in their approaches. The analysis indicates that, although all actors acknowledge the growing importance of intellectual capital, the mechanisms used to identify, assess, and mitigate risks differ substantially. The European Union provides an example of a more integrated and coordinated model, while Moldova continues to face challenges related to institutional capacity and limited investment in research and development. These findings suggest that Moldova could benefit from adopting elements of international best practice, particularly transparent risk assessment frameworks and innovative financing instruments, in order to enhance fiscal sustainability and advance the transition toward a knowledge-based economy. The article concludes by formulating practical recommendations for policy makers, with a focus on strengthening risk management and aligning fiscal policy more closely with the demands of a knowledge-driven world.

**Keywords:** knowledge economy, fiscal risks, budgetary relations, public finance sustainability, risk management

**JEL Classification:** H62, H30, O30, O38

### **INTRODUCTION**

The knowledge economy is increasingly emerging as a fundamental direction in the global economic transformations of recent decades. The shift from an industrial model to one grounded in knowledge and digitalization entails not only deep structural transformations within national economies, but also a fundamental reconsideration of the way fiscal and budgetary policies are formulated and put into practice. Within this context, the sustainability of public finances can no longer be viewed exclusively through the lens of conventional budgetary balances. Instead, it rests increasingly on the institutional ability to anticipate and manage financial risks in a proactive and effective manner. Such risks are inherently complex, stemming not only from internal dimensions—like the efficiency of revenue collection and the rigor of budgetary discipline—but also from external pressures linked to international economic integration, market volatility, and the accelerating rhythm of technological change.

Unlike the traditional resource-driven model, the knowledge economy is anchored in intellectual capital, scientific inquiry, and technological innovation. This shift underscores the

*Annual International Scientific Conference*  
*“Competitiveness and Innovation in the Knowledge Economy”*  
*September 26-27, 2025*  
*Chisinau, Republic of Moldova*

strategic value of steady investment in human capital and research and development, while at the same time adding new layers of uncertainty for fiscal frameworks. The growing need for funding innovation programs, the substantial costs of digital infrastructure, and the instability of tax revenues shaped by global market dynamics emerge as key factors with direct consequences for the sustainability and resilience of public finances.

For the Republic of Moldova, these challenges are particularly acute. The country is undergoing a stage of institutional transformation, defined by severe fiscal constraints and a pressing requirement for long-term structural investments. Limited funding for scientific research, insufficient capacity to capitalize on innovation, and a persistent reliance on external financing amplify the vulnerabilities of the budgetary and fiscal system. At the same time, evidence from European and international practices demonstrates that the adoption of enhanced risk assessment and monitoring instruments, transparent resource allocation mechanisms, and well-coordinated institutional frameworks can strengthen financial risk management within budgetary and fiscal relations in the context of the knowledge economy.

The comparative analysis of national and international experience makes it possible to identify the specific features of financial risk management in budgetary and fiscal relations within the knowledge economy, thereby underscoring the relevance and timeliness of this research.

The **aim** of this study is to explore the specific features of financial risk management in budgetary and fiscal relations within the knowledge economy, through a comparative analysis of the practices of the Republic of Moldova, the European Union, and international experience. Furthermore, it seeks to emphasize the opportunities for adapting international approaches in order to strengthen the sustainability of public finances in the Republic of Moldova.

**Research Methodology.** This research employs the method of comparative analysis, which makes it possible to identify both the similarities and the differences between the Republic of Moldova, the European Union, and international practice in the field of financial risk management. A systemic approach is likewise applied to capture the ways in which financial risks manifest within budgetary and fiscal relations. In addition, documentary analysis of statistical data and the regulatory framework complements the theoretical perspective, offering a clearer understanding of the current context.

### **LITERATURE REVIEW**

The first attempts to define the knowledge economy emerged in the literature during the second half of the twentieth century, beginning with the work of Fritz Machlup (1962), who underscored the central role of knowledge and information in the production process. Building on this foundation, Peter Drucker (1969, 1993) introduced the concept of the “knowledge society,” highlighting the significance of human capital and lifelong learning in shaping economic development. In a similar vein, the OECD (1996, 2007) advanced indicators and methodologies for assessing the knowledge economy, thereby facilitating the incorporation of this concept into public policies and growth strategies (see Table 1).

In contemporary literature, the knowledge economy is increasingly linked to digitalization, innovation, and intellectual capital (Foray, 2018) - factors that generate not only opportunities for development but also new sources of fiscal risk. At the same time, Stiglitz (2019) highlights the distributional dimension of the knowledge-based economy, underscoring that its expansion may exacerbate inequalities and create structural vulnerabilities for public finances.

**Table 1. Theoretical Contributions to the Knowledge Economy and Their Implications for Fiscal and Budgetary Policy**

<b>Period / Author</b>	<b>Main Contribution</b>	<b>Fiscal and Budgetary Implications</b>
Machlup (1962)	Defined the knowledge economy as a distinct sector	Necessity of incorporating education and R&D investment into fiscal policies

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Drucker (1969, 1993)	Concept of the “knowledge society” – human capital as a strategic resource	Reorientation of public spending towards human capital and innovation
OECD (1996, 2007)	Developed indicators for measuring the knowledge economy	Integration of statistical frameworks into budget planning
Foray (2018)	Identified innovation and digitalization as key drivers of growth	Adaptation of tax systems to the requirements of the digital economy
Stiglitz (2019)	Highlighted that the knowledge economy exacerbates inequality	Implementation of redistributive measures and social risk management in budgeting

Source: author’s elaboration

Thus, the theoretical framework of this research is grounded in two major strands:

1. The knowledge economy, which relies on intellectual capital, innovation, and digitalization;
2. Fiscal risk management, which focuses on the capacity of institutions to anticipate uncertainties and incorporate them into the budgetary planning process.

The conception of the knowledge economy has a long history, originating in the work of economists during the second half of the twentieth century. More recently, however, the transformations of the past decade - driven by digitalization, globalization, and the growing importance of intellectual capital - have endowed this paradigm with new dimensions and heightened relevance. Currently, the knowledge economy is conceptualized not only as a paradigm of economic development but also as an analytical framework for examining transformations in public finance, with direct relevance for the identification and management of financial risks in budgetary and fiscal relations.

The development of the knowledge economy concept over the past decade can be traced through several distinct stages, each capturing not only technological and institutional shifts but also the financial and fiscal challenges that accompanied them.

The years **2015 to 2018** may be seen as a period of consolidation in the broader processes of informatization and globalization. During these years, the availability of information and the speed with which it could be disseminated became central forces driving the knowledge economy. Yet, this phase also brought to light several structural contradictions, most notably the persistence of digital divides. These divides were evident not only in unequal access to and use of technology across countries and social groups, but also in the growing concentration of power held by multinational corporations in the technology sector. Their dominance reinforced the urgency of developing effective regulatory and supervisory instruments at the level of national economies and, more critically, in the sphere of fiscal and budgetary relations. From a fiscal policy perspective, digitalization compelled governments to adapt tax frameworks to new business models introduced by multinational technology firms, while at the same time tightening rules on the use and protection of data. These adjustments had direct consequences for tax transparency and oversight, equipping states with new tools of intervention but also exposing them to fresh challenges in the management of financial risks.

During the period **2019–2021**, the COVID-19 pandemic triggered a substantial rise in public expenditure on health, research, and digitalization. This increase generated additional fiscal risks and exposed vulnerabilities that threaten medium-term fiscal sustainability.

The period **2022–2024** is marked by the rapid expansion of generative artificial intelligence and other emerging deep-tech technologies, developments that have introduced new fiscal and budgetary risks. Among these are the migration of highly skilled human capital, the rising costs associated with workforce retraining, and the persistent difficulty of assessing the value of intangible assets. Taken together, these dynamics highlight the urgency of adapting fiscal policies to encourage investment in human capital and to reinforce the resilience of national innovation ecosystems.

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In 2025, the knowledge economy becomes explicitly integrated into the architecture of fiscal policy. The resource allocation function takes on a pivotal role, directing investment toward human capital, the digitalization of public services, and the shift to a low-emission economy. At the same time, the redistributive function of fiscal policy is oriented toward narrowing social disparities through instruments such as targeted social expenditures, tax relief for vulnerable groups, and specially designed support programs.

Fiscal policy currently operates under new constraints. The preservation of fiscal discipline and deficit control continues to represent central priorities. At the same time, the planning process must account for contingent risks that may undermine the stability of public finances. Moreover, the ethical and geopolitical dimensions of financial risks are emerging as decisive factors in evaluating long-term sustainability. Within this context, an integrated approach is required, one that seeks to balance innovation, social equity, and macroeconomic stability.

Fiscal policy currently operates within a framework of heightened constraints, where the preservation of fiscal discipline and the containment of budgetary deficits remain fundamental objectives. At the same time, medium- and long-term planning must explicitly account for contingent risks capable of undermining the stability of public finances. Increasingly, the ethical and geopolitical dimensions of financial risk are emerging as critical parameters in the assessment of fiscal sustainability. In this context, the adoption of an integrated policy approach becomes indispensable—one that reconciles the imperatives of innovation with the pursuit of social equity and the maintenance of macroeconomic stability.

#### **BODY OF THE ARTICLE**

The literature review demonstrates that the knowledge economy is reshaping the nexus between public policy, public finance, and risk management. From a theoretical standpoint, the focus falls on intellectual capital, digitalization, and innovation, whereas in practice these dimensions create additional pressures on fiscal sustainability and on the mechanisms of financial risk management embedded in budgetary and fiscal relations. In this context, a comparative analysis is essential to illustrate how different economic systems address these challenges. Accordingly, this study examines the Republic of Moldova in comparison with the European Union’s experience and relevant international practices, with the objective of identifying both points of convergence and areas of divergence in the management of financial risks within budgetary and fiscal relations, situated in the broader context of the knowledge economy.

In the Republic of Moldova, the analysis of financial risks within budgetary and fiscal relations highlights both the ongoing efforts toward institutional consolidation and the persistent structural vulnerabilities, as evidenced by the dynamics of the budget deficit and public revenue flows.

In 2023, the budget deficit reached approximately 5.2% of GDP, according to the IMF’s 2024 revisions, a figure also confirmed by the World Bank in its Moldova Economic Update 2024. For 2024, the IMF adjusted its projections, estimating the deficit at around 4.4% of GDP (World Bank, 2024).

Within the structure of government revenues, the variation in indicators reflects the diversity of financing sources. In 2023, total general government revenues represented approximately 33.7% of GDP, of which only 18.6% was generated through taxes and fees. Excluding external grants, domestic revenues are estimated at about 29.4% of GDP. This gap underscores the significant role of non-reimbursable transfers in financing the public budget and illustrates the country’s pronounced reliance on external partners. Consequently, while Moldova’s total public revenues amount to roughly one third of GDP, less than one fifth is derived from direct and indirect taxation, with the remainder covered by non-tax revenues and external grants. These discrepancies arise because each indicator captures a distinct dimension of the revenue structure [8]. Research and development expenditure remains exceptionally low, at approximately 0.22% of GDP in 2023,

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according to the WDI series based on UNESCO-UIS data. Similar values in previous years ( $\approx 0.24\%$  in 2019) confirm the persistence of chronic underfunding in this area, constraining the Republic of Moldova's capacity to advance the transition to a knowledge-based economy and exacerbating the structural vulnerabilities of the fiscal-budgetary framework (Trading Economics, n.d.).

The size of the informal economy in the Republic of Moldova remains substantial, regardless of the estimation method applied. MIMIC econometric models suggest a share of approximately 40% of GDP in 2020, while DGE macroeconomic models report similar values of around 43% (Trading Economics / TheGlobalEconomy.com, n.d.). From an occupational standpoint, IMF estimates indicate that nearly one quarter of the labor force is employed in the informal sector. These figures point to sustained pressure on the tax base, leading to reduced effective tax revenues and heightened uncertainty in the budget forecasting process, which represents a major vulnerability for fiscal sustainability.

The analysis indicates that Moldova's fiscal and budgetary profile is characterized by the persistence of a relatively high budget deficit and a moderate level of public revenues, within a context marked by chronic underfunding of R&D and the continued prevalence of a large informal economy. These conditions define a clear set of priorities for fiscal and budgetary policy. On the one hand, it is necessary to broaden the tax base and enhance tax compliance, including through the digitalization of collection processes. On the other hand, strengthening the financial risk management framework in fiscal and budgetary relations remains essential, with particular emphasis on the integration of contingent risks into budgetary planning. At the same time, a gradual increase in investment in human capital and R&D constitutes a prerequisite for advancing the transition to a knowledge-based economy and reinforcing long-term fiscal sustainability.

In this context, the experience of the European Union and other advanced economies offers valuable benchmarks for developing solutions applicable to Moldova. The EU's regulatory and institutional framework illustrates the importance of integrated fiscal monitoring mechanisms and strategic investment in R&D, as reflected in the level of R&D expenditure, which reached 2.22% of GDP in 2023 (Eurostat, 2024). In the United States, where fiscal policy is characterized by flexibility and a diversification of financing instruments, R&D intensity stood at 3.43% of GDP in 2022 (National Science Foundation (NSF), 2023), confirming the direct relationship between innovation and productivity. Similarly, Nordic countries such as Sweden maintained levels of around 3.3% of GDP in 2021 (Swedish Research Council, 2023), demonstrating that fiscal discipline can coexist with sustained investment in human capital and research. Relating these models to the national context makes it possible to identify concrete directions for reform and for strengthening fiscal sustainability.

### **CONCLUSIONS**

The analysis of financial risks in the field of budgetary and fiscal relations confirms that the knowledge economy fundamentally redefines both budgetary-fiscal relations and the management of financial risks. In Moldova, the fiscal and budgetary profile continues to be marked by a relatively high budget deficit, moderate public revenues, chronic underfunding of R&D, and the persistence of a large informal economy. These conditions exacerbate structural vulnerabilities and constrain the country's capacity to respond effectively to the challenges associated with the transition to a knowledge-based economy.

The experience of the European Union demonstrates that integrated fiscal surveillance mechanisms, combined with strategic targets for R&D investment, can reinforce fiscal sustainability and foster innovation. In the United States, flexible tax policy is accompanied by high levels of research funding, which in turn supports productivity and enhances economic competitiveness. The Nordic countries represent a complementary model, grounded in strict fiscal discipline and sustained investment in human capital and innovation. Their experience

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demonstrates that fiscal prudence and long-term developmental priorities are not mutually exclusive, but can coexist in synergy to reinforce both economic stability and social resilience.

For the Republic of Moldova, these benchmarks indicate several priority areas for reform: expanding the tax base and improving compliance through digitalization, strengthening the framework for financial risk management by integrating contingent risks into the budgetary process, and gradually increasing investment in education, research, and innovation. Adapting these measures to national specificities can mitigate fiscal vulnerabilities and orient the economy toward a sustainable development model that is consistent with both European and international standards.

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