ORIGINAL PAPER

DOI: 10.26794/2587-5671-2026-30-2-78-89
UDC 336.1(045)
JEL H60

Financial Mechanisms for Achieving Technological Sovereignty: Assessing the Impact of R&D Expenditures

S.E. Demidova, M.L. Vasyunina
Financial University under the Government of the Russian Federation, Moscow, Russian Federation

ABSTRACT

In the context of global competition for technological leadership, it is important to identify the factors of technological transformation is important for solving the problems of economic restructuring. This includes determining the optimal balance between public spending and private investment in research and development, as well as choosing effective fiscal instruments. Patent activity serves as an indicator of the effectiveness of scientific and technical policy. The purpose of the work is to evaluate the effectiveness of investments in research and development based on the criterion of patent activity in order to determine strategic guidelines for achieving technological sovereignty. The research focuses on financial and economic indicators from 77 foreign countries between 2019 and 2023. The subject of this research is the factors that influence the increase in the efficiency of investments in research and development. Research methods — in particular, the logarithmic transformation of data for linear approximation, correlation and regression analysis to determine the return on investment in R&D, classification of countries based on the level of efficiency of return on investment in R&D. The scientific novelty of our approach lies in the use of logarithmic data transformation and regression modeling to quantify the elasticity of patent applications from R&D costs. Additionally, we will group countries based on their level of return from research and development efforts. By conducting this study, we aim to demonstrate the impact of R&D investment on technological sovereignty, considering the indicator of patent activity. We also intend to incorporate foreign experience in government support, private investment, and the integration of science and production.. The study revealed a strong correlation between patent activity and R&D expenses. A 1% increase in R&D spending leads to a 1.21% increase in the number of patent applications. This confirms the importance of investing in R&D in order to maintain technological sovereignty. Russia demonstrates relatively high patent activity compared to its R&D investments, indicating a risk of depleting its innovation potential. To address this issue, it is crucial to increase R&D funding and remove barriers to technology commercialization.

Keywords: investment in R&D; technological sovereignty; patent activity; innovation; expenditures on R&D; patents; financial incentive mechanisms

For citation: **Demidova S.E., Vasyunina M.L. Financial mechanisms for achieving technological sovereignty: Assessing the impact of R&D expenditures. *Finance: Theory and Practice.* 2026;30(2):78-89. DOI: 10.26794/2587-5671-2026-30-2-78-89**

INTRODUCTION

In the context of global competition and sanctions pressure, the financial aspects of technological development are becoming particularly important. Science financing in Russia is about 1% of GDP, which is 2–3 times lower than in the leading technology countries.[1] At the same time, private investment in R&D does not exceed 30% of the total volume, which indicates the insufficient effectiveness of existing financial mechanisms to stimulate business. In this regard, the analysis of financial returns from research and development expenditures may influence fiscal decision-making and the justification of budget policy priorities. The paper uses the term "R&D expenditure" as corresponding to the methodology of the OECD international statistics, meaning the total cost of research and development, regardless of the sources of funding. For the private sector, the term "investment" is retained when analyzing the commercialization of results.

The transition to a new technological order [1] with the orientation of national goal-setting towards achieving technological sovereignty and technological leadership is becoming the main guideline in the long-term policy of developed and developing countries [2, 3]. At the level of the national economy, the most significant factors affecting Russia's competitiveness in the global economy are highlighted, including investment, technological, labor and financial [4]. By influencing these factors, it is possible to ensure a faster growth of the share of the domestic economy in global indicators [5, 6].

Summarizing the research, technological sovereignty can be defined as a component of state sovereignty [7], characterized by state control over a set of critical technologies [8, 9] with a focus on internal resource potential [10] while ensuring the ability of the national economy to produce domestic products of appropriate quality [11] to preserve the country's strategic independence in the face of global challenges [12, 13].

Ensuring technological sovereignty is associated with the formation of an economy with a high share of R&D in aggregate demand and the development of human capital capable of maintaining technological leadership. Financial incentives for science and education have a direct positive impact on economic growth [14].

Investments in education, health and skills of the population contribute to increasing labor productivity, reducing inequality and achieving technological sovereignty.[2] Human capital is included in the model of endogenous economic growth [15], the growth of innovation activity and labor productivity [16]. Innovation activity is supported not only by investments. The fundamental basis is a strategic vision that unites the government, business and the scientific community [17]. This leads to changes in the intellectual, social environment, as well as in the institutional sphere [18]. This conceptual approach is reflected in the "triple helix" model of institutional interaction [19]. The model reflects the transition from isolated sources of innovation to their conjugation with institutional elements in the context of the development of the knowledge economy (*Fig. 1*)

In the presented model, patents are considered from the point of view of three coordination mechanisms: wealth creation in the process of industrial production; formation of institutional conditions by the government; generation of innovations in the scientific and educational environment.

Thus, patents function as an element of the "triple helix" model, providing, on the one hand, opportunities for economic activity through the introduction of innovations, on

[1] Statistics and data of the UNECE. URL: https://w3.unece.org/PXWeb2015/pxweb/ru/STAT/STAT__92-SDG__01-sdgover/009_ru_sdGoal9_r.px/table/tableViewLayout1 (accessed on 27.04.2025).

[2] UNDP (United Nations Development Programe). 2020. Human Development Report 2020: The Next Frontier: Human Development and the Anthropocene. New York. URL: https://hdr.undp.org/content/human-development-report-2020 (accessed on 27.04.2025). OECD. The Future of Education and Skills: Education 2030. 2018. URL: http://oecd.org/content/dam/oecd/en/publications/reports/2018/06/the-future-of-education-and-skills_5424dd26/54ac7020-en.pdf (accessed on 27.04.2025).

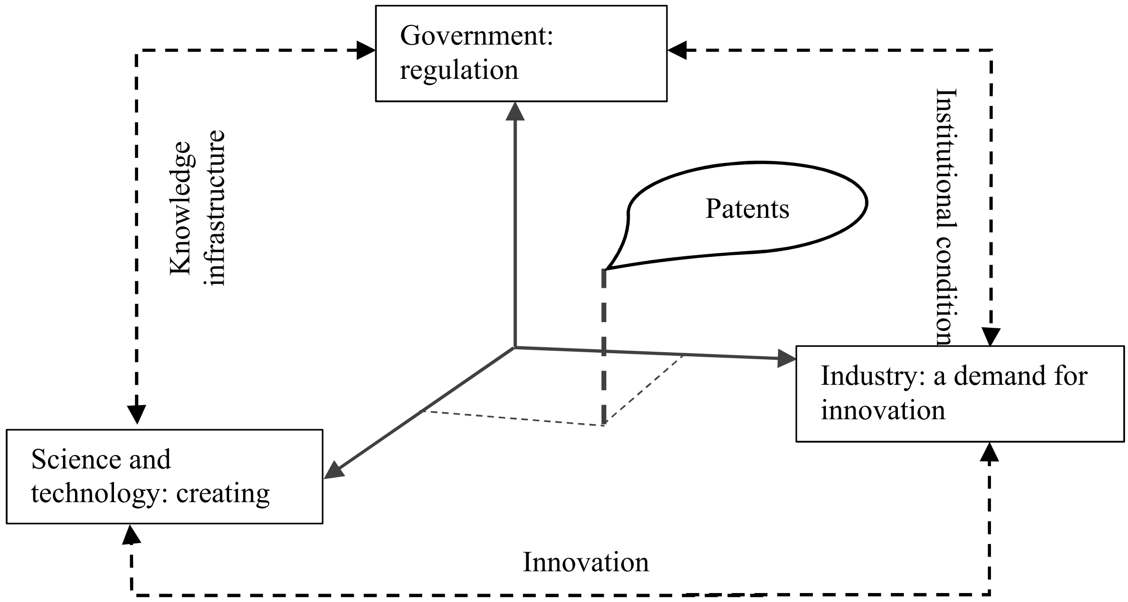

Fig. **Patents as Events in the Interaction Space of the "Triple Helix" Concept**
Source: Prepared by the authors based on [20].

the other hand, reflecting the results (output) of scientific activity. Innovations, in turn, can stimulate further research and development, as successful implementations require constant improvements and adaptations.

The purpose of the study is to assess the return on research and development (R&D) expenditures based on the criterion of patent activity as a factor in ensuring technological sovereignty.

METHODOLOGY

The indicators of 77 countries in the period 2019–2023 in terms of R&D expenditures as a percentage of GDP and the number of patent applications per 1 million population were used as initial data. Statistical data are obtained from reputable international sources: databases of the World Intellectual Property Organization (WIPO), UNESCO statistics, and the World Bank.

At the first stage, indicators of innovation activity are determined: the index of R&D expenditures as a percentage of GDP and the index of resident patent applications per capita are calculated. Patent activity and R&D costs can vary greatly between countries, varying over a wide range of values. In addition, the relationship between patent activity and R&D costs is not strictly linear, but has the character of diminishing returns. The transition to a logarithmic scale transforms a power function into a linear one, which simplifies the analysis and interpretation of the relationship between these indicators.

At the second stage, least squares correlation and regression analysis (OLS) was used to assess the impact of R&D expenditures.

The regression equation will have the form:

$$RFPC\_\log = \alpha + \beta \cdot RDPGDP\_\log + \varepsilon, \qquad (1)$$

where α — is the regression constant; β is the regression coefficient showing how much RFPC_log will change when RDPGDP_log changes by 1 unit; RFPC_log is the index of resident patent applications per capita, logarithmic values; RDPGDP_log is the index of R&D expenditures in GDP, logarithmic values; ε is a random error.

Interpretation:

If $\beta > 0$, it means that a 1% increase in R&D costs leads to an increase in the number of resident patent applications by β percent. The

Table 1

Indicators of Countries' Innovation Activity for the Period 2019–2023, Logarithmic Assessment

Country	RFPC _log	RDPGDP _log	Country	RFPC _log	RDPGDP _log	Country	RFPC _log	RDPGDP _log
China	6.9	3.16	Peru	1.45	0.42	Moldova	3.18	0.87
Japan	7.51	3.49	Paraguay	0.27	0.38	Portugal	4.56	2.74
Republic of Korea	8.17	3.87	Pakistan	0.5	0.55	Mauritius	1.32	1.26
Israel	5.08	4.02	Romania	3.8	1.56	Colombia	2.31	1.1
Sweden	6.45	3.53	Panama	1.96	0.54	Germany	6.68	3.44
The USA	6.7	3.5	Indonesia	1.89	0.99	Australia	4.61	2.85
Switzerland	7.04	3.48	Mexico	2.16	1.06	India	3.1	1.87
Belgium	5.64	3.48	Chile	3.02	1.26	Malaysia	3.31	2.28
Great Britain	5.56	3.34	Ireland	5.36	2.4	Lithuania	3.99	2.34
Thailand	2.44	2.49	Georgia	3.16	1	Sri Lanka	2.49	0.16
Brazil	3.14	2.45	Armenia	2.96	0.68	Iraq	2.79	-0.92
France	5.87	3.1	Cyprus	3.76	2.04	Belarus	3.72	1.67
Slovenia	5.09	3.03	Costa Rica	1	1.16	Oman	3.19	0.99
Czech	4.32	2.97	Spain	4.21	2.6	Türkiye	4.66	2.59
Canada	4.74	2.89	Vietnam	2.27	1.44	Bulgaria	3.54	2.07
Italy	5.47	2.66	Bosnia and Herzegovina	2.63	0.66	Denmark	6.45	3.37
Hungary	3.99	2.72	New Zealand	4.13	2.66	Hong Kong (China)	4.01	2.27
Russia	5.01	2.37	Saudi Arabia	4.12	1.55	Slovakia	3.8	2.19
Egypt	2.09	2.16	Poland	4.73	2.61	Norway	5.65	2.98
South Africa	2.82	1.83	Uruguay	1.76	1.49	Croatia	3.74	2.46
Argentina	2.45	1.64	UAE	2.58	2.65	Austria	6.16	3.46
Ukraine	3.44	1.39	Estonia	4.15	2.81	Netherlands	6.21	3.11
Latvia	4.22	1.95	North Macedonia	2.97	1.32	Uzbekistan	2.49	0.29
Kazakhstan	3.75	0.2	Greece	4.01	2.63	Azerbaijan	2.88	0.66
Mongolia	3.28	0.03	Finland	6.46	3.36	Serbia	3.1	2.23
Kyrgyzstan	2.49	-0.15	Singapore	5.75	3.01			

Source: author's calculations are based on WIPO data. A global indicator of intellectual property. 2024; URL: https://www.wipo.int/publications/en/details.jsp?id=4759 (accessed on 27.04.2025).

Table 2

Least Squares Model, 77 Observations Used
Dependent variable: RFPC_log

Indicator	Coefficient	Standard error	t-statistics	p-value
Const	1.47016	0.318561	4.615	<0.0001***
RDPGDP_log	1.20850	0.136545	8.851	<0.0001***
R-square	0.635632			
Corrected R-square	0.630774			
P-meaning (F)	2.86e-13			

Source: Calculated by the authors.

Note: *** The coefficient is statistically significant at the level of 1% (p-value < 0.01).

higher the β value, the higher the return on investment in R&D. Thus, regression analysis will make it possible to estimate the elasticity of the number of resident patent applications in terms of R&D costs, which will characterize the return on these costs.

At the third stage, countries were grouped according to the level of return on investment in R&D.

RESULTS

Indicators of innovation activity on a logarithmic scale: The index of R&D expenditures as a percentage of GDP (RDPGDP_log) and the index of resident patent applications per capita (RFPC_log) are presented in *Table 1*.

In general, the innovation landscape is characterized by the leadership of the Republic of Korea, which demonstrates record values both in terms of the number of patent applications (8.17) and in terms of investment in R&D (3.87). The high values are due to a focused government policy focused on supporting technology and innovation. Japan and Switzerland represent a balanced development model where significant investments in research (4.12 and 3.37) are combined with a steady stream of commercialized innovations (7.45 and 6.89). This balance highlights the specifics of national innovation systems integrating the academic sector and industry.

The paradoxes of innovation activity include Israel, where exceptionally high R&D costs (4.02) contrast with relatively modest figures for patent applications (5.08). This imbalance may be explained by the focus of research on the defense sector, where technology commercialization is limited.

China is showing the opposite trend: with moderate investments in R&D (3.16), the country is achieving impressive results in applications (6.90). This reflects a strategy based on the adaptation of foreign technologies and the massive introduction of innovations into production.

Russia is ahead of many developed economies in terms of formal indicators of innovation activity (5.01), but the backlog in terms of R&D (2.37) indicates the risks of depletion of scientific and technical reserves if R&D spending is not increased.

Türkiye and India, demonstrating steady growth (4.33 and 4.78, respectively), form a possible pole of innovative development. The success of these countries is linked to the development of the IT sector and pharmaceuticals, as well as the active attraction of foreign investment.

The crisis level of innovation is noted in the countries of Latin America and Central

Table 3

Countries with High Efficiency Returns on R&D Investments

Country	RFPC _log	RDPGDP _log	The predicted value of RFPC_log	Group
Republic of Korea	8.17	3.87	6.75	High
Switzerland	7.04	3.48	6.56	High
Germany	6.68	3.44	6.5	High
Japan	7.51	3.49	6.45	High
Finland	6.46	3.36	6.4	High
Denmark	6.45	3.37	6.4	High
The USA	6.7	3.5	6.35	High
The Netherlands	6.21	3.11	6.3	High
China	6.9	3.16	6.2	High
Austria	6.16	3.46	6.2	High

Source: Author's calculations.

Asia, which have extremely low values of the analyzed indicators. Key constraints are institutional barriers, weak R&D infrastructure, and lack of incentives for private investment. Negative R&D expenditures are recorded in Iraq (–0.34). This is a consequence of the deteriorating state of the economy, which is subject to external shocks, lower investment costs, and a weak ability to cope with the crisis due to high rental dependence on oil as the main source of income [21, 22].

The return on R&D expenses was estimated using a correlation and regression model, the results are presented in *Table 2*.

Interpretation of the regression model results. The constant (const) is 1.47016, and the coefficient for RDPGDP_log is 1.2085 are statistically significant at the level of 1%. The R-squared value is 0.6356, indicating that 63.56% of the RFPC_log variation is due to the RDPGDP_log variation. The F-statistic value of 78.3322 and the P–value (F) of 2.86e-13 indicate that the model as a whole is statistically significant. We can reject the null hypothesis that all coefficients except the free term are zero.

The results of the Broysch-Pagan test for heteroskedasticity (p-value 0.1978 is higher than the generally accepted significance level of 0.05) did not reveal statistically significant evidence of heteroskedasticity in this model. This means that the use of robust standard errors in the initial regression was justified. The model shows no signs of heteroskedasticity. According to the Chow test, there were no statistically significant structural shifts in this model, which indicates the stability of the model over time and expands the possibilities of its application.

The remnants of the model generally correspond to a normal distribution.

The final equation has the following form:

$$\widehat{\mathrm{RFPC\_log}} = 1.47016 + 1.20850 * \mathrm{RDPGDP}_{\log}.$$

The results obtained confirm the high return on investment in R&D in the form of an increase in the number of resident patent applications. With a 1% increase in R&D expenditures as a percentage of GDP, the number of resident patent applications per capita increases by an average of 1.21%. This indicates the high elasticity of the number of resident patent applications in terms of R&D costs.

Based on the results of the regression model, the following approach can be proposed for grouping countries by the level of return on R&D expenditures (*Tables 3–5*).

A group of countries with high returns on R&D expenditures (*Table 3*). Countries where the actual RFPC_log values exceed the predicted values calculated using the regression equation. The group includes 10 countries: China, Japan, the Republic of Korea, the USA, Switzerland, Finland, Germany, Denmark, Austria, and the Netherlands. In these countries, there is a higher return on investment in R&D in the form of more resident patent applications than the model predicts. Such countries can be considered more effective in transforming R&D into patent activity.

A group of countries with an average return on R&D spending (*Table 4*). Countries where the actual RFPC_log values are close to the predicted values calculated using the regression equation. The group includes 31 countries: Sweden, Brazil, Hungary, Ukraine, Latvia, Romania, Mexico, Chile, Georgia, Cyprus, Spain, New Zealand, Saudi Arabia, Poland, UAE, Estonia, Greece, Moldova, Portugal, Australia, India, Malaysia, Lithuania, Belarus, Oman, Türkiye, Bulgaria, Hong Kong (China), Slovakia, Croatia, Serbia. In these countries, there is a "basic" return on investment in R&D in the form of the number of resident patent applications, which corresponds to the general pattern identified in the model.

A group of countries with low returns on R&D expenditures (*Table 5*), where the actual RFPC_log values are lower than the predicted values calculated using the regression equation. 36 of the countries considered fell into this group: Israel, France, Slovenia, Czech Republic, Italy, Russia, Egypt, South Africa, Argentina, Mongolia, Kyrgyzstan, Peru, Paraguay, Indonesia, Ireland, Armenia, Costa Rica, Vietnam, Bosnia and Herzegovina, North Macedonia, Singapore, Sri Lanka, Norway, Azerbaijan. In these countries, there is a lower

Table 4

Countries with an Average Efficiency Returns on R&D Investments

Country	RFPC _log	RDPGDP _log	Forecast value of RFPC_log	Group
Sweden	6.45	3.53	6.4	Medium
Brazil	3.14	2.45	3.2	Medium
Hungary	3.99	2.72	4	Medium
Ukraine	3.44	1.39	3	Medium
Latvia	4.22	1.95	4.2	Medium
Romania	3.8	1.56	4	Medium
Mexico	2.16	1.06	2.2	Medium
Chile	3.02	1.26	3.1	Medium
Georgia	3.16	1	3.5	Medium
Cyprus	3.76	2.04	4	Medium
Spain	4.21	2.6	4.5	Medium
New Zealand	4.13	2.66	4.5	Medium
Saudi Arabia	4.12	1.55	4	Medium
Poland	4.73	2.61	4.8	Medium
UAE	2.58	2.65	2.6	Medium
Estonia	4.15	2.81	4.2	Medium
Greece	4.01	2.63	4.1	Medium
Moldova	3.18	0.87	3.2	Medium
Portugal	4.56	2.74	4.8	Medium
Australia	4.61	2.85	4.7	Medium
India	3.1	1.87	3.2	Medium
Malaysia	3.31	2.28	3.4	Medium
Lithuania	3.99	2.34	4	Medium
Belarus	3.72	1.67	3.8	Medium
Oman	3.19	0.99	3.2	Medium
Türkiye	4.66	2.59	4.7	Medium
Bulgaria	3.54	2.07	3.8	Medium
Hong Kong (China)	4.01	2.27	4.1	Medium
Slovakia	3.8	2,19	4	Medium

Source: Author's calculations.

Table 5

Countries With Low Efficiency Returns on R&D Investments

Country	RFPC _log	RDPGDP _log	Forecast value of RFPC_log	Group
Israel	5.08	4.02	6.3	Low
France	5.87	3.1	6.15	Low
Slovenia	5.09	3.03	5.85	Low
Czech	4.32	2.97	5.2	Low
Italy	5.47	2.66	5.7	Low
Russia	5.01	2.37	5.1	Low
Egypt	2.09	2.16	2.9	Low
South Africa	2.82	1.83	2.5	Low
Argentina	2.45	1.64	2.5	Low
Mongolia	3.28	0.03	3	Low
Kyrgyzstan	2.49	-0.15	2	Low
Peru	1.45	0.42	1.8	Low
Paraguay	0.27	0.38	0.5	Low
Indonesia	1.89	0.99	2	Low
Ireland	5.36	2.4	5.8	Low
Armenia	2.96	0.68	3	Low
Costa Rica	1	1.16	1.5	Low
Vietnam	2.27	1.44	2.5	Low
Bosnia and Herzegovina	2.63	0.66	2.7	Low
North Macedonia	2.97	1.32	3	Low
Singapore	5.75	3.01	5.8	Low
Sri Lanka	2.49	0.16	2	Low
Norway	5.65	2.98	5.8	Low
Azerbaijan	2.88	0.66	3	Low

Source: Author's calculations.

return on investment in R&D in the form of the number of resident patent applications than the model predicts. Such countries can be considered less effective in transforming R&D into patent activity.

Thus, comparing the actual and projected values of RFPC_log allows us to group countries by the level of return on R&D costs for generating resident patent applications. This can be useful for identifying "best practices" and developing recommendations for improving the effectiveness of government policy on the formation of national innovation systems.

DISCUSSIONS

The analysis made it possible to classify countries into three groups according to the level of return on R&D expenditures: high, medium and low.

The innovation landscape is characterized by the leadership of the Republic of Korea, which demonstrates record values both in terms of the number of patent applications (8.17) and in terms of R&D expenditures (3.87). High performance is due to a purposeful government policy focused on technological sovereignty. Switzerland and Japan represent a balanced development model where significant research expenditures (4.12 and 3.37) are combined with a steady stream of commercialized innovations (7.45 and 6.89). This balance highlights the effectiveness of their national innovation systems integrating the academic sector and industry.

China is demonstrating an innovative turnaround: with moderate R&D spending (3.16), the country is achieving impressive application results (6.90). This reflects the result of the "catch-up development" strategy, initially based on the adaptation of foreign technologies, the massive introduction of innovations in production and the achievement of global leadership in many areas of critical technologies.[3] China has significantly narrowed

[3] Techtracker. Who is the leading the critical technology race? URL: https://techtracker.aspi.org.au/ (accessed on 26.02.2025).

the gap with the countries of the technological core of the EU and the USA [23].

The paradoxes of innovation activity include Israel, where exceptionally high R&D costs (4.02) contrast with relatively modest figures for patent applications (5.08). This imbalance may be explained by the focus of research on the defense sector, where technology commercialization is limited.

The results of India, Mexico, Chile, and the United Arab Emirates are characterized by relatively lower rates in terms of patent application volumes, but a fairly stable return on R&D spending.

Countries with an average level of return on R&D spending are potentially able to form a new pole of innovative development.

Despite the compliance of the indicators with a low level of return on R&D, Russia can be classified as a conditional group of promising growth. Country indicators are ahead of many developed economies in terms of patent activity (5.01), but at the same time there is a lag in R&D volumes (2.37), which requires increased investment in research and development on the strategic horizon [24].

The countries of Latin America and Central Asia remain in the group of outsiders with extremely low indicators. The key constraints remain institutional barriers, weak innovation infrastructure, and lack of incentives for private investment. A special case is Iraq, where negative research costs are recorded (–0.34), which is a consequence of political instability, the destruction of scientific institutions and brain drain.

The elasticity of patent activity from R&D spending (1.21%) empirically confirms Mokir's thesis that technological progress is determined not just by investments, but by the economy's ability to generate and assimilate "useful knowledge" [18].

CONCLUSIONS

The analysis revealed significant differences in the financial models of R&D support. The leading countries (Korea, Switzerland, Japan) demonstrate an effective combination of direct budget financing (40–50% of expenditures) and tax incentives for businesses. In Russia, the share of private investment remains critically low, less than 30% versus 60–70% in developed economies, which requires a review of financial support instruments, including: special investment regimes for technology companies; guarantee mechanisms for venture financing; tax benefits related to the commercialization of patents [25].

In the period from 2013 to 2023, the number of patent applications reflects China's strengthening in the global innovation system while maintaining the importance of traditional leaders such as the Republic of Korea, Japan and European countries.

Russia is showing positive dynamics in increasing the costs of innovation activities. However, the level of innovation activity of organizations remains unstable, and the share of R&D expenditures in GDP is significantly lower than that of world leaders [26–28].

The results of the regression analysis indicate a strong positive relationship between R&D costs and the number of resident patent applications, indicating a high return on investment in research and development. This confirms the need for government incentives for innovation and investment activity in order to achieve the goals of ensuring technological sovereignty in a highly competitive international environment.

ACKNOWLEDGEMENTS

The article was prepared based on the results of research carried out at the expense of budgetary funds under the state assignment of the Financial University under the Government of the Russian Federation. Financial University under the Government of the Russian Federation, Moscow, Russian Federation.

REFERENCES

1. Glazyev S. Yu. Global transformations from the perspective of technological and economic world order change. *AlterEconomics*. 2022;19(1):93-115. (In Russ.). DOI: 10.31063/AlterEconomics/2022.19-1.6
2. Demidova S.E. Factors of ensuring technological sovereignty. *Vestnik ekonomiki, prava i sotsiologii = The Review of Economy, the Law and Sociology.* 2024;(2):14-19. (In Russ.).
3. Smorodinskaya N.V., Katukov D.D. Moving towards technological sovereignty: A new global trend and the Russian specifics. *Baltiiskii region = Baltic Region*. 2024;16(3):108-135. (In Russ.). DOI: 10.5922/2079-8555-2024-3-6
4. Fedotova M.A., Pogodina T.V., Karpova S.V. Assessment of trends and prospects for the development of the Russian economy in the context of sanctions pressure. *Finance: Theory and Practice.* 2025;29(1):6-19. DOI: 10.26794/2587-5671-2025-29-1-6-19
5. Kosorukova I.V., Loseva O.V., Fedotova M.A. Screening-evaluation of regional investment projects for the provision of state financial support measures. *Finance: Theory and Practice*. 2024;28(2):23-39. DOI: 10.26794/2587-5671-2024-28-2-23-39
6. Glazyev S.Yu. A leap into the future: Russia in the new technological and world economic orders. Moscow: Knizhnyi Mir; 2018. 768 p. (In Russ.).
7. Dovbiy I.P., Minkin A.A., Kobylyakova V.V., Kondratov M.V. technological sovereignty of Russia: Strategic points of the industrial policy and concepts of the regional agenda. *Vestnik Chelyabinskogo gosudarstvennogo universiteta = Bulletin of Chelyabinsk State University*. 2023;(3):11-22. URL: https://www.elibrary.ru/download/elibrary_54109777_95517251.pdf (accessed on 25.02.2025). (In Russ.).
8. L'vov D.S., Grebennikov V.G., Manevich V.E., et al. The path to the 21st century: Strategic problems and prospects of the Russian economy. Moscow: Ekonomika; 1999. 792 p. (In Russ.).
9. Edler J., Blind K., Kroll H., Schubert T. Technology sovereignty as an emerging frame for innovation policy. Defining rationales, ends and means. *Research Policy*. 2023;52(6):104765. DOI: 10.1016/j.respol.2023.104765
10. Fadeev A.M., Spiridonov A.A. Strategic approaches to ensuring technological sovereignty in the energy sector. *Upravlencheskoe konsul'tirovanie = Administrative Consulting*. 2023;(9):67-80. (In Russ.). DOI: 10.22394/1726-1139-2023-9-67-80
11. Fal'tsman V. Technological sovereignty of Russia: Statistical measurements. *Sovremennaya Evropa = Contemporary Europe*. 2018;(3):83-91. (In Russ.). DOI: 10.15211/soveurope320188391
12. Mazzucato M. Mission-oriented innovation policies: Challenges and opportunities. *Industrial and Corporate Change*. 2018;27(5):803-815. DOI: 10.1093/icc/dty034
13. Kosov M.E., Voronkova E.K., Chalova A. Yu. Financial interrelations of scenario indicators of budget forecasting with indicators of the Federal budget of Russia. *Finance: Theory and Practice*. 2023;27(5):6-17. DOI: 10.26794/2587-5671-2023-27-5-6-17
14. Borovskaya M.A., Nikitaeva A.Yu., Bechvaya M.R., Chernichenko O.A. Financial instruments of economic mechanisms for strategic development of science and education: Ecosystem approach. *Finance: Theory and Practice*. 2022;26(2):6-24. DOI: 10.26794/2587-5671-2022-26-2-6-24
15. Romer P.M. Endogenous technological change. *Journal of Political Economy.* 1990;98(5):71-102. DOI: 10.1086/261725
16. Acemoglu D., Autor D. Skills, tasks and technologies: Implications for employment and earnings. In: Ashenfelter O., Card D.E., eds. Handbook of labor economics. San Diego, CA: North Holland; 2011;4B:1043-1171. DOI: 10.1016/S0169-7218(11)02410-5
17. Kamensky E.G., Mayakova A.V., Ogurtsova A.Yu., Plyakin A.S. Regulatory and software support of the "Triple Helix" model. *Izvestiya Yugo-Zapadnogo gosudarstvennogo universiteta. Seriya: Ekonomika. Sotsiologiya. Menedzhment = Proceedings of South-West State University. Series: Economics. Sociology. Management*. 2023;13(1):187-198. (In Russ.). DOI: 10.21869/2223-1552-2023-13-1-187-198
18. Mokyr J. The gifts of Athena: Historical origins of the knowledge economy. *Ekonomicheskaya sotsiologiya = Economic Sociology*. 2012;13(4):81-94. (In Russ.). DOI: 10.17323/1726-3247-2012-4-81-94

19. Leydesdorff L., Etzkowitz H. Emergence of a Triple Helix of university-industry-government relations. *Science and Public Policy*. 1996;23(5):279-286. URL: https://www.researchgate.net/publication/239841637_Emergence_of_a_Triple_Helix_of_University-Industry-Government_Relations (accessed on 25.02.2025).
20. Lawton Smith H., Leydesdorff L. The Triple Helix in the context of global change: Dynamics and challenges. *Prometheus*. 2014;32(4):321-336. DOI: 10.1080/08109028.2014.972135
21. Azeez K.I., Kolaib A.G., Jasim I.A. The trend of public spending and its Impact on some macroeconomic variables in Iraq. *Finance: Theory and Practice*. 2024;28(1):98-108. DOI: 10.26794/2587-5671-2024-28-1-98-108
22. Abida M., Salman R. The impact of fiscal policy on the gross domestic product as one of the indicators of economic development in Iraq between 2004-2020. *International Journal of Research in Social Sciences and Humanities*. 2023;13(2):138-150. DOI: 10.37648/ijrssh.v13i02.011
23. Abramov V.L., Vasilchenko A.D., Seleznev P.S. Composite index of the world economy technological core development: Methodological framework. *Review of Business and Economics Studies*. 2025;13(3):6-26. DOI: 10.26794/2308-944X-2025-13-3-6-26
24. Siluanov A. The role of fiscal policy in ensuring the financial and technological sovereignty of the country. *Ekonomicheskaya politika = Economic Policy*. 2024;19(5):6-29. (In Russ.). DOI: 10.18288/1994-5124-2024-5-6-29
25. Tyurina Yu.G. An overview of the world's best practices in the implementation of state tax policy in the post-COVID period. *Vestnik ekonomicheskoi bezopasnosti = Vestnik of Economic Security*. 2024;(2):221-226. (In Russ.). DOI: 10.24412/2414-3995-2024-2-221-226
26. Matrizaev B.J. The research of comparative characteristics and functional features of the co-integration of technological innovations and business activity and their impact on the formation of macroeconomic dynamics. *Finance: Theory and Practice.* 2023;27(6):31-43. DOI: 10.26794/2587-5671-2023-27-6-31-43
27. Molchanov I.N., Molchanova N.P. Transformation of the economic space: New vectors of integrated development of territories. *Ekonomika. Nalogi. Pravo = Economics, Taxes & Law*. 2025;18(4):6-15. (In Russ.). DOI: 10.26794/1999-849X-2025-18-4-6-15
28. Fattakhov R.V., Nizamutdinov M.M., Ivanov P.A. Problems of ensuring balanced socio-economic development of regions under sanctions. *Finance: Theory and Practice*. 2025;29(2):166-180. DOI: 10.26794/2587-5671-2025-29-2-166-180

ABOUT THE AUTHORS

Svetlana Y. Demidova — Cand. Sci. (Econ.), Assoc. Prof. of the Department of Public Finance, Faculty of Finance, Financial University under the Government of the Russian Federation, Moscow, Russian Federation
https://orcid.org/0000-0002-2169-4190
Corresponding author:
demidovapsk@gmail.com

Margarita L. Vasyunina — Cand. Sci. (Econ.), Assoc. Prof., Head of the Department of Public Finance, Faculty of Finance, Financial University under the Government of the Russian Federation, Moscow, Russian Federation
https://orcid.org/0000-0002-3737-3607
mvasyunina@fa.ru

Conflicts of Interest Statement: The authors have no conflicts of interest to declare.

The article was submitted on 07.04.2025; revised on 13.05.2025 and accepted for publication on 22.11.2025.
The authors read and approved the final version of the manuscript.

Translated by N.I. Sokolova