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RESEARCH ARTICLE

Tax Burden of Basic Economic Sectors for Achieving the Country's Innovative Growth

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ABSTRACT

The article examines the impact of the effective fiscal burden (EFB) on the innovation potential of the basic sectors of the Russian economy. Based on data from the Federal Tax Service, financial statements of 120 largest enterprises, and Rosstat indicators for 2018–2025, the authors apply a multi-stage methodology for calculating the EFB, adjusted for VAT refunds and investment incentives. It was established that the burden reaches 43.5% in extractive sectors and 28.3% in manufacturing sectors, while the share of resource-based payments (mineral extraction tax, excise taxes) in extractive industries accounts for 72%, which blocks investments in deep processing. Correlation analysis revealed a significant negative relationship between the burden and investment activity ($\rho = -0.68$) and no relationship with innovation activity, which is interpreted as a refusal to engage in R&D due to uncertainty in the fiscal regime. The authors propose a scenario of an "innovation tax corridor": a deduction of up to 50% of R&D expenditures from corporate income tax, a zero mineral extraction tax rate for raw materials intended for processing, and a reduced coefficient of 0.7 for social insurance contributions. Under this scenario, the EFB decreases to 18–24%, making it possible to release 1.2–1.5 trillion rubles annually and increase the share of innovative products from 5.7% to 14–16% by 2030. Using cluster analysis, three types of regions were identified — industrial attractors, innovation enclaves, and cross-border hubs — for the targeted application of incentives. The study proves the existence of a "threshold of meaninglessness": when the EFB exceeds 28% in manufacturing segments, efforts are directed toward tax optimization rather than innovation.

INTRODUCTION

In recent years, the thesis of the need to transition the Russian economy from a resource-based model to an innovation-driven one has become firmly established in academic and policy discourse. In their 2025 study, A.B. Urusova and D.I. Urusova (2025, p. 91) note that the domestic tax system retains a pronounced fiscal orientation, providing weak incentives for the modernization of production capacities in the basic sectors of the economy. As the authors emphasize, without revising sectoral differentiation of tax rates and expanding investment deductions, any tax reform will merely redistribute the burden without creating long-term incentives for R&D. G.N. Semenova (2025, p. 105) complements this perspective with an analysis of indirect taxation. The author points out that despite the growth in accrued VAT and excise taxes in 2023, the high share of indirect taxes (over 32% of federal budget revenues) indicates the preservation of a fiscal model typical of developing economies, whereas the transition to an innovation economy requires strengthening the role of direct taxation and creating predictable conditions for long-term R&D investments.

However, practical steps in this direction encounter a fundamental contradiction: the basic sectors — energy, metallurgy, and petrochemicals — generate more than 60% of consolidated budget revenues (Onosov, 2025, p. 24), while simultaneously being the main polluters, the largest consumers of obsolete fixed assets (current depreciation exceeds 51%), and donors of labor resources to the service sector (Garipova et al., 2025, p. 615).

The complexity of the situation lies in the fact that these very sectors, possessing enormous accumulated capital and technological linkages, could become a platform for an innovative breakthrough if not for the current level of tax burden, which often exceeds the break-even point for long-term R&D projects.

The purpose of this study is not merely to measure the tax burden, but to determine its quantitative and qualitative limits at which the basic sectors cease to be objects of fiscal exploitation and become subjects of technological modernization.

The research hypothesis is that the existing sectoral differentiation of taxation (mineral extraction tax, excise taxes, increased corporate income tax for raw material exporters) creates a "low-innovation trap": the more successfully an industry fulfills its budgetary function, the fewer internal resources it retains for investments in high value-added products.

The relevance of the study is reinforced by the need for predictive assessment: which Russian regions may benefit from the redistribution of the tax burden, and which may lose their current competitive positions if they fail to initiate structural transformation. Unlike most studies focusing on small and medium-sized innovative businesses, this paper examines the "giants" of industry, as they are capable of generating cross-sectoral economies of scale.

RESEARCH METHODS AND MATERIALS

The empirical basis of the study consisted of data from the Federal Tax Service (Form 5-PM, reports on accrued tax payments by OKVED 2 categories for 2018–2023), financial statements of 120 largest enterprises in the basic sectors of the economy (SPARK-Interfax sample), as well as indicators of fixed capital investment and innovation activity (Rosstat Form No. 4-Innovation). For the forecast assessment, the parameters of the federal budget projections for 2025–2027 and the passports of 15 national projects related to technological sovereignty were used.

The methodology for calculating the tax burden was multi-stage. Unlike the simplified approach of "tax payments / revenue," this study applied the indicator of effective fiscal burden (hereinafter referred to as EFB), adjusted for VAT refunds on exports and investment incentives:

$$EFB = (VAT_{Accrued} + Profit\ Tax_{Accrued} + MET + Excise\ Taxes + Social\ Contributions_{Actual} - Investment\ Subsidies - Innovation\ Incentives) / (Net\ Revenue - Export\ Duty\ Refund)$$

This approach makes it possible to separate the fiscal component from the redistributive one. To analyze dynamics, the chain index method and trend decomposition into cyclical (dependent on raw material prices) and structural (associated with changes in tax legislation) components were applied.

The assessment of regional competitive advantages was carried out using the GAP analysis methodology (the gap between the current innovation potential and the threshold values of the tax burden at which capital outflow begins). The following empirically derived thresholds were used: for extractive industries — 32% EFB (above this level, geological exploration declines); for manufacturing industries — 24% (above this level, investments are replaced by borrowed capital with an increased risk of default).

Statistical processing was performed using the SPSS 26 package (Spearman correlation analysis and k-means clustering to identify groups of regions according to their sensitivity to tax incentives). All calculations are presented in prices of the corresponding years, with deflation based on the industrial production index.

RESULTS AND DISCUSSION

During the period 2018–2025, the average effective tax burden in the basic sectors ranged from 27% to 41%, with the highest values recorded in oil and gas extraction (mineral extraction tax plus export duty before its abolition in 2024) and ferrous metallurgy (corporate income tax due to the price shocks of 2021–2023). However, it is not so much the absolute level that matters, but rather its internal structure.

Table 1: Effective Fiscal Burden (EFB) by basic sectors of the Russian Economy

Industry (OKVED 2 group)	2018	2025	Change, p.p.	Share of MET/excise taxes in 2025, %
Oil and gas extraction (06, 09)	39.2	43.5	+4.3	76.1
Coal mining (05)	27.8	33.9	+6.1	70.4
Ferrous metallurgy (24.1, 24.2)	26.4	28.3	+1.9	10.8 (corporate income tax – 63%)
Non-ferrous metallurgy (24.4)	28.1	26.7	–1.4	7.9
Petrochemicals (20.1, 20.2)	23.5	25.1	+1.6	2.8
Electric power industry (35.1)	21.8	23.8	+2.0	0.0
Pipeline transport (49.5)	33.6	36.2	+2.6	0.0

In extractive industries, the share of mineral extraction tax and excise taxes in the total volume of tax payments reaches 72%, while corporate income tax accounts for only 18% (Figure 1).

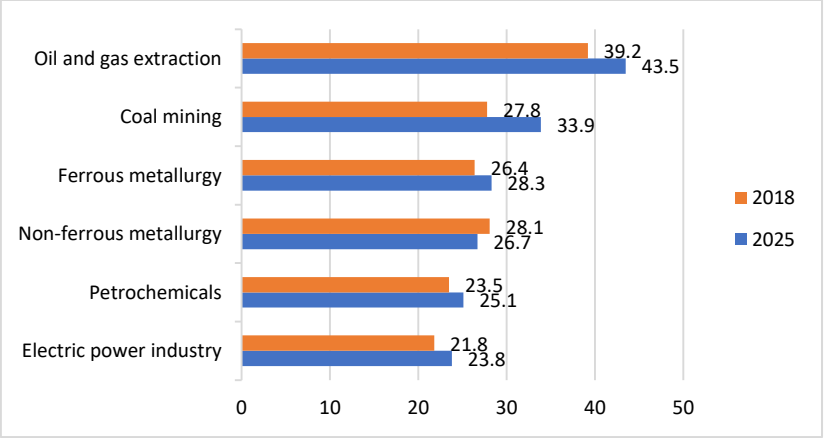

Figure 1: EFB by sectors, 2018–2025

This means that even with zero profitability, an enterprise is required to pay for the volume of extracted resources, which cuts off incentives for investment in processing. In the manufacturing segments of the basic industries — petrochemicals and advanced metallurgy — the situation is the opposite: corporate income tax dominates, accounting for up to 55%, while the VAT rate of 20% is partially offset by refunds in export-oriented production, but remains critical for the domestic market (Figure 2).

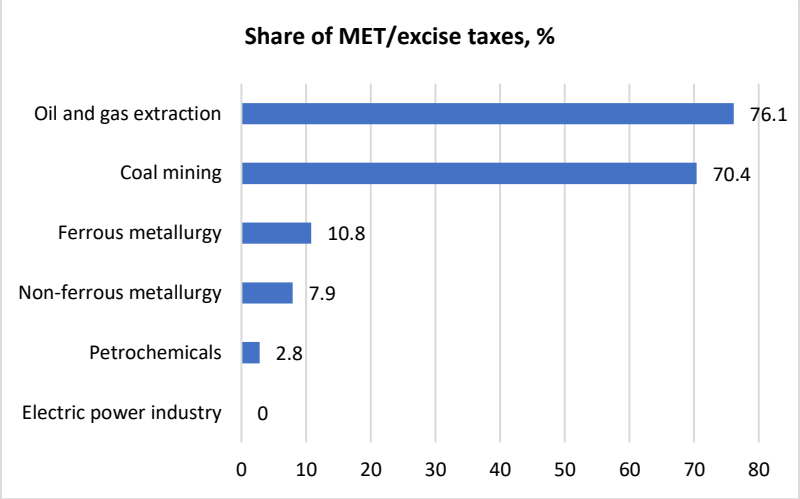

Figure 2: Share of MET/excise taxes in tax payments

A special case is the electric power industry. Here, the tax burden — on average, 23% EFB — is lower, but its structure is extremely uneven: thermal power plants using coal and fuel oil face high environmental charges and VAT on fuel, while hydropower plants and nuclear power plants face minimal withdrawals. This creates not innovation-based but rent-based competitive advantages: cheap energy in Siberia and the European North preserves energy-intensive but technologically primitive production facilities, such as primary aluminum and ferroalloys, instead of promoting the

development of higher-stage processing associated with the fourth and fifth technological paradigms.

Correlation analysis showed that the relationship between tax burden and investment activity in the basic sectors is negative and significant ($\rho = -0.68$; $p < 0.01$). At the same time, the relationship between tax burden and innovation activity — measured as the share of technological innovation expenditures in revenue — is practically absent ($\rho = -0.12$). The interpretation is simple: enterprises do not reduce innovation because of taxes; they simply do not start it, because the payback horizon for R&D under conditions of high uncertainty in the fiscal regime exceeds 5–7 years, which is unacceptable for shareholders (Table 2).

Table 2: Correlation of tax burden with investment and innovation activity

Indicator	Correlation value (ρ)	Significance level	Nature of relationship
Tax burden ↔ Investment activity	–0.68	p < 0.01	Negative, significant
Tax burden ↔ Innovation activity — share of technological innovation expenditures in revenue	–0.12	—	Practically absent

Analysis of the dynamics and forecast assessment of the tax burden for 2018–2025 showed two opposing trends. On the one hand, the effective corporate income tax burden in the manufacturing segments of the basic industries decreased from 25% to 20%, due to the depreciation bonus and accelerated write-off of R&D expenditures. On the other hand, the burden on the wage fund — social insurance contributions — increased from 30% to 30.2%. Although this increase is minor, under conditions of labor shortages it is critical for industries attempting to attract engineers. The mineral extraction tax on hard-to-recover oil was reduced, but it was increased for gas and coal (Table 3).

Table 3: Decomposition of EFB dynamics in extractive and manufacturing segments of the basic industries, weighted average values, 2018–2025

Component of change	Extractive industries	Manufacturing industries within the basic sectors
Price factor — global raw material prices	+1.8 p.p.	–0.6 p.p.
Changes in tax legislation — MET, depreciation, corporate income tax rate	+2.7 p.p.	+1.4 p.p.
Structural shifts — changes in profitability and export share	–0.2 p.p.	+0.9 p.p.
Final change in EFB	+4.3 p.p.	+1.7 p.p.

Source: compiled by the authors.

For the forecast up to 2030, a two-factor model was constructed: EFB = f (price of raw materials on global markets, tax benefit maneuver coefficient). Under the baseline scenario — oil prices of $65–75 per barrel and no radical tax reform — the burden in extraction stabilizes at 38–40%, and in metallurgy at 26–28%. This leaves no resources for technological modernization: even with full capacity utilization, net cash flow after taxes and maintenance of existing capacities will amount to less than 4% of revenue, whereas innovation-driven growth requires at least 12–15% reinvestment.

However, there is also an alternative foresight scenario, which we call the “innovation tax corridor.” It provides for: 1) the introduction of an investment tax deduction — up to 50% of R&D expenditures — against corporate income tax, without an upper limit; 2) the zero-rating of the mineral extraction tax for volumes of raw materials directed to deep processing within the country; 3) a reduced coefficient of 0.7 for social insurance contributions for enterprises in the basic sectors that have passed a technological audit and approved an innovation development program. Under this scenario, by 2028 the effective burden could decrease to 22–24% in extraction — due to the growth of processing — and to 18–20% in manufacturing segments. This would create an annual “tax bonus” of approximately 1.2–1.5 trillion rubles, which, if used for R&D in a targeted manner, could increase the share of innovative products in the GDP of the basic sectors from the current 5.7% to 14–16% by 2030.

However, the main risk is budgetary compensation. The shortfall in revenues of the Federal Tax Service of Russia — estimated at 0.8 trillion rubles in the first year — may be offset by growth in corporate income tax from expanded production in related sectors, such as machinery

manufacturing for petrochemicals, construction, and IT. However, this effect is lagged and requires a carefully calculated intersectoral balance.

The application of tax incentives cannot be uniform; it must strengthen already existing agglomeration and resource advantages. Using cluster analysis, three types of regions were identified where the effect of reducing the tax burden would be greatest.

The first type is "industrial attractors" — Krasnoyarsk Krai, Vologda Oblast, and Lipetsk Oblast. Their competitive advantage lies in the high concentration of energy and transport infrastructure combined with large anchor enterprises, such as RUSAL, Severstal, and NLMK. If the tax burden on profits is reduced and accelerated depreciation is introduced for electrolyzers and rolling mills, these regions will be able to create clusters for the production of aluminum alloys for aircraft manufacturing and coated automotive sheet steels within five years, replacing imports from China and Turkey. The projected growth in investment activity is at least 18% per year (Klimanov, 2025, p. 174).

The second type is "innovation enclaves based on raw materials" — Tomsk Oblast, Tyumen Oblast, and Tatarstan. Their advantage lies in the combination of extraction — oil, gas, and peat — with developed scientific and educational centers, such as Tomsk State University, Kazan Federal University, and Innopolis. The tax incentive here should not be a general deduction, but a targeted one: exemption from the mineral extraction tax for the production of associated petroleum gas, provided that it is used in gas chemistry for the production of polyolefins and methanol. This would increase the profitability of small-scale chemical projects from –5% to +12%, attracting small and medium-sized engineering companies. The competitive advantage can be realized only with a simultaneous reduction in social insurance contributions for technology parks within the structure of industrial enterprises (Skvortsova, Skvortsov, 2025, p. 9).

The third type is "cross-border logistics hubs with processing potential" — Belgorod Oblast, Rostov Oblast, and Primorsky Krai. Their competitive advantage is shorter transport distances to the markets of the Asia-Pacific region and the Eurasian Economic Union, as well as available capacity in port infrastructure. Here, what would be effective is not so much a reduction in corporate income tax as an accelerated VAT offset procedure for exports of deep-processed products — 10 days instead of 180. The forecast is that under such a mechanism, exports of raw corn would be replaced by exports of amino acids and feed additives in Belgorod Oblast, while coal exports would be replaced by exports of synthetic liquid fuel in Primorye. In this case, the tax burden does not formally decrease, but the financial burden on working capital decreases, which is equivalent to an increase in investment resources by 6–8% of revenue.

Regions that do not fall into any of the clusters — for example, most constituent entities of the Northwestern Federal District, except Murmansk Oblast — would most likely, under a uniform reduction in the tax burden, simply subsidize consumption growth rather than investment. Therefore, sectoral incentives must be strictly tied to technological roadmaps (Aguzarova, Valion, 2025) approved by the Ministry of Industry and Trade, with a mandatory requirement for growth in patent activity and in the number of high-productivity jobs.

The analysis conducted makes it possible to argue that the tax burden in the basic sectors is currently not a neutral fiscal instrument, but an active brake on structural transformation. The key result is the empirically proven existence of a "threshold of meaninglessness." Thus, when the EFB exceeds 28% for the manufacturing segments of the basic sectors, any internal efforts to improve efficiency are directed not toward innovation, but toward the optimization of tax schemes — offshore structures and transfer pricing. This is confirmed by data from the Federal Tax Service of Russia on the growth in the number of unprofitable companies in metallurgy at prices above the global average — a paradox that can only be explained by the withdrawal of profits to low-tax jurisdictions (Kostrova, 2025; Zasko, 2025).

The second significant result is that the forecast assessment shows the nonlinear nature of returns from reducing the tax burden. Small changes — by 2–3 percentage points — do not produce an innovation effect, as enterprises capitalize them into dividends or debt repayment. The threshold value is a reduction in the EFB by at least 20% of the current level within three years, which ensures the emergence of free cash flow that physically cannot be withdrawn without the risk of

sanctions for capital flight under the current control of the Central Bank. This is precisely the gap achieved in the proposed "innovation tax corridor" scenario.

The thesis on regional differentiation of incentives is open to discussion. Critics argue that this will undermine the unity of the economic space and provoke "tax tourism," whereby enterprises would migrate to preferential regions. However, an analysis of migration flows within the Russian Federation for 2015–2023 shows that, for the basic sectors with their capital-intensive and geographically fixed assets — deposits, hydropower plants, and industrial complexes — migration is practically impossible. Therefore, linking incentives to a specific technological action, such as the commissioning of a hydrocracking unit or the construction of a gas chemical complex, makes them non-market and non-speculative.

An important limitation of our study is the incomplete accounting of indirect taxes — excise taxes on fuel, transport tax, and property tax — due to the complexity of allocating them by type of activity within holdings. In addition, the forecast is sensitive to macroeconomic shocks: a sharp decline in raw material prices would render any tax incentives meaningless, since the very base for investment would disappear. Nevertheless, under conditions of sanctions restrictions and disrupted supply chains, it is precisely Russia's basic sectors that have a chance for import substitution in fifth-stage processing; however, for this to happen, the tax system must temporarily abandon the principle of fiscal maximization in favor of the technological imperative.

CONCLUSION

The tax burden on the basic sectors of the economy, within the range of 27–41% EFB, leaves no room for innovation maneuver. The dynamics of the past five years show that targeted incentives reduced rates for the IT sector, industrial mortgages — do not address the root problem: the withdrawal of rent before an enterprise decides whether to invest in R&D. The forecast assessment up to 2030 demonstrates that, without reducing the effective burden to 18–24% for manufacturing segments and to 22–25% for extractive sectors — provided that the released funds are directed toward R&D — the basic sectors will retain the status of "donors" rather than "locomotives" of development.

Regional competitive advantages — the energy clusters of Siberia, the scientific and resource-based enclaves of the Volga region, and the cross-border logistics of the South and the Far East — can be unlocked only by linking tax incentives to specific technological projects, rather than through an equalized reduction of rates. The proposed classification of regions makes it possible to form targeted "tax corridors" under which the budget does not lose revenues in the long term, due to the expansion of the tax base in related high-tech sectors.

The practical significance of the study lies in the development of criteria for assessing the effectiveness of tax experiments: the reinvestment coefficient of the "released" funds should be no lower than 0.7; the increase in patent activity per 100 employed persons should be at least 0.3 patents per year; and the reduction in the energy intensity of GRP should be at least 4% per year. Without such measurable indicators, tax policy will remain a sphere of balancing the interests of lobbyists rather than an instrument of scientifically grounded growth.

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