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Fixed Capital Formation Effectiveness in Russia: Trends and Scenarios

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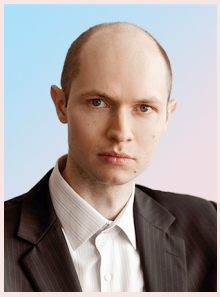

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Abstract. Designing new methods and approaches to assessing the results of long-term economic development is a relevant task within the framework of analyzing and forecasting the development of industries and industry complexes. The paper substantiates an approach to studying the process of capital formation through the full-fledged use of available resources. Based on the data on the dynamics of metal consumption, we show features of gross fixed capital formation. We consider changes in Russia's economic development and highlight three periods in the accumulation of the country's wealth, estimated by the indicators of the metal stock (the crisis situation of the 1990s, the recovery GDP growth in 2000–2013, and the formation of a new mechanism for the reproduction of fixed assets starting in 2014). We define prerequisites for the formation of imbalances in the investment and stock process related to the increase in the country's wealth. We show that restrictions on attracting resources from abroad and the lack of a reliable domestic investment base determine the key problems of the domestic capital formation

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mechanism. We arrange countries of the world in groups according to capital formation indicators, including the availability of resources for capital formation and the availability of favorable conditions for the commercial use of investments. We substantiate the need to increase the effectiveness of capital formation management in Russia. We emphasize that investments in the national investment complex can become effective only if the current criteria for evaluating the effectiveness of economic activity are revised. We provide an overview of the positive and negative scenarios for the development of the domestic capital formation system in the medium term. State management of the investment and stock process is singled out as a necessary element of a positive medium-term forecast.

Key words: investments in fixed assets, final metal consumption, wealth accumulation, reproduction approach, investment and stock process.

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Introduction

Assessing the results of long-term economic development is of fundamental importance for the organization of management, forecasting processes in industries and complexes. As a more general parameter characterizing the dynamics of economic development, we can consider the formation of fixed capital as a key element in increasing national wealth (Kirichenko, 1964; Modeling the Cycle..., 1988; Smith, 2022). The effectiveness of this process should be assessed through the full use of available resources (financial, material, labor, intellectual) necessary for investments in fixed assets. Accordingly, the analysis of trends in gross fixed capital formation based on macroeconomic statistics can be supplemented with data on the dynamics of metal consumption and estimates of changes in the country's metal stock (Zusman, 1982).

The effectiveness of savings in Russia is at a low level and has not changed for many years, alongside negative trends in industries (Khanin, Fomin, 2017). According to Rosstat, the ratio of investments in fixed assets to GDP in 2014–2022 ranged from 19.9% (2021) to 21.5% (2020), while the ratio of gross savings to GDP increased from 24.6% in 2014 to 31.8% in 2022. The ratio of gross fixed capital formation to gross savings, which was more than 85% in 2014 and 2016–2017, decreased to 64–65% in 2021–2022.

There is a significant differentiation between types of economic activity according to the degree of use of own investment resources (net profit plus depreciation) for investments in fixed assets. In machine-building activities in 2014–2018 and in 2022 there was a shortage of own investment resources to finance investments, while in manufacturing industries in general and in the sectors of the construction materials complex in particular in 2015–2022 own investment resources were used by about half (by 54 and 48%, respectively; *Tab. 1*).

It is necessary to understand why the seemingly natural course of events – the process of increasing wealth in the country – is moving forward with great difficulty. To do this, it is advisable to consider changes in Russia's economic development that affect the process of capital formation over a long period of time.

Specifics of the methodological approach

The processes of capital materialization in the country and the capital formation zone in the global economy are proposed to be assessed on the basis of steel consumption indicators, the dynamics of which reflect the results of investment activity. The

Table 1. Capital formation effectiveness in the Russian Federation at different levels of management, %

Indicator	2014	2016	2018	2020	2022
Ratio of gross fixed capital formation to gross savings	87.2	87.3	71.4	83.8	65.2
Ratio of investment in fixed capital to own investment resource (net profit + depreciation) by type of economic activity:					
manufacturing industries	1.12	0.56	0.63	0.63	0.43
complex of construction materials	2.01	0.50	0.62	0.52	0.45
machine-building activities	2.26	1.05	1.48	0.87	1.04
Calculated according to: Investments in Russia. 2023: Statistics collection. Rosstat. Moscow, 2023; EMISS. Available at: https://www.fedstat.ru/					

information base for our research includes data from Rosstat (dynamics of investments, gross formation, and production of ferrous metals in the Russian Federation) and the World Steel Association (indicators of production, consumption, and foreign trade of ferrous metallurgy products by country). We chose apparent steel use as a basic indicator of metal consumption, calculated as production plus net imports of steel products (Budanov, Ustinov, 2020). In contrast to traditional approaches, the study of the natural and material content of investments allows us to formulate requirements for the development of the current reproductive mechanism.

The problem of comparability of data on changes in fixed assets is one of the most important in assessing the formed capital. With the transition of statistical authorities to a mixed method of estimating fixed assets, criticism of official information has intensified. Regression-type research models (Suvorov et al., 2022; Khanin, Fomin, 2017) identify controversial issues in the dynamics of fixed assets related to the virtual components in the revaluation of fixed assets in the process of asset resale, with the effects of changes in the rules of asset registration. The possibilities of using these models in solving predictive tasks are reduced to identifying existing trends. The use of data on the dynamics of final metal consumption in the country not only solves the problem of comparability of information on investments and inputs of fixed assets over a fairly long period of time, but also makes it possible to identify bottlenecks in the investment and stock process.

Periodization of the country's economic development in terms of wealth formation trends

Let us single out three periods in the formation of the country's wealth, estimated by the indicators of the metal stock: crisis situation of the 1990s, recovery growth of 2000–2013, and formation of a new mechanism for capital formation since 2014.

Despite ***the crisis situation of the 1990s***, with the formation of GDP (a decrease of 39% in 1999 compared to 1990), the country's wealth, estimated using data on metal turnover, has changed slightly (a decrease in the absolute volume of accumulated metal reserves by about 2–3%) (Budanov, 2002).

A decrease in the volume of metal investment (domestic consumption of finished rolled products decreased by more than three times in 2000 compared to 1990) occurred in parallel with a decrease in the retirement of fixed assets (the retirement ratio of fixed assets decreased from 1.8% in 1990 to 0.9% in 1999, that is, twofold). The pre-reform model of fixed capital renewal was destroyed, in which up to 90% of the invested resource was used to replace retired machinery and equipment (Budanov, 2002). The change in the mechanism for maintaining fixed assets in operation included mobilization of stocks of resources (at the beginning of the 1990s, stocks of unidentified equipment were almost five times higher than current supplies for investment needs). Measures were taken to increase the service life of the equipment.

A radical change in the conditions of capital formation has led to a decrease in interest in previously prioritized capital formation points and

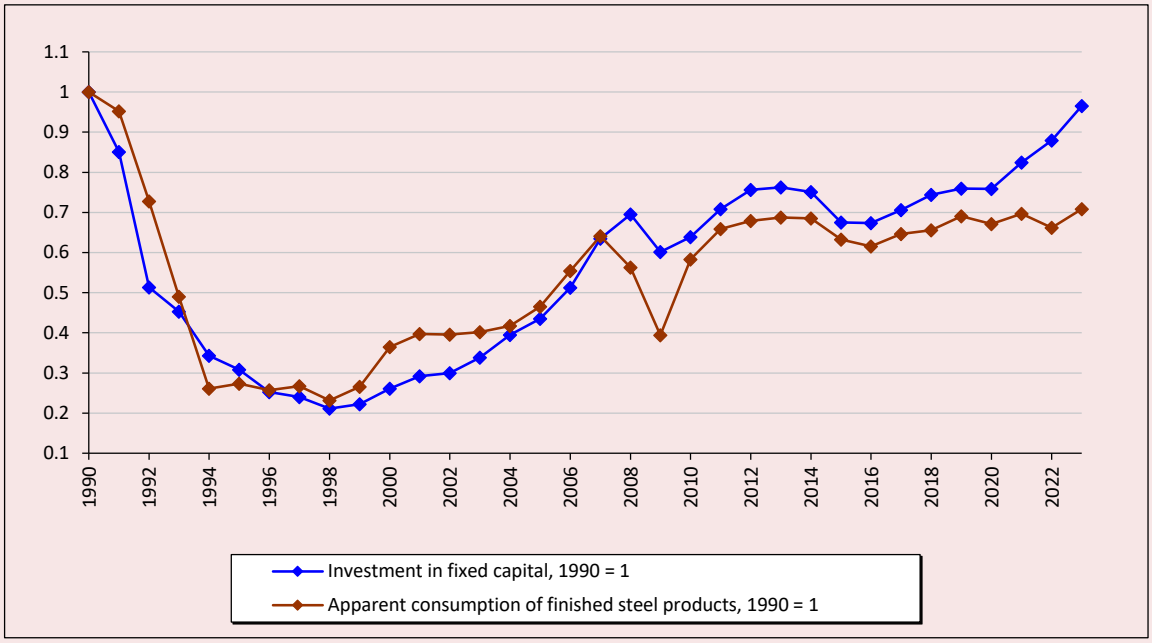
social facilities. Assets related to defense needs and the social infrastructure of enterprises were rehabilitated. In industry, production was being redesigned to meet new demand trends. The sectoral crisis and the privatization of public wealth characterized the structural changes in the Russian economy. Kindergartens became office spaces, enterprises became warehouses, that is, the previously created capital was used for a new purpose.

The export of fixed assets from the country, according to estimates of exports of machinery, equipment and scrap metal (including military equipment), amounted to about 6–8 million tons per year, that is, it occurred on a relatively small scale (less than 0.3% of the country's metal stock). At the same time, resources were attracted from abroad to accumulate capital, including second hand vehicles, high-tech production lines for consumer goods (alcohol, tobacco, household chemicals, food products, warehouse equipment, etc.).

It is significant that at the beginning of the 2000s, wealth per capita, based on the logic of potential sales, was estimated to be six times higher in Russia than in the United States, 20 times higher than in Germany, and 80 times higher than in China. In terms of production capital per capita and the labor component of national wealth, Russia lagged behind the United States (2.3 and 1.8 times, respectively), but with parameters fairly similar to those for the EU countries (Valentey, Nesterov, 2000; Lvov, 2003). The decline in investment in the 1990s, estimated both by the dynamics of physical investment in fixed assets and by the apparent consumption of finished steel products *(Fig. 1)*, resulted from the abandonment of planned investment management, a decrease in the financial capabilities of the economy, and the reorientation of business toward a foreign investment complex (Gladyshevsky, 2004).

Thus, in the process of the 1990s reforms the available opportunities for effective capital formation in the country were missed, the level of use of existing production potential decreased, but in terms of accumulated wealth, the Russian Federation remained one of the world's leading economies (Silvestrov, Porfiriev, 2008).

Figure 1. Dynamics of investment and consumption of steel in Russia



Calculated according to: Rosstat. Available at: https://rosstat.gov.ru/investment_nonfinancial; World Steel Association.

The processes of restoring GDP growth in 2000–2013, including the legalization of shadow schemes, the expansion of the list of paid benefits, etc., went hand in hand with the formation of a new model of capital reproduction in the country (Economic Growth Recovery..., 2016; Shirov, 2023). Of great importance was the creation of new points for capital investment (business with foreign participation, agricultural business formed on the basis of leasing, the sphere of modern communication technology, state megaprojects, and areas of federal programs). After the privatization of property, natural and social capital became a source for current revenue generation by both business and the state. Material capital became a strategic carrier of rental income of the business. The value of assets as a source of access to the country's resources and their involvement in economic turnover was growing. The domestic investment base became an important element of capital formation in other countries in the field of nuclear energy, pipeline transportation, subway and bridge construction. Under the current investment mechanism, it was attractive for the state to place financial capital (funds) abroad, and for businesses and citizens to materialize savings in assets from other countries.

Economic growth in the 2000s was metal-intensive (with GDP growing by 60%, real metal consumption in the country increased 2.15-fold) (Budanov, Ustinov, 2020). In the context of economic growth it was possible to maintain investments sufficient to compensate for the outflow of fixed assets in priority sectors (basic and export-oriented) (Budanov, 2002). Low levels of capacity utilization in depressed industries (less than 25%) indicated the "decline" of fixed capital, rather than its retirement, including due to the lack of funds for retirement. The negative effects of maintaining fixed assets in non-profitable economic sectors were gradually eliminated. Restrictions on the export of scrap metal played a positive role in reducing the gratuitous disposal of assets (a decrease in the export flow from 12.8 million tons in 2004 and 12.65 million tons in 2005 to 2.4 million tons in 2009 and 4 million tons in 2010[1]).

The process of improving the state's wealth management mechanism has led to mixed results. Government authorities lost control over the previously formed capital (optimization of the social sphere), and asset conversion. The "privatization period" was coming to an end, and there started a "period of property redistribution", which ensured an increase in the commercial value of fixed assets (Pappe, 2002). The effectiveness of savings has increased in comparison with the 1990s. The ratio of gross fixed capital formation to gross savings increased from 46.6% in 2000 to 69.5% in 2008, and the rate of investment in fixed assets increased from 15.9% in 2000 to 21% in 2008[2]. This process was accompanied by double-digit growth rates in fixed assets (by 17.8% in 2006, by 23.8% in 2007, in comparable prices). By the early 2010s investment growth in the Russian Federation faced resource constraints. The increase in the physical volume of investments by 19.3% in 2010–2013 was accompanied by an increase in real consumption of finished steel products by 9.5 million tons (from 42.8 million tons in 2010 to 52.3 million tons in 2013) and an increase in net imports of metal-containing products from 6 million tons in 2010 to 8.9 million tons in 2013 (9.6 million tons in 2012).

For the reproduction of fixed capital, a model of investment development in Russia was formed with the exchange of resources on the global market. With a relatively low volume of foreign investment[3], the foreign trade turnover of metal and metal-containing products under this model in 2012–

[1] According to UN Comtrade. Available at: https://comtradeplus.un.org/

[2] Investments in Russia. 2009: Statistics collection. Rosstat. Moscow, 2009.

[3] Investments in fixed assets of organizations with foreign ownership in 2010–2013 accounted for 6–9% of total investments in fixed assets in the Russian Federation, the share of organizations with joint Russian and foreign ownership was 6–8%.

2013 exceeded 200 billion US dollars. In the early 2010s exports of ferrous metals from the Russian Federation in various forms (ore, scrap, rolled products, pipes, and finished metal products) reached 27–28 billion USD per year, while imports of metal-containing products (machinery, equipment, and vehicles) into the Russian Federation in 2012–2013 exceeded 150 billion USD[4].

A certain price for expanding the access to foreign investment resources was the reduction of the need for the development of their production in the Russian Federation. As a result, in the context of the investment growth of the 2000s, it was not possible to stop the process of scaling down the domestic investment base; nor was it possible to restore the investment projects generating system based on domestic competencies. The previously accumulated capital in mechanical engineering and metal processing was being lost (capacity reduction by 15–20%).

Since 2014, fundamentally new trends in capital formation in the Russian Federation have been outlined. Previously existing capital formation mechanisms (transnational, shadow, corporate) have reduced their attractiveness to citizens and businesses, and the state has faced challenges that require capital formation in many sectors (Potential opportunities..., 2022; Russia 2035..., 2024).

Since 2015 the volume of current savings has stabilized at a relatively low level. Thus, the average annual real steel consumption[5] in 2015–2023 is estimated at 47.6 million tons, which is 92.6% of the average annual level of 2011–2014 (51.4 million tons). Savings management has become more active in liberal-market directions: investment climate, investor attraction, high international capital mobility, etc. (Damasceno, Guedes, 2024), that is, in those directions that did not meet expectations in the previous period. Thus, not only the crisis phenomena in other countries (pandemic, closure of markets and trade barriers, over 20,000 existing sanctions), but also the exhaustion of the potential of the current transnational investment mechanism have reduced the results of capital formation in the Russian Federation. The country's economy has faced material and financial imbalances in the investment sector, as well as restrictions from the domestic investment complex.

The effectiveness of savings decreased (Budanov, 2023). With an increase in the savings rate to 31.8% in 2022 (the highest value since the early 2000s), the ratio of gross fixed capital formation to gross savings decreased to 64–65% in 2021–2022 (with the values of this indicator ranging from 71.4 to 94% in 2010–2020).

In the structure of capital investments by type, the share of machinery and equipment in 2022 decreased dramatically to 34.8% (vs 39.5% in 2021); thus, the share of construction and installation work increased. A significant reduction in the share of machinery and equipment in the structure of investments by type of fixed assets indicates the presence of crisis phenomena in the investment process (by analogy with the situation in 2014–2015, when investment activity was influenced by the devaluation of the ruble and the imposition of sanctions on certain sectors of the domestic economy).

There has been a prolonged investment pause in the industry. In the export-oriented sectors, a financial resource has been formed that is exces-sive for current capital investments (1.5-2-fold). The opportunities for the formation in consumer-oriented sectors (trade, various types of paid services to the public) were underutilized. Due to the increase in loan rates (from less than 10% in the early 2010s to more than 20% currently), conditions for capital formation in low-income and high-risk projects have deteriorated. The balance of the financial account of the balance of payments of the Russian Federation in 2022 increased to a record 227.1 billion USD (39.1 billion USD in 2020, 124.1 billion USD in 2021), despite seemingly emerging restrictions on capital formation abroad.

[4] Own calculations according to UN Comtrade.

[5] Apparent steel consumption, taking into account net imports of metal-containing products.

Problems and prerequisites for the formation of a new model of capital formation

The negative phenomena of 2014–2024 predetermined the difficulties of establishing a new mechanism for the reproduction of fixed capital. The flow of resources from abroad necessary for the formation of fixed capital in innovative economic sectors has decreased. A number of priority points of capital formation (the Arctic, aircraft manufacturing, shipbuilding, microelectronics, etc.) have lost imported investment resources for political reasons. As a result, the planned domestic investments in these industries were also not implemented.

The creation of prerequisites for designing a capital formation model based primarily on the domestic resource base was provided by specialized funds (Russian Direct Investment Fund, Industry Development Fund, Internet Initiatives Development Fund, etc.) and measures to implement import substitution policies. The fundraising rate for such projects does not exceed 7%, while in the financial market it does not fall below 20%. Until the 2020s, project financing was carried out in an extremely limited amount (less than 0.1% of total investments) and did not have a significant impact on the investment development of the country. Real changes (a multiple increase in the amount of funds invested in government projects) were noted in 2022–2024. The production of domestic investment products, having received state support, demonstrates high growth rates. Thus, by the end of 2024, the production index in the production of computers, electronic and optical products amounted to 128.8%, in the production of finished metal products – 135.3% (as a percentage to 2023).

In 2024 the effect of the new mechanisms of state regulation of investment activity was expressed both in maintaining high growth rates of investments in fixed assets (8.6% year-on-year for 9 months of 2024) and in the growth of investment-purpose products. Thus, the conditions for capital formation in the 2020s vary significantly by economic sector, and capital formation remains sectoral rather than frontal. The full use of resources in some public investment mechanisms (development of over 100% of allocated funds) related to the defense industry is observed when the implementation of regional programs and development programs of state corporations (Russian Railways, Rostec) is disrupted. This affects the efficiency of the capital formation process in the country.

The problems of the domestic capital formation mechanism related to the restriction on attracting resources from abroad and the lack of a reliable domestic investment base will persist for the foreseeable future (Frolov et al., 2023). Until these problems are resolved, the process of losing the country's accumulated wealth poses the main economic threat to medium-term development. Internal and external trends in demand for investment resources are highlighted in the formation of crisis potential.

First, there are prerequisites for an increase in the volume of compensatory investments in fixed assets in the Russian Federation. The immediate threats are observed in the energy sector that uses imported equipment, as well as in the transport fleet, and the capacities of joint ventures, whose operational resources are gradually becoming obsolete and require updating (Frolov et al., 2023).

Second, the process of accelerated capital formation in China, India, Vietnam and many other countries poses a strategic threat to investments in the domestic economy (Zhou et al., 2024). The flow of resources from the Russian Federation continues to increase to ensure investments in industrializing countries.

Thus, the reproduction processes of 2014–2024, and especially the period of 2022–2024, are of interest for understanding the changes regarding fixed assets in the domestic and global economies. The problems of capital formation in Russia should be considered in the context of the processes taking place in the global economy. Success in capital formation is demonstrated by many countries, including the Russian Federation.

Grouping the countries according to the availability of resources and conditions for effective capital formation

Many phenomena related to economic development in various countries can be explained using two parameters. The first one is availability of resources for capital formation, and the second one is availability of conditions for the effective use of savings. Based on the analysis, it was important to show which countries are getting richer and how they attract resources to materialize financial resources. Since countries vary significantly in size and structure of their economy, and solve different problems, it is possible to apply a universal approach to analysis, but there are no universal solutions that would suit all countries (Budanov, Ustinov, 2020; Budanov, 2023).

To conduct the cross-country analysis, we used data for the last decade (2013–2023) on the volume and dynamics of metal production and consumption, which can be considered as an indicator of the cross-country movement of wealth *(Tab. 2)*.

The ***first group*** of resource-rich countries (where steel production exceeds its apparent consumption) with favorable conditions for the commercial use of investments (resulting in an increase in apparent steel consumption over the period under review) includes four of the six largest steel producers by the end of 2023: China (1,019.1 million tons), India (140.8 million tons), Russia (76 million tons) and the Republic of Korea (66.7 million tons). The highest growth rates of visible consumption of finished steel products in 2013–2023 in this group of countries are noted in India (1.81-fold, from 73.7 million tons to 133.4 million tons), the Netherlands (1.23-fold growth on a low base, from 3.7 million tons to 4.6 million tons) and China (1.21-fold growth, from 741.4 million tons to 895.7 million tons) were noted. While only India showed an annual increase in metal consumption (with the exception of the pandemic period in 2020), in other countries periods of growth in demand in the domestic market (in Russia – in 2017–2019, 2021, 2023) were followed by crisis periods (in Russia 2014–2016, 2020, 2022). In China, the apparent consumption of finished steel products decreased from 741.4 million tons in 2013. to 672.3 million tons in 2015 and from a peak of 1.01 billion tons in 2020 to 895.7 million tons in 2023. The decrease in steel consumption by more than 100 million tons over three years was due, among other things, to the crisis in the construction industry (according to estimates for 2018, 293.5 million tons or about 33% of steel in terms of iron content were consumed in the construction of buildings in China (Yang et al., 2023)).

The ***second group*** includes net exporters of steel products with a decrease in demand in the domestic metal market in 2013–2023. Among the major steel producers, such countries include Japan (steel production of 87 million tons in 2023), Germany (35.4 million tons), Brazil (31.8 million tons), and Iran (31 million tons). They have the resources necessary to accumulate capital, but for various

Table 2. Distribution of the countries by indicators of steel production and consumption in 2013–2023

Conditions of commercial utilization of investments	Resource-rich countries (net exporters of steel products)	Countries experiencing resource constraints (net importers of steel products)	Share in global steel consumption in 2023, %
Favorable (growth in apparent steel consumption over 2013–2023)	China, India, Russia, Republic of Korea, etc.	Turkey, Italy, Poland, Romania, Spain, Mexico, Vietnam, Philippines, Indonesia, etc.	81.8
Unfavorable (decline in apparent steel consumption over 2013–2023)	Japan, Germany, Brazil, Iran, Austria, Sweden, South Africa, Ukraine, etc.	USA, Canada, UK, France, Czech Republic, etc.	18.2
Share in global steel production in 2023, %	79	21	100
Calculated according to: World Steel Association (World Steel in Figures 2024, Steel Statistical Yearbook 2021).			

reasons they face problems of capital loss in the field of industrial production (Araujo et al., 2021). In particular, the apparent consumption of finished steel products decreased by 26% in Germany (from 38 million tons in 2013 to 28 million tons in 2023) and by 18% in Japan (from 65.2 million tons in 2013 to 53.3 million tons in 2023). An example of a country with limited opportunities for capital formation due to economic sanctions is represented by Iran (Aflatooni et al., 2022), which showed a slight decrease in the apparent consumption of finished steel products (by 0.3 million tons in 2013–2023, to 19.5 million tons) with a twofold increase in steel production and the development of its own raw material base during the period under consideration.

In total, the first and second groups of countries accounted for 79% of global steel production in 2023 (mainly due to China, which accounted for 53.9%).

The ***third group*** of countries is characterized by favorable conditions for the commercial use of investments while at the same time having resource constraints (these countries are net importers of steel products). This group includes European economies (Turkey, Poland, Italy, Spain, Romania), Mexico, and newly industrialized Asian countries (Vietnam, Philippines, Indonesia, etc.). The growth of apparent metal consumption in Italy and Spain in 2013–2023 was associated with the recovery after the eurozone debt crisis (Ruščáková, Semančíková, 2016), while in Asian countries the growth occurred due to the increased demand for metal for the development of own industry and infrastructure. The growth in apparent consumption of finished steel products in Asian countries (excluding China, India, Japan and the Republic of Korea) in 2013–2023 was 1.25-fold (+19.6 million tons).

The ***fourth group*** comprises countries that face constraints on the resources needed to form capital and the challenges of creating the conditions necessary for the effective use of investments. The traditional industrialized countries included in this group (USA, Canada, UK, France) are characterized by the effects of material wealth saturation, issues related to maintaining the metal stock (a decrease in input alongside an increase in retirement), reduction in the absolute volume of consumption of structural materials in the economy (Matos, 2022). The created conditions have predetermined such phenomena as the closing down and transfer of capacities to other countries (Tang et al., 2023). In particular, in the UK during the period under consideration, steel production decreased by more than twofold (from 11.9 to 5.6 million tons), in France – by 36% (from 15.7 to 10 million tons), in the Czech Republic – by 34% (from 5.2 to 3.4 million tons). The apparent consumption of finished steel products in the United States in 2023 amounted to 90.5 million tons, which is 24.6% less than in 2000 (120 million tons).

The fourth group also includes countries whose current situation is determined by the aggravation of domestic political and social problems (Venezuela, Argentina, etc.).

According to the analysis, there are countries that are more successful in terms of capital formation dynamics than Russia, and their experience should be taken into account when solving problems of the domestic economy.

Forecast scenarios for the development of the capital formation system in the Russian Federation

As part of the most likely scenario for the development of the global economy, it is possible to consider both positive and negative options for capital formation in the Russian Federation. Given the availability of domestic resources for further capital formation, there is a problem of integrating them into the current investment mechanism. Reorienting the economic system toward increasing the country's wealth is crucial for assessing Russia's prospects (Zusman, 1978; Budanov, Ustinov, 2020; Frolov et al., 2023).

In terms of capital formation, estimated using the data on final metal consumption, Russia

occupies a fairly stable position in the world. The Russian Federation is 1.4 times ahead of the global average in terms of per capita consumption of finished steel products (309.1 kg/person in the Russian Federation versus 219.3 kg/person worldwide in 2023). The absolute volume of real steel consumption in Russia in the 2010s amounted to 480 million tons (3.3% of the global value)[6]. The growth potential for the period up to 2030 allows us to consider the opportunities for doubling investments in wealth formation based on domestic resources as a realistic option.

The domestic capital formation system is attractive for foreign resources investments. In 2011–2013 imports of metal-containing products (machinery, equipment, vehicles, assemblies, and components) exceeded 10 million tons in terms of steel content (the so-called indirect steel imports (Molajoni et al., 2012)). The curtailment of cooperation processes with a number of companies in 2014–2024 was caused by political reasons and can be considered as an opportunistic moment in the restructuring of foreign trade flows. The economic interest in the reliability of investments and their effectiveness allows us to count on an increase in the share of foreign investments in the total volume of investments in the Russian Federation to the pre-crisis level on the horizon until 2030 (from 9.1% in 2013 to 3% in 2022, the share of companies with foreign ownership in investments in fixed assets in the Russian Federation decreased), that is the growth potential is about three times.

Lagging behind other countries does not seem to be critical. In terms of per capita real steel consumption (341 kg/person per year) Russia is slightly inferior to the traditional leaders (382 kg/person in the USA, 389 kg/person in Japan), but due to lower rates of fixed assets retirement, the increase in savings is approximately at the same level. New industrial countries (790 kg/person) pose a more serious threat in terms of the pace of formation and the quality of accumulated capital (790 kg/person in the Republic of Korea, 576 kg/person in China)[7]. A number of issues related to maintaining the competitiveness of the Russian Federation are solved at the expense of previously formed capital, primarily in the military-industrial complex. The situation is less successful in investment engineering, in the production of durable goods and in innovative sectors, where the role of previous investments in production is relatively small. Industrializing countries may reach Russia's level of capital formation in a number of economic sectors in the next decade (as happened in mechanical engineering, electronics of the Republic of Korea, light industry in Pakistan and Vietnam, automotive industry in Mexico, etc.).

Thus, in the forecasting process, current savings should be considered taking into account previously invested funds, the cost of maintaining assets in operation and their updating (compensation for retirement).

The negative and positive scenarios for the capital formation forecast in the Russian Federation differ in the dominant processes rather than quantitative characteristics (Russia 2035..., 2024). Understanding the price of transition between options in the logic of wealth formation concepts is of key importance *(Tab. 3)*.

The ***negative forecast scenario*** proceeds from the idea that the desire for wealth is a natural state of society and the main thing is to let people implement their desire to get richer. At the level of government, there are still hopes that the increase in the country's wealth depends on the rate of saving (saving on consumption), on business profitability (return on investment), and on large companies of global importance. Attempts are continuing to adjust the investment development process based on institutional transformations: improving the investment climate, establishing numerous support structures, and holding investment forums

[6] Calculated according to the data provided by the World Steel Association.

[7] World Steel Association (Steel Statistical Yearbook 2021).

Table 3. Pre-forecast factors and capital formation processes in the Russian Federation

Indicator	Negative scenario	Positive scenario
Formation volume for the period up to 2030, million tons in steel equivalent	250–300	400–500
Formation effectiveness, estimated by full utilization of investment resources, %	60–80	До 100
Invested resources utilization conditions (real per capita steel consumption), kg/person/year	300–350	450–600
Volume of domestic resources generated and investment products attracted from abroad, million tons per year	Under 90	Under 120
Investments in the investment complex in total investments, %	Less than 10	Over 30
Compiled according to: EMISS, World Steel Association, own assessments.		

(Haddad, Verriest, 2024). This view is based not only on the advice of international organizations, but also on the limited capabilities of the state in conducting investment policy. The actions taken do not significantly change the formation of wealth. It is important to understand the imaginary and real reasons for the formation of investment dynamics.

The availability of resources in the country does not guarantee their allocation to the needs of investment development. Thus, in 2013–2023, gross savings in Russia increased from 17.7 trillion rubles to 51.5 trillion rubles (2.9-fold), and investments in fixed assets increased from 13.5 to 34.0 trillion rubles (2.5-fold)[8]. Accordingly, the total volume of underinvestment in capital formation for the period under consideration amounted to 37.8 trillion rubles (in current prices). Based on the proportions between invested and lost (non-invested) funds, a 1.7-fold investment growth by 2030 will be accompanied by the formation of 167 trillion rubles of excess savings (difference between gross savings and investments in fixed assets in total for 2024–2030).

According to the results of 2014–2020s, the role of highly profitable business in the process of the country's investment development raises many questions, and there is an insufficiently effective financial interaction between metallurgical corporations and the state (Pechenskaya-Polishchuk, Malyshev, 2021). In 2013–2020, against the background of an increase in the amount of profit (2.22 times in current prices and 1.45 times in comparable prices) and the net financial result of domestic organizations (1.96 and 1.28 times, respectively), there was a decline in investment activity in the Russian Federation (in 2020 the physical volume of investments in fixed assets amounted to 99.6% of the 2013 level). Short- and long-term financial investments of enterprises are many times higher than current capital investments; that is, in conditions when investment products are insufficient to ensure the current financial flow, previously formed funds will remain unclaimed for a long time (money overhang).

The dependence of the investment process in the Russian Federation on resources attracted from abroad, observed in the 2000s (the dynamics of investments in fixed assets was 80% described by changes in imports of machinery and equipment), increased in the 2020s after the shock of the late 2010s (coefficient of determination is 0.86). Domestic consumers are losing the competition for Russian metal and other investment products. All the same, about 30% of the resources released as a result of the sanctions were exported to the EU and the United States. The leading importers of this resource from Russia are TNCs, which direct it to the industrialization of other countries. They are also the largest suppliers of investment products to the Russian economy.

In the 2020s there is a gap between the dynamics of metal consumption and investment (the physical volume of investments in fixed assets in 2023 increased by 27.2% compared to 2020, while the

[8] According to Rosstat. Available at: https://rosstat.gov.ru/investment_nonfinancial, https://rosstat.gov.ru/statistics/accounts

apparent consumption of steel increased by only 5.4%). This problem is described in special studies (Russia 2035..., 2024). Currently, capital formation in Russia is carried out in conditions of resource constraints, with an imbalance "between the growth of business income and the slowdown in investment" (Russian Territories..., 2022). The imbalances lead to a high profitability of participants in investment activities (developers, resource suppliers, etc.). Investments in fixed assets increased 1.45-fold in 2017–2021 (in current prices), while the growth rate of net profit in metallurgical production was 3.84 times, in the production of other non-metallic mineral products – 4.34 times, in construction – 5.43 times. The conversion of investments into current super profits of business is the main threat to the existing capital formation system in the country. Investment activity has become a source of income exported from Russia and invested in foreign capital. Capital formation in the Russian Federation is becoming unprofitable not only for business (the amount of funds invested is higher than the value of the asset being created), but also for the state.

The country's specialization in metal production on the global market does not mean success in meeting domestic demand for metal (Ilyin et al., 2021). Having solid reserves and the production of primary raw materials, it may find itself without resources to accumulate capital if the concentration of capital in its investment complex is not ensured. The country has been saving on this for a long time under the slogan "down with production for the sake of production", the priority is given to people rather than "production of the means of production". There are many reasons for this, but the main thing is that generating income by capital "decumulation" is more attractive to businesses than increasing wealth through effective capital formation. There was no understanding at the government level that by using the global investment complex to meet domestic capital formation needs, the country was "saving" on its own wealth.

Thus, the main threats determining the negative scenario of capital formation in the country are described by the observed trends in the investment and stock process. The formed capital creates prerequisites and sets limits on the process of national economic development, determining the need to address many issues (for example, dilapidated housing, "rust belts", single-industry towns, etc.). In 2025–2030 the tasks are to ensure the exploitation of existing assets in the new international conditions and compensate for the outflow of fixed assets created on the basis of imported resources. According to rough calculations, this may require all the resources currently available to the domestic economy. The transition to the loss of previously accumulated capital in the country in a negative scenario is most likely to occur in the early 2030s.

State management of capital formation, that is, the investment and stock process, including the production of investment products, is a necessary element of a positive medium-term forecast scenario. An effective increase in the country's wealth is possible in various ways, which were tested in the 2010s and 2020s. There is a positive experience of companies that have formed their own system for generating investment resources and have created an investment development base (Rosatom, Mosmetrostroy, etc.). Various leasing centers contribute to the formation of capital in the agro-industrial complex, national transport system and the growth of production of investment products. By including the investment component in the price of products, progress has been achieved in the development of energy and transport infrastructure (On the Long-Term..., 2022). Investments in promising sectors of capital formation are equally important. On the basis of scientific institutions, new investment resources are being generated, and conditions are being created for the effective use of public funds (Frolov et al., 2023). Corporations have gained successful experience in accumulating capital as part of adapting production to the actual

available resources and demand trends. When conducting investment policy (areas, materials, labor, finance) they used design solutions and specialized equipment from foreign companies.

The country has very few resources to create assets that would be valuable in the long run. It should be borne in mind that currently the output of investment-purpose products in the Russian Federation is about 15–20% of the 1990 level. There are examples of production revival within 2–3 years in those areas where the previously formed capital (MIC) has been preserved, but there are also many examples of failures to restore the production of machinery and equipment (aircraft engineering, instrument making, machine-tool industry, etc.).

The shift of the reproduction mechanism from relying on foreign investment potential (a leading role until 2014) toward creating own resource support for the investment and stock process will determine the prospects for increasing the country's wealth (Russia 2035..., 2024). The transition from a foreign to a domestic investment base is primarily a matter of capital formation in the relevant economic sector. It is quite difficult and expensive to eliminate the dependence of investment activity on imports due to the need to restore the investment and stock process in the country as the material basis of savings (Kirichenko, 1964; On the Long-Term ..., 2022; Frolov et al., 2023). The structure of final metal consumption is an indicator of the processes observed in the investment sector. The transition from a basic resource to advanced processing products and investment products requires an increase in current costs and preparation of the production framework. To increase investments in fixed assets by 1–2%, it is necessary to increase the volume of generated investment resources by 5–10% per year, and this is possible with an increase in fixed assets of investment complex enterprises by a similar amount. As a result, the investment growth model initially concentrates the growth of investments in the country into the investment complex itself.

The elements of a positive scenario for increasing the country's wealth based on capital formation are outlined in government plans[9], requirements for executive authorities[10] and other materials of strategic importance[11]. The unfavorable trends in the development of the country's fixed assets, primarily in socially significant sectors and infrastructure, are implicitly identified, and solutions to the tasks set are proposed. Due to the inertia of the capital formation process, in order to reverse existing trends, more radical actions may be required regarding the management of the development of the country's fixed assets, the formation and implementation of depreciation policy, and the strengthening of the material base that ensures the reproduction of fixed assets.

Organizing the work with state property requires fundamental changes. Management decisions should focus on the increase of fixed capital and its modernization, and the problem of "unnecessary assets", raised by the Minister of Economic Development, as well as rehabilitation and privatization, should be considered as a flaw in the current system of organizing the work with the previously formed wealth.

The requirements for the targeted use of depreciation deductions should become an integral part of the country's reproductive policy. It is necessary to overcome the situation in which less than 10% of the depreciation accrued in some industries is allocated for investment. In the future, depreciation charges should become not only the

[9] Unified plan to achieve the national development goals of the Russian Federation for the period up to 2030 and for the planning period up to 2036 available at: http://static.government.ru/media/files/ZsnFICpxWknEXeTfQdmcFHNei2FhcR0A.pdf (accessed: February 20, 2025).

[10] On assessing the effectiveness of the activities of the highest officials of constituent entities of the Russian Federation and the activities of the executive bodies of constituent entities of the Russian Federation. Presidential Decree 1014, dated November 28, 2024.

[11] Spatial Development Strategy of the Russian Federation for the period until 2030 with a forecast until 2036. Approved by RF Government Resolution 4146-r, dated December 28, 2024.

main source of long-term investments, but also the basis for financing activities to preserve and increase national wealth.

It is necessary to form a specialized economic sector that would ensure the maintenance of the country's production facilities. Within the framework of this direction, the tasks of low-efficient use of resources, the "garage economy", and the risks associated with poor-quality equipment maintenance are being solved, but, most importantly, the tasks of increasing the countryэs wealth based on previously created assets are being addressed as well. Technologies of modernization, restoration and protection of assets of existing production improve the operational characteristics of machinery and equipment, increase the reliability of buildings and structures.

Together, this will make it possible to avoid the implementation of a negative forecast for capital formation, eliminate the most likely threats and, after the 30 years of sales, move toward positive trends in increasing national wealth.

Conclusion

There are ambiguous processes in the world that quite simply become unambiguous if the change in national wealth is taken as the basis for assessing the results of economic activity – in terms of natural rather than monetary indicators. We focused on them by considering the resource support of the investment process and capital formation in the country.

The proposed approach makes it possible not only to assess the scale of the problem (the need for annual renewal of assets with a total weight of about 50 million tons), but also to identify key areas for solving existing problems. Normalization of the investment and stock process in the country can be considered in conjunction with the intensification of actions to maintain fixed assets in operation. The use of restorative technology, modern means of protection and modernization of products makes it possible to reduce quite significantly (10–15-fold) the cost of metal products to compensate for the retirement of machinery and equipment.

In order to increase national wealth by 150–200 trillion rubles by 2030 (potentially available additional savings), it will be necessary not only to increase metal consumption by 200–250 million tons (in total over the period), but also to create capacities for their transformation into the country's assets. This means an increase in capital formation in the fixed assets of the country's investment complex by 2.2–2.3 times, which requires active government intervention in this process.

The analysis shows that the investment process in the 21st century is still a process of converting the obtained economic results (money) into valuable assets, and this requires metal. We would like to emphasize that there is no other way to accumulate national wealth other than investment; that investments are a process of materializing finances, i.e. creating assets, and that the inevitable consequence of capital formation is obvious resource constraints on investment development.

The forecast prospects for capital formation are determined by the effectiveness of creating an appropriate system. Investments in the country's investment complex, including domestic machine tool manufacturing, electronics, aircraft manufacturing and other heavy industries, cannot be effective under current criteria for evaluating the effectiveness of economic performance. The result of the adopted approach is a decrease in the efficiency of investments in 2000–2024, while huge resources remain unaffected in the process of national wealth accumulation.

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