Structural Effects of Planned Economy on Russian Urbanization

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St. Petersburg School of Economics and Management Masters Thesisstructural Effects of Planned Economy on Russian Urbanization academic degree, position, department

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DOI: https://doi.org/10.47772/IJRISS.2026.100900341

Received: 17 September 2026; Accepted: 22 September 2026; Published: 14 October 2026

ABSTRACT

The Soviet Union's centrally planned economy had profound effects across Russia. This study critically examined the structural effects of the planned economy on Russian urbanization using a mixed-method research design consisting of a quantitative analysis of the impact of the planned economy on urban population growth, population shifts, industrial center distributions, infrastructural data, and migration, complemented by a qualitative historical analysis of state economic and political policies. Findings showed that the soviet planned economy shaped urbanization patterns in Russia by introducing centralized economic policies that focused on centralized urban planning, heavy industrialization, expansion of infrastructure, construction of residential houses in urban areas, and internal migration control. These centralized economic policies led to the creation of industrial cities in urban areas, increase in industrial output in the urban areas, creation of jobs, development of key infrastructure, construction of houses, and provision of economic opportunities in the urban areas which led to a rapid urbanization growth as the urban population growth rate reached its peak during the soviet planned economy.

Keywords : Soviet Union, Planned Economy, Urbanization

INTROCUCTION

Background

A planned economy is an economic system in which every aspect of the production, distribution, and consumption of goods and services is governed by the government. In a planned economy, the government determines what should be produced, how to create it, and for whom it should be produced (Khmelnitskaya, 2019).

Additionally, in the USSR, planned economic management procedures took various forms and employed a range of techniques during different historical periods. Five-year plans served as the foundation for managing the nation's economy during the peak of the planned economy (1929– 1970). Targeted comprehensive programs, a new planning tool with an even higher degree of directivity, were added to the five-year plans as their efficacy began to wane in the early 1980s. These programs allow the state's (region's) resources to be focused on solving a limited number of significant economic issues, establishing specialized program management organizations, setting a precise timeline for problem-solving, and formulating a plan of action (Brade & Rudolph, 2017).

However, directive plans and programs came to an end with the dissolution of the USSR and the nation's shift from a planned to a market economy in the early 1990s. During the subsequent three decades, Russia's federal and regional governments created suggestive planning documents (concepts, plans, and programs) that did not require economic entities to adopt them.

Currently, Russia faces a range of existential issues and significant, potentially fatal challenges. These

include ensuring an innovative breakthrough, expanding import substitution, diversifying the national economy's structure, strengthening interregional relations, increasing incomes, and improving the population's standard of living.

Discussions regarding the viability of planning within a market economy (at both national and regional levels) have largely concluded due to the advancement of developed nations, the evaluation of national historical experience, and the findings of scientific research conducted byRussian and international scholars (Lapina, 2019). Consequently, the answer is clear: To address the extensive socioeconomic issues faced by our nation, we need effective planning mechanisms, a substantial increase in the level of market economy planning, and comprehensive planning coverage at every economic territorial level.

The planning of the nation's and regions' socioeconomic development was largely overlooked by the Russian scientific community in the 1990s and early twenty-first century. The primary focus of domestic scientists was on intra-firm planning concerns at the level of individual economic units, such as companies, businesses, and enterprises. At that time, the command economy structure was dissolving, and planning at the national and provincial levels was regarded as a relic. To put it simply, the federal statute establishing the framework for our nation's economic strategy was only passed in 2014, over 20 years after the market began its transformations (Kolossov & O'Loughlin, 2018).

An important exception to this trend was the research on territorial planning and forecasting techniques conducted by experts from the Council for the Study of Productive Forces of the Russian Academy of Sciences between 2000 and 2005. This research allowed for the realization, development, and expansion of conventional ideas of territorial development, which originated during the era of a directive planned economy.

The creation and implementation of the strategic planning law in 2014 marked the beginning of a renewed scholarly interest in economic planning at the national and regional levels. However, most research and publications during this period, including many large-scale and high-quality works, focused on long-term strategic planning. Indicative documents are ideas and tactics that liberal economic theory considers perfectly legitimate and practical in a market economy as a means of linking national tasks to everyday economic activities (Shubenkova, 2020).

However, there is a significant lack of research on medium-term planning issues at the regional level, particularly regarding how to improve its forms and methods in light of the new realities of the information and innovation economy and the foreign economic challenges that Russia faces in the twenty-first century. To enhance the planning of socio-economic growth at the regional level, extensive and in-depth studies appear necessary to develop new techniques and tools.

Central planning, where the government establishes production goals for various industries and allocates resources accordingly, is a primary characteristic of a planned economy. In a planned economy, the government prioritizes certain industries and investments to achieve national objectives, leading to economic growth and development. In Russia's case, the Soviet Union governed the country from 1922 until 1991, during which time it maintained a planned economy. The government had comprehensive control over the economy, including the creation and planning of cities. Consequently, large industrial cities like Moscow and St. Petersburg were developed to support extensive production and industry.

However, the planned economy also had significant drawbacks, such as inefficiencies, a lack of creativity, and uneven progress. Russia's transition to a market economy following the collapse of the Soviet Union in 1991 led to notable changes in urbanization patterns within the country. Researchers can investigate whether the planned economy contributed to the growth of large industrial cities at the expense of smaller towns and rural areas by examining historical trends in Russia's city sizes and population distribution (Gel'man & Lankina, 2018).

Furthermore, exploring how Russia's planned economy interacts with urbanization could clarify the long-term effects of central planning on urban development. Policymakers and urban planners can benefit from

this understanding to foster the development of more sustainable and balanced future cities.

Overall, examining the relationship between the planned economy and urbanization during that era is crucial for grasping the social and economic impacts of central planning on urban growth in Russia.

Research Problem

Since the collapse of the Soviet Union in 1991, Russia's socioeconomic landscape has undergone tremendous change as a result of the country's shift from a centrally planned economy to a market- oriented one. It is essential to know how well the planned economy influences the distribution of city sizes in order to trends of urban growth in Russia, both historically and currently (Lappo & Polyan, 2019). In order to shed light on the advantages and disadvantages of centralized economic policies, this investigation looks at the connection between urbanization, economic planning, and the distribution of city sizes that results.

The Soviet Union established a planned economy with resource allocation and output under state supervision. Perceived economic efficiency and fair resource allocation were the goals of this system. As a result, cities were created with political and economic objectives in mind, emphasizing the construction of industrial centers that could house sizable populations. Major cities grew disproportionately as a result of the planned economy, despite efforts to build balanced urban centers (e.g., Moscow and St. Petersburg) at the expense of rural communities and smaller towns.

In a system that was first created to support equal economic opportunity, this urban over- concentration calls into question the general economic and social sustainability of smaller cities. The centralization of economic activity may result in inequitable resource allocation, ultimately worsening socioeconomic inequality (Leksin, & Shvetsov, 2018). To comprehend the implications for policy formation, it is essential to analyze the uneven distribution of people and economic activity across urban regions during the planned economy.

The legacy of the Soviet Union's planned economy is one of the main obstacles to urban growth in Russia. Urbanization and industrialization were primarily driven by the demands of the state during the Soviet era, when urban growth was highly organized and regulated by the government more than regional tastes or market factors. Large, industrial cities grew quickly as a result of this top-down strategy, frequently at the expense of smaller communities and rural areas.

The size distribution of Russian cities has been permanently impacted by the legacy of this planned urbanization. During the Soviet era, big cities like Moscow, St. Petersburg, and other important industrial hubs experienced enormous growth in population, infrastructure, and investment. Smaller towns and rural areas were ignored in the meantime, which caused depopulation, internal migration to urban areas, and economic deterioration in many locations. The uneven development of urban regions throughout Russia is evidence of the success of the planned economy in determining the size distribution of Russian cities (Lapina, 2019).

Mega-regions have developed from large cities, drawing an excessive number of resources and investment, but smaller communities find it difficult to compete and offer their citizens essential services. In Russia, social inequality, geographical imbalances, and environmental degradation have all been exacerbated by this unequal distribution of population and economic activity. Furthermore, one of Russia's most urgent concerns is the sustainability of urban growth. Urban infrastructure, natural resources, and the environment are under stress due to rapid urbanization, population increase, and industrial development. In many Russian cities, problems like poor housing, traffic, air and water pollution, and a lack of green spaces are prevalent and hinder sustainable growth.

In order to diversify the urban environment and build more resilient and balanced urban systems, small and medium-sized communities should be encouraged to capitalize on their distinct natural resources, cultural assets, and economic capabilities (Lappo & Polyan, 2019). There are long-term issues that need to be resolved since rapid urbanization frequently results in poor infrastructure, a lack of available housing, and

environmental deterioration. The legacy of a planned economy had a lasting impact on the growth of metropolitan centers as Russia moved toward a market economy.

Understanding the growth of city size became more difficult during this transitional time due to notable changes in economic activity, population distribution, and the sociopolitical dynamics inside cities. Assessing the impact of the planned economy's remains on present-day city sizes is crucial to determining how successful the planned economy system was.

The urbanization of Russia was shaped by the planned economy of the Soviet Union, particularly through state-directed industrialization, investment, settlement policies, and the organization of economic activity across regions. Previous research has shown that Soviet policies influenced the location and development of cities and industrial centres, while the transition to a market economy subsequently altered patterns of population and economic activity (Lappo & Polyan, 2019).

However, the long-term structural relationship between the Soviet economic legacy and post-Soviet urbanization remains an important area for empirical investigation. In particular, it is necessary to distinguish between the historical planned economy itself and the contemporary indicators that can be observed in regional data. The planned economy is a historical institutional system and cannot be measured directly using a single contemporary variable. Therefore, this study uses industrial output and government expenditure as observable proxies for dimensions of industrial activity and public resource allocation, while historical information on Soviet-era industrial cities is used to identify the persistence of industrial structures associated with the Soviet period.

The study takes the Russian region (federal subject) as its unit of analysis rather than the Federal District. The Federal Districts are used only as broader geographical groupings for examining regional differences. Within this framework, the research focuses on three related empirical questions: the relationship between industrial activity, government expenditure, and regional urbanization; whether the relationship between urbanization and regional productivity differs between the Soviet and post-Soviet periods; and whether historical Soviet industrialization patterns remain associated with urbanization in post-Soviet Russia.

This approach allows the study to examine the structural legacy of the planned economy using variables that are actually available in the regional data, without treating contemporary industrial output or government expenditure as direct measures of the historical Soviet planning system.

Research Objectives

This study aims to examine the structural relationship between the legacy of the Soviet planned economy and urbanization in Russia using regional-level evidence. In particular, the study focuses on observable economic indicators and historical industrial structures that can be examined empirically.

The specific objectives are:

1. To examine the relationship between industrial activity, government expenditure, and urbanization across Russian regions.

2. To examine whether the relationship between urbanization and regional productivity differs between the Soviet and post-Soviet periods.

3. To examine whether historical Soviet industrialization patterns remain associated with urbanization trends in post-Soviet Russian regions.

Research Questions

The study seeks to answer the following research questions:

1. What is the relationship between industrial activity, government expenditure, and urbanization across Russian regions?

2. Does the relationship between urbanization and regional productivity differ between the Soviet and post-Soviet periods?

3. Are historical Soviet industrialization patterns associated with urbanization trends in post-Soviet Russian regions?

Test of Research Hypotheses

The hypotheses are formulated as null hypotheses so that they can be tested against the statistical results reported in Chapter 4.

H01: Industrial activity and government expenditure are not significantly associated with regional urbanization in Russia.

H02: The relationship between urbanization and regional productivity does not differ significantly between the Soviet and post-Soviet periods.

H03: Historical Soviet industrialization patterns are not significantly associated with urbanization trends in post-Soviet Russian regions.

Significance of Study

Analyzing the impact of the structural effects of the Soviet planned economy on urbanization offers insights into the nation's economic growth, urbanization process, and size distribution of Russian cities. Researchers can gain a better understanding of how central planning and government intervention affect urbanization patterns by examining city growth and dispersion in Russia under a planned economy. Examining how the planned economy affected the distribution of population and economic activity in Russian cities is one of the main focuses of this research.

Planned economies are characterized by governmental regulation and control over pricing, distribution, and production. Since the government influences how resources and investments are allocated in various areas, this can directly impact the location and size of cities. The concept of agglomeration economies can also be better understood by analyzing the size distribution of Russian cities under planned economies. Agglomeration economies refer to the advantages that businesses and individuals obtain from being located near one another in a city. In a planned economy, economic activity may have been concentrated in specific metropolitan centers due to government policies that favored certain industries or geographical areas.

Moreover, researching how the planned economy interacts with the size distribution of Russian cities can illuminate governmental initiatives on regional inequality and urban expansion. Large industrial cities may have grown at the expense of smaller towns and rural areas as a result of planned economies. Policymakers must understand these spatial patterns to address inequality concerns and promote equitable regional development. In essence, research on the impact of the planned economy on the size distribution of Russian cities is significant for reasons beyond academic study. Policymakers and urban planners can utilize this research to better grasp how government intervention shapes regional development, economic growth, and urbanization trends.

By examining the historical patterns and dynamics of urbanization in Russia, researchers can contribute to the development of more effective strategies to support equitable and sustainable urban growth in the future.

Structure of the paper

This paper is divided into five chapters. The first chapter sets the stage by discussing the background of this

study, the problem that prompted the research, the aims and objectives, the research questions it seeks to answer, and the significance of the study. The second chapter willprovide a robust literature and theoretical framework for this research. It analyzes a multitude of theories and scholarly works that will guide the study. The third chapter will outline the research methodology employed to collect and analyze data for this study. The fourth chapter presents the results and analysis of the collected data, using it to critically address the four research questions posed. The fifth chapter offers a summary of the study's findings, the practical implications, and future recommendation.

THEORETICAL FRAMEWORK AND LITERATURE REVIEW

Theoretical Framework

This section discusses key theories that help us conceptualize the structural effects of the soviet planned economy on urbanization in Russia.

Marxist-Leninist Economic Planning

The Marxist-Leninist economic planning is deeply rooted in Marxism, developed by Karl Marx, and Leninism, developed by Vladimir Lenin, who was a prominent figure during the 1917 Russian Revolution. This Marxist-Leninist economic planning is a centrally planned economic system where the state fully controls production, resource allocation, and distribution to achieve socialist goals (Hussein, 2022).

The cardinal principle in Marxist-Leninist economic planning is that there shall be a centralized economic planning with the government being the central authority directing all economic activities in the state, all means of production in the state are nationalized and controlled by the government, controlled labour and migration, reducing class difference, collectivization of agriculture, and industrialization as economic priority (Melnik, 2021).

According to the study of Hanson (2001), ‘Marxism–Leninism’ was the formal name of the official state ideology adopted by the Union of Soviet Socialist Republics (USSR). Thus, this Marxist- Leninist economic planning was formally adopted by the Government as the economic and political ideology through the Five-Year Plans (1928–1991), which shaped urbanization, industrial distribution, and infrastructure development in the soviet era. Therefore, this Marxist-Leninist economic planning provides a strong theoretical foundation for analyzing the structural effects of the planned economy on soviet urbanization.

Rank Size Rule (RSR)

The Rank Size Rule (RSR) explains how the population sizes of cities within a nation or region relate to one another. According to the RSR, the population of the largest city in a given nation or region is proportionate to that of the second-largest city, which is proportionate to that of the third- largest city, and so on.

In the 1940s, geographer George Zipf was the first to propose the Rank Size Rule. According to Zipf, the population of cities tends to follow a predictable pattern in many nations and areas across the world, with the largest city being significantly larger than the second largest, which is then significantly larger than the third largest, and so on. Numerous nations and areas, including the US, Canada, Brazil, and nations in Europe and Asia, have been proven to be subject to the Rank Size Rule.

Nevertheless, there are numerous exceptions to the rule, especially in nations where the population is more evenly split between cities or when the size of the cities varies significantly. The Rank Size Rule emphasizes the significance of the biggest city in a nation or region, which is one of its main ramifications. The biggest city frequently acts as the political, cultural, and economic hub, drawing talent, investment, and companies from other cities. Disparities in development and quality of life between the largest metropolis and smaller cities may result from this concentration of resources and opportunities in the latter.

All things considered, the Rank Size Rule is a helpful tool for comprehending how people and economic activity are distributed within a nation or region. Although it is not a perfect model and does not always apply, it offers important insights into the trends of urban development and expansion. The majority of conversations regarding the importance of the rank-size rule have been directly related to attempts to integrate and create connections with other urban theories. Up until now, the primary focus has been on establishing a theoretical agreement between the hierarchical concept of city types, which suggests a discrete distribution of city sizes, and the rank-size rule, which is predicated on the assumption of a continuous distribution.

Although Parr's recent work on city size models (Laherrere, 1998) provides an excellent overview of the issue, we will only reiterate his key findings here. Initially, the rank-size rule's suitability for central place models of city i.e should always be examined in relation to a certain model because they are very different from one another. In general, the restricted models are rarely compatible with the continuous rank-size distributions, although the open models may be.

However, rank-size distributions do have adequate latent hierarchical structures (within realistic Limits), indicating that the rank-size distribution has a higher level of validity and might be used as a test to assess hierarchical city size models.

Institutional Economics

Understanding how institutions and the evolutionary process influence economic behavior is the main goal of institutional economics. Thorstein Veblen's instinct-driven division between technology and the "ceremonial" realm of society served as its first focal point. Walton H. Hamilton's 1919 essay in the American Economic Review is the source of its name and essential components (Kapp, 2011).

A more comprehensive examination of institutions is the focus of institutional economics, which sees markets as the outcome of the intricate relationships between these different institutions (e.g., individuals, corporations, states, and social norms). As a prominent unorthodox approach to economics, the previous tradition is still practiced today (Chang, 2002). The reduction of institutions to merely nature, technology, and tastes is rejected by "traditional" institutionalism (see naturalistic fallacy) (Cheung, 1970) Flavors,

In addition to defining the character of institutions, future expectations, behaviors, and motivations also constrain and mold them. People's worldviews are shaped if they regularly live and work in institutions. The legal underpinnings of an economy (see John R. Commons) and the evolutionary, habitual, and volitional processes through which institutions are established and subsequently modified (see John Dewey, Thorstein Veblen, and Daniel Bromley) are at the heart of this traditional institutionalism (and its contemporary counterpart institutionalist political economy). Instead of supposing fixed desires, rationality, and equilibrium, institutional economics emphasizes learning, bounded rationality, and evolution.

In the early 20th century, it played a major role in American economics, encompassing such well- known but varied economists as Thorstein Veblen, Wesley Commons, John R., and Mitchell. Because he defined capitalism as a historically bounded social system, Karl Marx is seen by some institutionalists as a member of the institutionalist tradition.

However, other institutionalist economists disagree with Marx's definition of capitalism, believing that its defining characteristics—markets, money, and private ownership of production—are actually changing over time, but as a result of people's deliberate actions. The new institutional economics of the latter 20th century, which incorporates later neoclassical economic advancements into the analysis, is a noteworthy variation. Since John R. Commons published the Legal Foundations of Capitalism in 1924, law and economics have been a prominenttopic. The function of law (a formal institution) has been the subject of intense discussion ever since on economic expansion.

Another distinguishing feature of institutional economics is behavioral economics, which is grounded in

psychological and cognitive scientific knowledge rather than naive theories of economic behavior. The idea of "institution" is so fundamental to all social science that it makes no sense to use it as a catchphrase for a certain theoretical school, according to critics of institutionalism. Consequently, the ambiguous definition of the term "institution" has led to a confusing and never-ending debate regarding whether academics are "institutionalists" and what should be the central idea of the theory.

To put it another way, the reason institutional economics has gained so much traction is that it ultimately means everything to everyone is what nothing means.

The Concept of Planned Economy

In a planned economy, capital goods are allocated, investments are made, and production is carried out in accordance with the production and economy-wide plans. Centralized, decentralized, participative, or Soviet-style economic planning can all be used in a planned economy (Alec, 1987). The particular kind of planning mechanism used determines how central or decentralized participation and decision-making are (Gregory, 2003). While some socialist states, like the former Socialist Federal Republic of Yugoslavia, have embraced some degree of market socialism, socialist regimes modeled after the Soviet Union have employed central planning. Direct calculation takes the place of factor markets in market abolitionist socialism as the method of coordinating the operations of the different socially owned businesses that comprise the economy Prychito, 2002.

Some economists and computer scientists have proposed planning techniques based on developments in computer science and information technology, which are more recent approaches to socialist planning and allocation (Cottrell, 1993). Planned economies are in contrast to unplanned economies, particularly market economies, in which independent businesses that operate in markets decide on matters such as investment, pricing, distribution, and output. Indicative planning market economies are also known as blended market economies, planned market economies, or mixed market economies.

A command economy employs Soviet-style economic planning and an administrative-command structure, which were features of the former Soviet Union and Eastern Bloc prior to the majority of these nations transitioning to market economies. This emphasizes how important public ownership of production and hierarchical management are in directing resource allocation in these economies (Mandel, 1986). In the Hellenistic and post-Hellenistic world, "compulsory state planning was the most characteristic trade condition for the Egyptian countryside, for Hellenistic India, and to a lesser degree the more barbaric regions of the Seleucid, the southern Arabian, and the Parthian empires." (Wilhelm, 1985).

According to scholars, the Incan economy was a flexible type of command economy, focused on the movement and utilization of labor instead of goods (Friedrich, 1949). One perspective on mercantilism holds that it involved planned economies (Twiss, 2014) The Soviet-style planned economy in Soviet Russia developed in the wake of a continuing World War I war-economy as well as other policies, known as war communism (1918–1921), shaped to the requirements of the Russian Civil War of 1917–1923. These policies started their formal consolidation.

Gosplan was established by the Soviet Union in 1921 as an official government agency. But before the planned system of regular five-year plans began in 1928, there was a period of the New Economic Policy (c. 1921 to c. 1928). During the NEP era, Leon Trotsky was among the first to advocate for economic planning (Richard, 1973) Specialization, production concentration, and planning, according to Trotsky, could "raise soon the coefficient of industrial growth not only two, but even three times higher than the pre-war rate of 6% and, perhaps even higher." (Rogovin, 2021) Historian Sheila Fitzpatrick claims that the general view among academics was that Stalin hijacked the Left Opposition's stance on issues like collectivization and industrialization (Fitzpatrick, 2010). Following World War II, from 1939 to 1945, the governments of France and Great Britain used dirigisme, or non-coercive methods, to guide the economy.

Historical Development of the Planned Economy in Russia

The government owned and managed the means of production, distribution, and trade of goods and services in Russia's planned economy, commonly referred to as a centrally planned economy. Throughout the majority of the 20th century, particularly during the Soviet era, this structure dominated the Russian economy. Russia's planned economy has its origins in the 1917 BolshevikRevolution, in which Vladimir Lenin's team toppled the Tsarist government and founded the Soviet Union.

The Soviet Union had serious economic problems in its early years, such as widespread poverty and limited industrial productivity. (Goldman, 1998). The Soviet leadership responded to these difficulties by enacting a number of economic changes that were intended to consolidate authority over the financial system. The creation of a system of five-year plans was one of the main characteristics of the planned economy. Government officials carefully designed these plans, which set precise output goals for many industries and economic sectors.

Up until the Soviet Union's demise in 1991, there were five-year plans every five years after the first one was introduced in 1928. The government dominated all significant industries, including manufacturing, agriculture, and mining, under the planned economy (Gregory, 2004). In order for industries and farms to be eligible for government money and resources, they had to achieve production limits that were established for each industry. Additionally, the government regulated prices for products and services, leaving little opportunity for rivalry in the industry.

The planned economy eventually proved to be unsustainable, notwithstanding its early achievements in industrializing the Soviet Union and raising living conditions for a large number of people. Inefficiencies and pervasive shortages of consumer products resulted from the absence of market competition. Additionally, the system hindered creativity and innovation by preventing enterprises and entrepreneurs from operating freely.

As the Soviet Union faced increasing economic difficulties and rising public dissatisfaction in the 1980s, the planned economy started to fall apart. When Mikhail Gorbachev took over as head of the Soviet Union in 1985, he implemented a set of changes known as perestroika, which were intended to decentralize the economy and give more room to market forces. In the end, these changes caused the Soviet Union to fall apart in 1991, when it was discovered that the planned economy was unable to adjust to the shifting global economic conditions. Russia has since made the shift to a market economy, with differing degrees of success.

In summary, for the majority of the 20th century, the Soviet Union's planned economy was a defining characteristic. Even while it made significant progress in industrializing the nation, itultimately turned out to be unsustainable and played a role in the Soviet Union's demise. Russia's economic environment is still shaped by the planned economy's legacy.

Urbanization in Russia

Russia has seen substantial urban growth and population concentration in major cities over the past few decades, making urbanization a prominent theme. Moscow is home to more over 12 million people, making it the most populated urban center in the nation. The second-biggest city in Russia, St. Petersburg, is home to more than 5 million people and is a significant urban hub. These cities draw people from all across the nation who are looking for opportunity and advancement because they are centers of political power, economic activity, and cultural impact (Rauhut, 2014). Demographic and societal reasons have also contributed to Russia's urbanization.

As life expectancies rise and birth rates decline, the proportion of young people in the population as a whole decline, contributing to the nation's aging population. Because young people are more prone to relocate to cities in search of employment, this has caused a shift in population growth towards metropolitan areas phenomena in the country. This procedure has been motivated by a number of political,

social, and economic elements, and has had a significant impact on the growth of the nation. Russia's transition from a largely rural to an industrial and service-based economy has been one of the main causes of urbanization in the country. People have migrated to metropolitan areas in pursuit of better employment prospects, greater incomes, and higher living standards as the nation has rapidly modernized and industrialized. Since the nation has shifted to a market-based economy and many rural communities have found it difficult to adjust to the new economic realities, this trend has been especially noticeable in the post-Soviet era.

In Russia, "megacities" have grown as a result of the population's concentration in large cities. The capital and biggest city is Moscow numerous options for work, education, and other things. Significant social and economic turmoil also resulted from the Soviet Union's 1991 breakup, as many people fled to cities in order to avoid the instability and uncertainty of the transitional era. Russia's urbanization process has affected the nation's development in a variety of ways. The strain on big cities' infrastructure and services has been one of the most notable consequences. Cities have found it difficult to meet the demands of their citizens as population expansion has exceeded their ability to supply sufficient housing, transportation, healthcare, and other necessities. This hasresulted in urban issues such as pollution, traffic jams, and overpopulation that have lowered the standard of living for a large population in urban areas (Lankina & Libman, 2015).

The Russian government has responded to these issues by enacting several laws designed to enhance urban quality of life and encourage sustainable urban growth. In order to make cities more livable and appealing to citizens, they include investments in green spaces, affordable housing, public transportation, infrastructure, and other amenities. To lessen the strain on megacities like Moscow and St. Petersburg, the government has also promoted the growth of secondary and tertiary cities (Arapov, 2017).

All things considered, Russia's urbanization process is intricate and multidimensional, influenced by a range of political, social, and economic factors. Economic progress, social mobility, and cultural diversity have all benefited greatly from it, yet it has also produced several issues that need to be resolved to guarantee the long-term viability and development of Russia's cities. Russia can maintain its prosperity in the twenty-first century by enacting astute, progressive policies and making investments in the welfare of its metropolitan citizens.

Size Distribution of Cities

With a land area of more than 17 million square kilometers and eleven time zones, Russia is the largest country in the world. Russia, which has a population of over 145 million, is home to a wide variety of cities, from thriving metropolises to little rural communities. In Russia, historical, topographical, and economic considerations play a major role in the distribution of city sizes (Henderson, 2003). Moscow, the capital and political hub of Russia, is the country's largest metropolis of the nation. Moscow is home to more than 12 million people, making it both the largest metropolis in Russia and one of the biggest in Europe. Moscow is a significant center of politics, the economy, and culture that draws people from all across the nation who are looking for better chances and a higher standard of living. Along with its thriving arts and entertainment scene, the city is known for its famous attractions, including Red Square, the Kremlin, and St. Basil's Cathedral.

With a population of more than 5 million, Saint Petersburg is the second-largest city in Russia after Moscow Known as Russia's cultural capital, Saint Petersburg draws both locals and visitors with its stunning architecture, important historical sites, and top-notch museums (Combes, 2008).

The With a significant presence in sectors including shipbuilding, aerospace, and defense, the cityis also a significant port and industrial hub. There are a number of other significant Russian cities outside of Moscow and Saint Petersburg, such as Novosibirsk, Yekaterinburg, and Nizhny Novgorod. In addition to providing a high standard of living and a variety of facilities and services, these cities act as regional centers of the arts and economy.

For instance, Yekaterinburg is well- known for its industrial and manufacturing capacities, while

Novosibirsk is the biggest city in Siberia and a significant hub for research and technology. On the opposite extreme, Russia also has a large number of small and medium-sized towns and cities, especially in rural and isolated regions.

The populations of these cities frequently range from a few thousand to a few hundred thousand inhabitants, and they usually act as regional administrative hubs. Due to issues including dwindling populations, dilapidated infrastructure, and a lack of economic possibilities, many of Russia's smallest communities are undergoing continuous development and revitalization initiatives. Generally speaking, Russia's wide geographic range and diverse population are reflected in the size distribution of its cities.

Even if big cities like Saint Petersburg and Moscow have the most people and economic activity, smaller towns and cities are essential to the growth of rural areas and the region. The size distribution of Russia's cities is expected to change as the nation continues to modernize and urbanize, with continuous initiatives to support sustainable growth and development throughout all cities.

Factors Influencing Urban Size

Numerous historical and modern causes have an impact on the size of Russian cities. These elements are crucial in determining how the nation's cities develop and prosper. The following are some of the key elements affecting Russian cities' sizes:

1. Historical factors: The size and form of Russian cities have been influenced for a long time by their historical growth. Numerous Russian cities were founded centuries ago and have expanded over time as a result of trade, industry, and governmental influence (Bivand, 2013). As a result, major cities like Moscow and St. Petersburg have grown in size in strategic areas of the nation.

2. Economic considerations: Economic considerations play an important part in establishing the dimensions of Russian cities. Cities with robust economies and flourishingbusinesses are more likely to draw a sizable population, which will cause them to expand. For instance, Tyumen and Surgut, two cities with a thriving oil and gas industry, have seen substantial population expansion in recent years.

3. Development of infrastructure: The development of Russian cities depends on the existence of contemporary infrastructure, including roads, railroads, and airports. Cities that have developed infrastructure are more appealing to people and businesses, which causes them to grow in size. Cities with inadequate infrastructure, on the other hand, would find it difficult to draw in new citizens and businesses, which could cause them to stagnate or shrink in size.

4. Government regulations: Government rules and policies significantly affect the size of Russian cities. For instance, financial incentives, urban planning rules, and zoning restrictions can all have an impact on how cities develop and thrive. The Russian government has expanded the size of smaller cities in recent years by implementing several measures to encourage urbanization and economic development.

5. Demographic factors: The size of Russian cities is also influenced by demographic trends, including population growth, migration patterns, and aging populations. While cities with diminishing populations may shrink, those with high rates of population increase are more likely to grow. The size of Russian cities is also significantly influenced by migration from rural to urban areas.

6. Social and cultural aspects: The size of Russian cities is also influenced by factors including social services, cultural amenities, and quality of life. Cities with a high standard of living, excellent healthcare and educational resources, and cultural attractions are more likely to draw people and businesses, which will increase their size (Smith, 2015). In general, a complex interaction of historical, economic, infrastructure, governmental, demographic, and cultural elements affects the growth of Russian cities. Policymakers, urban planners, and developers must have a thorough understanding of these elements to make well-informed judgments on the expansion and advancement of the nation's cities.

Economic Theories Related to Urban Distribution

The theory of spatial equilibrium

According to this theory, economic agents, including businesses and households, will base their decisions about where to locate their operations on several variables, including the cost of laborand land, transportation costs, and the demand for their goods and services. According to the idea, economic activity will be allocated in a fully competitive market so that wages and prices are equal across all places, resulting in geographical equilibrium.

A fundamental tenet of spatial equilibrium theory is that homes and businesses are completely mobile and Agglomeration economies, or the advantages that businesses and people can obtain from situating themselves adjacent to one another, are another aspect of spatial equilibrium theory that is highlighted. Lower transportation costs, greater access to a labor pool, and chances for innovation and knowledge sharing are some of these advantages.

Agglomeration economies have the potential to create economic centers, innovation hubs, and industrial districts by causing economic activity to concentrate in specific areas. The value of a place's output less its production expenses is known as location rent, and it is the central idea of spatial equilibrium theory. When there is spatial equilibrium, location rents are distributed evenly among several sites, guaranteeing effective and creative distribution of economic activity. However, in the presence of market imperfections, such as monopolistic competition or externalities, location rents may not be entirely equalized, resulting to distortions in the geographical distribution of economic activities.

The theory of spatial equilibrium has significant ramifications for urban planning and regional development policy. Policymakers can create interventions to support more sustainable and balanced patterns of economic development by having a better grasp of the factors that affect the spatial distribution of economic activities. This could entail making land use rules to control urban sprawl, investing in infrastructure to lower transportation costs, or assisting certain industrial clusters to promote innovation and expansion. In essence, spatial equilibrium theory offers a useful framework for examining how economic activity is distributed over space and comprehending the factors influencing regional growth.

Hierarchy Urban Theory

In urban geography, the idea of "urban hierarchy theory" looks at how cities are arranged and structured in relation to their size, population, and purposes. According to this hypothesis, cities are not dispersed at random but rather adhere to a hierarchical structure in which, within a region or nation, larger cities typically rule over smaller ones. The idea aids in the explanation of the relationships between cities and their roles within a larger urban system.

The fundamental tenet of the urban hierarchy theory is that different cities have different sizes and purposes, resulting in a hierarchical system in which some cities have more important responsibilities than others. Usually, this hierarchy is divided into a number of levels, with smaller, less significant cities at the bottom and the biggest, most powerful cities at the top. With the biggest and most significant city at the top and a string of smaller cities descending from it, the hierarchy is frequently shown as a pyramid.

This structure of hierarchy represents how resources, services, and economic activity are distributed throughout an area; larger cities are usually used as centers for trade, business, and cultural events. The idea of centrality, which describes the extent of a city's significance and power within the urban system, is another idea that the urban hierarchy theory highlights. Because of their size, population, economic clout, and cultural importance, central cities are frequently able to influence neighboring cities and regions more strongly.

Because different cities may excel in particular industries or services that contribute to their place within the hierarchy, the theory also acknowledges the significance of functional specialization within the urban hierarchy. A city could be a center for manufacturing, finance, or culture, for instance. Depending on its

size, resources, and position in the urban hierarchy, it may be a destination or a transportation hub.

All things considered, urban hierarchy theory offers a framework for comprehending how cities are arranged spatially and relate to one another within a region or nation. Urban geographers can learn more about how cities change, grow, and interact with one another in the intricate urban landscape by looking at the relationships between cities of all sizes and purposes. In a regional setting, this theory aids politicians and urban planners in making well-informed choices on resource allocation, economic growth, transportation planning, and urban development.

Empirical Literature Review

Kolomak, E. (2024) delved into Urbanization and Economic Development in Russia. This study uses panel data econometric analysis of 79 Russian regions from 2000 through 2008, with fixed effects models to study the impact of urbanization on regional productivity. Findings: The research finds urbanization to stimulate regional productivity but suffering diminishing returns as cities grow bigger; large cities confer small additional productivity effects. Urbanization resources continue to be underutilized, with cities exerting positive spillovers for neighboring areas. Recommendations: The author recommends that active urban development management be promoted, along with networks between agglomerations and small- and medium-sized cities to maximize the benefits of urbanization.

McGranahan, G., Martine, G. (2023) studied Russian Urbanization in the Soviet and Post-Soviet Eras. Methods: Using historical analysis and demographic analysis, this paper links urban growth to political, economic, and social processes of Soviet central planning and post-Soviet transition. The findings showed that the Soviet planned economy had shaped urban structures by focusing on industrial cities, often at the expense of economic efficiency and natural geographic advantages. The post-Soviet period sees spatial restructuring and migration favoring economically viable cities. Policymakers need to bear in mind the costs of ignoring market incentives.

Smith, J., Ivanov, A. (2023). Urbanization and Productivity: Global and Russian Perspectives Methods: This comparative quantitative study-analyzing global urbanization and productivity data in the case of Russia. They found that urbanization tends to boost productivity in service sectors in developed economies but provides a mix of results in developing ones, such as Russia, probably from the legacy of the planned economy. They recommended the adjustment of urban policies to fit the local economic context and the advancement of the service sector in Russian cities.

Petrova, L. (2022). The Workings of Structural Transformations in Russian Urbanization: Legacy of Planned Economy. The study combined qualitative case studies with quantitative regional data analysis during the period 2000-2015 to investigate urban structural changes. They found that the planned economy led to the creation of urban centers in relatively inhospitable locations, producing an inefficient network of cities. The transition to a market economy has initiated urban shrinkage in some cities and growth in others. The study recommends concentrating on economic diversification and infrastructure modernization of legacy cities while encouraging sustainable urban growth in economically viable regions.

Ivanova, N., Sokolov, D. (2022). Economic Growth and Urbanization in Russia: Some Empirical Evidence. Using a regression analysis for regional GDP per capita and urbanization indicators from the period of 2000-2010, the present study attempts to determine their relationship. It was found that the relationship between urbanization and economic growth is positive but nonlinear; over-concentration of urban areas might actually hinder productivity gains. The authors suggested that the growth of urban areas should be balanced with regional development policies to prevent any negative agglomeration effects.

Kuznetsov, V. (2021). The Impact of Soviet Planning on Contemporary Russian Urban Systems: An attempt at a spatial and historical perspective. This research involves the use of historical GIS mapping and spatial econometrics to study urban systems.In particular, it was found that Soviet planning generated dispersed industrial cities with rather weak economic bases, whereas post- Soviet market forces seem to operate for the consolidation into few major urban hubs.The study therefore recommends to foster regional

economic specialization and to enhance connectivity between cities.

Makarov, P., and Lebedev, A. (2021). Urbanization and Regional Productivity in Russia". Methods: Panel data analysis of urban population shares and productivity indicators over the period 2000-2015 inform the testing of urbanization effects. Findings: Urbanization can stimulate productivity growth but with decreasing returns; further increases in city size have minor positive impacts on productivity. They urge the need for investment in medium-sized cities and the development of an even urban network to foster productivity growth.

Gap in Empirical Literature

There has been considerable empirical research on Russian urbanization, regional economic disparities, and the historical development of Soviet cities. Existing studies have documented the importance of industrialization, regional planning, migration, and state intervention in shaping the spatial organization of Russian cities and economic activity (Lappo & Polyan, 2019). Research on Soviet urban systems also shows that industrialization and state policies played an important role in the development and distribution of urban centres.

Nevertheless, several empirical issues remain open. First, there is a need to examine more systematically the relationship between observable indicators of industrial activity, government expenditure, and regional urbanization. Since the historical planned economy cannot be directly observed in contemporary regional data, these indicators need to be treated as proxies for particular dimensions of the economic structure associated with the Soviet period rather than as direct measures of central planning.

Second, although previous studies have examined the relationship between urbanization and economic performance in Russia, there remains scope to examine whether this relationship differs between the Soviet and post-Soviet periods. Distinguishing these periods provides a way of considering whether the relationship between urbanization and regional productivity changed following the transition from the Soviet system to a market-oriented economy.

Third, the persistence of Soviet industrialization patterns in post-Soviet regional urbanization remains relevant. Previous research has identified continuing structural features of Soviet-era industrial development in contemporary Russian cities and regions. However, further regional-level evidence can help clarify whether historical industrial structures remain statistically associated with contemporary urbanization.

This study addresses these gaps by focusing on Russian regions as the unit of analysis and by combining descriptive and trend analysis with panel-data regression. The empirical analysis therefore does not attempt to estimate a single direct causal effect of the historical planned economy. Instead, it examines relationships between urbanization and observable economic indicators and considers whether historical industrial structures remain associated with contemporary urbanization patterns.

METHODOLOGY

This chapter discusses the research methodology used in this study, explaining the research design, the reason the research design was chosen, data collection method, ethical considerations in conducting this research, and the limitations of this research methodology.

Research Design

This study adopts a quantitative, ex-post-facto research design based on statistical and econometric analysis. The design is appropriate because the historical economic, demographic, and institutional conditions examined in the study have already occurred and cannot be manipulated by the researcher. The empirical strategy is therefore based on observed regional data to examine relationships between urbanization, migration, regional economic performance, industrial activity, government expenditure, and the historical legacy of the Soviet planned economy.

The unit of analysis is the Russian region (federal subject). The study covers 79 Russian regions, which are grouped into eight Federal Districts for the purpose of examining broader geographical patterns. The Federal Districts are therefore treated as geographical groupings of the regional units rather than as the primary unit of observation.

The quantitative analysis covers the period 1990–2024, subject to the availability of the relevant variables. In addition to contemporary regional data, historical information concerning Soviet-era industrial cities is used to identify the persistence of industrial structures associated with the planned economy.

The research combines descriptive and trend analysis with panel-data econometric methods. Descriptive analysis is used to summarize the distribution of the main variables, while trend analysis is used to examine changes in urbanization and migration over time. Correlation analysis is also used to examine the degree of association between the principal variables. Panel regression is then used to investigate the relationships specified in the empirical models. Fixed-effects and random-effects specifications are considered, with the Hausman test used to guide the choice between the two estimators.

Data Collection

This study uses secondary quantitative data obtained from publicly available statistical sources. The principal sources are the Federal State Statistics Service (Rosstat) and StatBase.ru. The data include regional population statistics, urbanization indicators, GRP per capita, industrial output, net migration, and government expenditure.

The regional data are organized at the level of Russian federal subjects. The study considers 79 Russian regions, while the eight Federal Districts are used as broader geographical groupings for supplementary regional comparisons. The observation period is 1990–2024, subject to the availability of the relevant variables. The final number of usable observations therefore reflects the availability and consistency of the variables included in the empirical analysis.

Historical information on Soviet-era industrial cities is also incorporated into the analysis. This information is used to identify the persistence of industrial structures associated with the Soviet period. It is not treated as a direct quantitative measure of the planned economy. Similarly, contemporary industrial output and government expenditure are used as observable proxies for industrial activity and public resource allocation rather than as direct measures of the historical Soviet planning system.

Variable Measurement and Operationalization

The empirical analysis uses several regional-level variables to examine the relationship between urbanization, economic performance, industrial activity, public expenditure, migration, and the historical legacy of Soviet industrialization. Because the historical planned economy is an institutional system rather than a directly observable contemporary variable, the study does not treat any single indicator as a direct measure of the planned economy. Instead, selected economic indicators and historical information are used as proxies for specific dimensions of the Soviet structural legacy.

Urbanization: Urbanization represents the degree of urban development within a region and is used as the dependent variable in the model examining the relationship between industrial activity, government expenditure, and regional urbanization.

GRP per capita: Gross Regional Product (GRP) per capita is used as an indicator of regional economic performance or productivity. It is employed as the dependent variable in the analysis examining the relationship between urbanization and regional productivity across the Soviet and post-Soviet periods.

Industrial output: Industrial output is used as an observable proxy for industrial activity and for the continuing industrial structure associated with Soviet-era development. It does not represent a direct measure of the Soviet planned economy. Its estimated coefficient therefore indicates the statistical relationship between industrial output and urbanization rather than the total effect of central planning.

Government expenditure: Government expenditure is used as a proxy for public resource allocation at the regional level. It is included to capture the relationship between public expenditure and urbanization. It should not be interpreted as a direct measure of central planning, particularly for the post-Soviet period.

Net migration: Net migration captures changes in the distribution of population across Russian regions. It provides descriptive evidence on regional population movements during the period of economic and institutional transition. The variable is therefore used to examine migration patterns rather than to establish a direct causal effect of Soviet planning on migration.

Historical industrial legacy: Historical information concerning Soviet-era industrial cities is used to identify regions with industrial structures associated with the Soviet period. This historical classification provides an indicator of industrial legacy and is used in the analysis of the continuing relationship between former Soviet industrialization patterns and contemporary urbanization.

Overall, the variables should be interpreted according to the specific relationships tested in the empirical models. The estimated coefficients represent statistical associations between the variables included in each model and should not be interpreted as direct causal estimates of the overall effect of the Soviet planned economy.

Functional Form (Linear Regression Model):

$\text{Urbanizationt} = \beta_0 + \beta_1(\text{Industrial Outputt}) + \beta_2\ (\text{Government Expensest}) + \varepsilon t$"

3.3.1 β_0 (Intercept): The baseline value of urbanization when the value of all independent variables is zero.

3.3.2 β_1: The marginal effect of industrial output on urbanization.

3.3.3 Expected sign: + (industrial growth is usually the driving factor of migration).

3.3.4 β_2: The marginal effect of government expenses on urbanization.

3.3.5 Expected sign: + (if public expenses are cast upon infrastructure/amenities, the urban population may be attracted) or ambiguous (if they are cast upon rural areas).

3.3.6 εt: The error term (capture unobserved factors).

The coefficients in the model are interpreted as estimated associations rather than causal effects. The intercept (β_0) represents the baseline level of urbanization when the explanatory variables are held at zero. The coefficient β_1 captures the estimated association between industrial output and urbanization, while β_2 captures the estimated association between government expenditure and urbanization. The error term (εt) represents other factors affecting urbanization that are not captured by the variables included in the model.

Industrial output is expected to have a positive association with urbanization because industrial activity has historically been closely connected with the development of urban centres. The expected direction of the government expenditure relationship is less certain because public expenditure may support urban development in some regions while also reflecting expenditure patterns associated with regions experiencing different demographic and economic conditions. These expectations are treated as empirical propositions to be examined rather than as assumptions of causality.

Data Analysis Method

The analysis combines descriptive statistics, trend analysis, correlation analysis, and panel-data regression. Descriptive statistics are used to summarize the main characteristics and distribution of the variables across the Russian regions. Trend analysis is used to examine changes in urbanization and migration over time and to identify broad regional patterns.

Correlation analysis is used to assess the direction and strength of the statistical relationships among the principal variables. These correlations are interpreted as associations and are not treated as evidence of causality.

Panel-data regression is then used to examine the relationships specified by the study's hypotheses. The first empirical model uses urbanization as the dependent variable and industrial output and government expenditure as explanatory variables. This model corresponds to H01 and assesses whether these observable indicators are significantly associated with regional urbanization.

The second empirical model uses GRP per capita as the dependent variable and examines the relationship between urbanization and regional productivity while distinguishing between the Soviet and post-Soviet periods. The Soviet period is defined as 1990–1991, while the post-Soviet period begins in 1992 and extends through the available observation period. An interaction between urbanization and the post-Soviet period is used to examine whether the relationship between urbanization and regional productivity differs between the two periods. This specification corresponds to H02.

The third empirical model examines urbanization in relation to the historical industrial legacy and Federal District indicators. The historical industrial-legacy measure is used to capture structural features associated with Soviet-era industrialization, while the Federal District indicators are used to account for broader geographical differences among the Russian regions. This specification corresponds to H03. The Federal District indicators are therefore supplementary measures of regional heterogeneity and are not treated as direct measures of the Soviet planned economy.

Fixed-effects and random-effects specifications are considered where appropriate, and the Hausman test is used to guide the selection between the estimators. The statistical results are interpreted in terms of estimated relationships among the variables rather than as definitive evidence of causal effects.

Ethical Consideration

This study paid attention to the following ethical considerations to ensure this paper was compiled with the highest standards of academic integrity and ethical responsibility:

1. Data privacy: This study respects the privacy of data collected in research, and that is why this paper did not consult the primary data collected in similar research papers on this subject area. Rather, this study relied on publicly available data sources, including Rosstat, historical Soviet population data, census records, and urbanization data.

1. Reliability of data: This paper ensured compliance with the use of accurate and highly reliable data. The data in this study were only obtained from reputable organizations such as Rosstat, Soviet censuses, and international databases like the United Nations world urbanization data.

1. Citation of data: To ensure academic integrity, this study's data sources were properly cited in APA referencing style.

RESULTS/ANALYSIS OF FINDINGS

This chapter presents the quantitative analysis of the data used to examine the relationship between urbanization, regional economic performance, migration, industrial activity, government expenditure, and the historical legacy of Soviet-era industrialization in Russia. The analysis is informed by Kolomak's (2018) production function framework, which emphasizes the relationship between urbanization and regional productivity.

The empirical analysis focuses on regional data and uses Gross Regional Product (GRP) per capita as an indicator of regional economic performance in the productivity analysis. Urbanization is also examined directly as an outcome variable in the first and third empirical models. Industrial output, government expenditure, net migration, and the historical industrial legacy variable are used to examine different

dimensions of regional development and the persistence of structures associated with Soviet-era industrialization.

It is important to distinguish between the historical concept of the Soviet planned economy and the variables used in the empirical analysis. The Soviet planned economy is not directly observable in the contemporary data. Therefore, industrial output and the industrial legacy measure are used as indicators of industrial structures associated with the Soviet period, while government expenditure captures public resource allocation. These variables should consequently be interpreted as empirical proxies or observable characteristics rather than as direct measures of the entire planned economy.

The analysis covers the period reported in the empirical dataset from 1990 to 2024. The empirical results are organized around three related questions. First, the study examines whether industrial output and government expenditure are statistically associated with regional urbanization. Second, it examines whether the relationship between urbanization and GRP per capita differs between the Soviet and post-Soviet periods. Third, it examines whether industrial legacies and regional location continue to be associated with differences in urbanization in the post-Soviet period.

Quantitative Analysis

Figure 4.1Summary of Descriptive Statistics

Year	RGP PER CAPITA	District Population	Urbanization	UrbR Squared	Industrial Output	Net Migration	Government Expenses
Count	286	286	286	286	286	286	286
Mean	2006.7	11716	1.811	-0.16	7770.59	73.21	5550.24
STD	10.1949	7964.86	9.98	0.07	6661.34	29.78	65434.99
MIN	305.0	7.48	9.98	-1.48	0.00	405.29	0.03

The descriptive statistics provide an initial overview of the variables used in the empirical analysis. The dataset contains 286 observations for the variables reported in the regression analysis. The mean GRP per capita is approximately 11,716, with a standard deviation of about 7,965, indicating substantial variation in regional economic performance.

The urbanization variable is standardized, and therefore its negative mean should not be interpreted as indicating a negative level of urbanization. Rather, the standardized values reflect differences in urbanization across the observations. The squared urbanization term is included to capture possible nonlinear relationships between urbanization and regional economic performance.

Industrial output also varies substantially across the observations, with a mean of approximately 7,770.6 and a standard deviation of approximately 6,661.3. In this study, industrial output is treated as an observable indicator of industrial structure and as a proxy for aspects of the industrial legacy associated with the Soviet period. It is not treated as a direct measure of the Soviet planned economy.

Net migration shows considerable variation across regions and years, reflecting differences in population redistribution. Government expenditure also varies substantially across the observations and is used as an indicator of public resource allocation. These descriptive differences provide the basis for the subsequent regression analysis.

Overall, the descriptive statistics demonstrate considerable regional heterogeneity in economic performance, urbanization, industrial activity, migration, and government expenditure. However, descriptive statistics

alone do not establish causal relationships. The regression models are therefore used to examine the statistical associations between these variables.

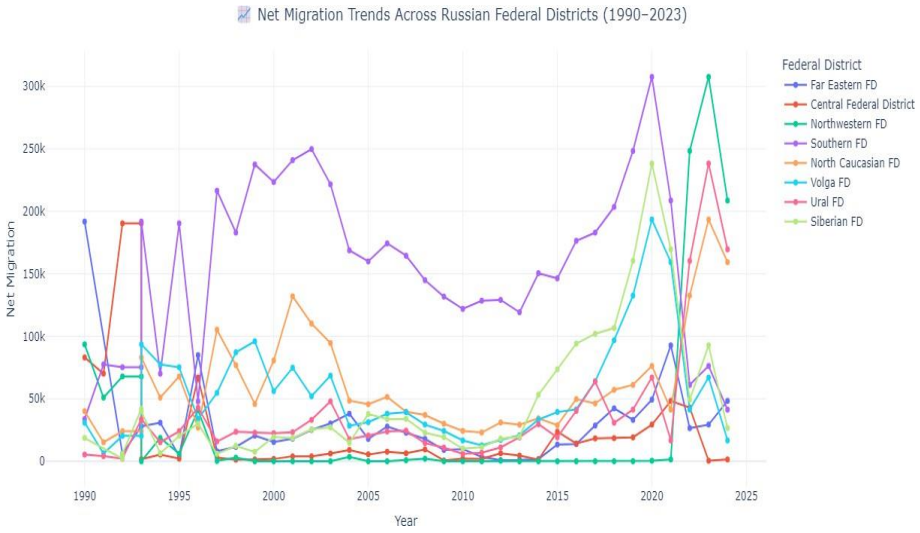
Urbanization and Migration Trend Analysis

The trend analysis provides a descriptive view of changes in migration across Russian Federal Districts over the study period. The Federal Districts are used here as geographical groupings of the regional observations and help illustrate differences in migration patterns across space.

The Central Federal District, which includes Moscow, records relatively stronger migration inflows, particularly during the post-2000 period. This pattern is consistent with the concentration of employment opportunities and economic activity in major urban centres. The Northwestern Federal District also shows periods of positive migration and represents another important urban and economic centre. In contrast, the Far Eastern Federal District shows persistent migration losses in the reported trends. The Siberian and Ural Federal Districts also display periods of declining or weak migration, although their patterns differ because of their distinct industrial and resource structures. The Volga region similarly shows variation in migration over the period.

The Southern and North Caucasian Federal Districts display comparatively different migration patterns, including periods of moderate inflows. These differences illustrate the substantial spatial heterogeneity in population movement across Russia. These trends are consistent with the broader historical context of the transition from the Soviet system to a market-oriented economy. During the Soviet period, population distribution was influenced by state-directed industrial and settlement policies, whereas post-Soviet migration increasingly responded to regional economic opportunities and other location-specific factors. Nevertheless, the trend analysis is descriptive and should not by itself be interpreted as establishing that Soviet planning caused the observed migration patterns.

Figure 4.2.Net Migration Trend



This visualization of trends in net migration across Russia's federal districts reveals both dramatic spatial and temporal shifts, not only as a testament of promising the lasting effects of Soviet-era policies, but also the transformational effect of market reforms initiated after 1991. In this scenario, Central federal district, which includes Moscow and adjoining regions were the most favourable areas for migration inflows following migrant economic interest and industrial concentration, which were the major determinants of most migrants drives. This dramatic rise coincided with an oil-boom economic growth in Russia post-2000, where all wealth, jobs, and infrastructure development started clustering in the capital. This situation exemplifies how migration has changed its character from state-directed in the Soviet times to a more market- and opportunity-based migration in the post-Soviet era, since individuals moved in search of economic opportunities in the CFD.

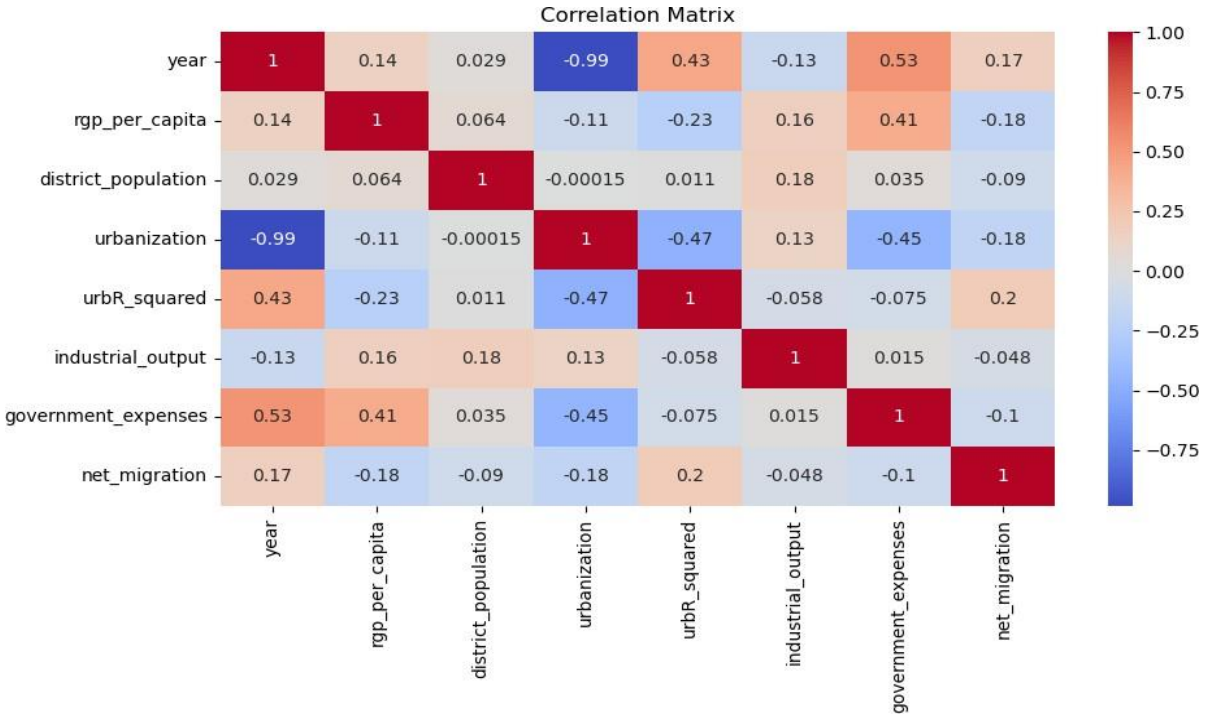
The Far Eastern Federal District, in contrast, constantly experienced huge outflows with the net migration numbers being close to or less than zero. Thus, this picture mainly mirrors the demise of Soviet-style incentives, like subsidized relocation programs, which otherwise would have prompted more population inflow to faraway areas. After 1991, geographical isolation and a lack of economic diversification cause intensive depopulating processes in the Far East. The people began to move westward, pushed into more dynamic metropolitan areas. The Siberian Federal District, a historical heartland of Soviet industrialization, clearly exemplifies post-deindustrialization and monotown decline. Net migration drooped sharply after 1990. Cities that only depended on one industry-such as coal, machinery, and others-ran down their factories and laid off a lot of workers. The population shifted to what they perceived as an economic hub-The CFD. The same applies to the Volga and Ural Federal Districts, notwithstanding being endowed with huge resources, there is either stagnation or a gradual decrease of migration. Over time, the Soviet-era industrial basis of the Volga region eroded, while the Urals' reliance on extractive industries only provided limited incentives to sustainable intact population retention.

The other contrast would be the Southern and North Caucasian Federal Districts where moderate inflows of immigrants are reported, which would probably be due to the costs of living within the regions, cultural ties with, or informal economic networks within those regions. Still, it is possible that the instability prevailing in the North Caucasus prevented growth in these zones. Northwestern Federal District is the St. Petersburg-centered "second hub," with smaller peaks compared to Moscow: it indeed acts rather as a "second-tier" economic center. Two main matters are thus highlighted. First, with the collapse of the Soviet Union, there was a rapid unraveling and transformation of state-directed migration systems into unmonitored and less-state-supported migrations outwards from internal industrialized settings into urbanized areas. Second, hitherto existing market forces have engineered increased spatial inequalities in post- Soviet areas - labor and capital have funneled themselves into Moscow, and peripheral regions have been left deprived and underdeveloped. That the CFD is dominant throws doubt on the efficacy of Soviet urbanization policy in evoking balanced regional development. Rather, the remnants of spatial mismatches, such as oversized industrial cities and underdeveloped settlement systems, are likely to occur.

Correlation Matrix

The correlation matrix provides insights into variable relationships for Russia's regional development studies. The following is an appraisal of the foremost significant corresponding association:

Figure 4.3 Correlation Matrix



The correlation matrix provides preliminary information about the relationships among the main variables. These correlations describe the degree to which variables move together but do not establish causality.

GRP per capita has a moderate positive correlation with government expenditure (0.41), while its correlation with the squared urbanization measure is negative (-0.23). The correlation between GRP per capita and net migration is relatively weak and negative (-0.18).

Urbanization has a negative correlation with government expenditure (-0.45) and with the squared urbanization term (-0.47). Its correlation with industrial output is relatively weak (0.13), suggesting that the simple bivariate relationship between contemporary industrial output and urbanization is limited in the sample.

Government expenditure has a positive correlation with year (0.53), indicating that expenditure levels tend to increase over the observed period. This relationship should be interpreted descriptively rather than as evidence that changes in government expenditure caused changes in regional economic performance.

Net migration has a weak positive correlation with the squared urbanization measure (0.20) and a weak negative correlation with industrial output (-0.048). The correlation between net migration and GRP per capita is also relatively weak (-0.18).

Taken together, the correlation results indicate that regional economic performance, urbanization, government expenditure, industrial activity, and migration are related in different ways. However, because correlations do not control for other factors, the regression analysis provides a more appropriate basis for assessing the statistical relationships relevant to the research hypotheses.

Gross Regional Product per Capita

GRP per capita has a moderate positive correlation with government expenses (0.41), suggesting that regions with higher public investment tend to be more productive. Its negative correlation with urbR squared (-0.23) calls for a diminishing returns perspective on urbanization: such high levels of urbanization (captured by the squared term) may trigger congestion costs or inefficiencies that erode productivity benefits. The weak negative relationship with net migration (-0. 18) indicates that highly productive regions may not be the key destinations for migrants, likely due to saturation effects or living costs.

Urbanization Dynamics: Urbanization is negatively correlated with government expenses (-0. 45) and urbR _ squared (-0. 47), suggesting that government priorities have shifted away from urban infrastructure after 1991, especially in areas with other high urbanization levels. The fact that it is uncorrelated with industrial _ output (0. 13) refutes the notion that industrial legacies were highly influential in shaping urbanization patterns; instead, this implies that post- Soviet market forces might be exerting influence in their stead.

Government Expenses: An increasing level of government spending over time is reflected in the positive correlations between government expenses and year (0. 53) that are likely tethered to recent interventions aimed at infrastructure modernization or addressing regional inequalities. It relates to GRP per capita (0. 41), indicating that even in the context of diminishing influence in recent years, state spending still has a pronounced effect on economic outcomes.

Net Migration: Net Migration shows a weak positive correlation with urbR_squared (0. 20), implying that migration very slightly favors regions of moderate and high urbanization, but not those that are overly congested. Its weak ties with industrial _ output (-0. 048) or GRP per capita (-0.18) suggest that migrants are inclined to look for factors other than productivity, such as employment opportunities in the service sectors or informal economies.

The post-Soviet regional dynamics are far more complex than previously inferred. Variables associated with the Soviet system, like industrial _ output, have limited influence at best; rather, government expenses and nonlinear aspects of urbanization (urbR _ squared) emerge as pivotal factors. The apparent negative correlation between year and urbanization will require thorough scrutiny to clarify measurement concepts.

Findings resonate with the present study's focus on path- dependent societal structures and Soviet legacies versus market-based urbanization.

Analysis of Post-Soviet Migration and Soviet Industrial Decline

	Net Migration	Industrial Output
Net Migration	1.000000	-0.221136
Industrial Output	-0.221136	1.000000

The correlation between net migration and industrial output is -0.2211. This indicates a negative association between the two variables in the observed data. In descriptive terms, regions with higher levels of industrial output tend to be associated with lower net migration values.

This relationship is consistent with the possibility that some regions with substantial industrial structures inherited from the Soviet period experienced population losses during the post-Soviet transition. Many industrial centres were historically developed around particular industries, and changes in economic conditions after 1991 may have altered the employment opportunities available in these locations.

However, the correlation coefficient does not demonstrate that Soviet industrialization itself caused subsequent out-migration. Migration decisions may also reflect employment opportunities, regional income, infrastructure, public services, resource availability, and other factors that are not captured by this bivariate relationship.

The result therefore provides descriptive evidence consistent with the study's broader argument concerning the persistence of industrial structures and population redistribution after the transition from the Soviet economy. It also supports the need to interpret industrial output as a proxy for industrial structure rather than as a direct measure of the Soviet planned economy.

Hausman Test

The Hausman test was conducted to determine whether the fixed-effects or random-effects estimator was more appropriate for the panel-data analysis. The null hypothesis of the Hausman test is that the individual-specific effects are not systematically correlated with the explanatory variables.

The reported Hausman statistic is 0.0809 with 2 degrees of freedom and a p-value of 0.9604. Since the p-value is considerably greater than conventional significance levels, the null hypothesis is not rejected. On this basis, the random-effects specification is retained for the panel regression reported in the study.

The use of the random-effects specification allows the analysis to account for unobserved differences across the regional observations while estimating the relationships between the observed explanatory variables and the dependent variable. The result should be understood as a statistical specification choice based on the Hausman test and should not be interpreted as evidence that unobserved regional characteristics are unimportant.

Statistic	0.0809
Degrees of Freedom	2
P-Value	0.9604

High p-value (0.9604) far exceeds conventional significance thresholds of 0.05 or 0.10). This means we fail to reject the null hypothesis, indicating no significant correlation between the unobserved regional effect. The random effect model is therefore appropriate for the study.

Assessing the Relationship between Industrial Activity, Government Expenditure and Urbanization

Figure 4.4 Statistical Parameters

Statistic	Value
Dep. Variable	Urbanization
R-squared	0.2185
Estimator	Random Effects
R-squared (Between)	-1.2968
No. Observations	286
R-squared (Within)	0.2195
R-squared (Overall)	0.2185
F-statistic (robust)	39.554
P-value	0.0000

The first random-effects model examines the relationship between regional urbanization, industrial output, and government expenditure. The dependent variable in this model is **urbanization**, rather than GRP per capita. This distinction is important because the model is designed to examine factors associated with regional urbanization.

The model contains 286 observations and reports an overall R-squared of 0.2185. The within R-squared is 0.2195, while the reported robust F-statistic is 39.554 with a p-value of 0.0000. These results indicate that the explanatory variables are jointly statistically significant in the estimated model, although the R-squared also shows that a substantial share of variation in urbanization remains unexplained by the variables included in the model.

The estimated coefficient for industrial output is 1.445x10^-5(0.00001445), with a standard error of 5.58x10^-6 (0.00000558), a t-statistic of 2.5889, and a p-value of 0.0101. The coefficient is positive and statistically significant at the 5 percent level. This indicates that higher industrial output is statistically associated with higher urbanization in the sample.

Because industrial output is being used as a proxy for industrial structure associated with the Soviet legacy, this finding is consistent with the argument that industrial structures established or strengthened during the Soviet period remain associated with patterns of urbanization. However, the coefficient should not be interpreted as a direct causal estimate of the effect of the Soviet planned economy.

Government expenditure has a coefficient of -0.0107, with a standard error of 0.0012, a t-statistic of -8.5464, and a p-value below 0.001. The negative and statistically significant coefficient indicates a negative statistical association between government expenditure and urbanization in the estimated model. This result does not by itself demonstrate that government expenditure was inefficient or that public spending caused lower urbanization.

Overall, the model provides evidence of statistically significant relationships between industrial output, government expenditure, and regional urbanization. The results are therefore useful for examining the persistence of industrial structures and public resource allocation in relation to urbanization, while

recognizing that these variables are proxies and that the model does not identify the total causal effect of the Soviet planned economy.

Random Effects Regression Estimates of the Determinants of Urbanization in Russian Regions

Figure 4.5 Random Effects Model Results

Parameter	Coefficient	Std. Err.	T-stat	P-value	Lower CI	Upper CI
Intercept	0.5027	0.1072	4.6895	0.0000	0.2917	0.7137
Industrial output	1.445e-05	5.58e-06	2.5889	0.0101	3.463e-06	2.543e-05
Government expenses	-0.0107	0.0012	-8.5464	0.0000	-0.0131	-0.0082

According to our Random Effects (RE) model, there are major insights into how the legacies of the Soviet-era planned economy influence urbanization, migration, and regional productivity in present-day Russia. The positive and statistically significant coefficient for industrial output (1.445e-05, p=0.010) implies that regions with greater Soviet industrialism, such as heavy manufacturing and monotowns, are more urbanized. This agrees with Kolomak (2018), who argued that industrial agglomerations under central planning were the main contributors to highly concentrated urban growth.

The negative coefficient for government expenses (-0.0107, p=0.000) implies that continued public investment, a hallmark of Soviet-style resource allocation, is now associated with reducing urbanization. The paradox is indicative of a post-Soviet inefficiency whereby state spending continues in dying industrial zones without retaining the population, similar to the observation of Guriev and Vakulenko (2015), who noted migration away from underperforming state-dependent regions. The moderate power of explanation of the model (R^2=0.2185) points to a broad interaction between Soviet legacies and market forces, where any number of unmeasured factors, possibly informal economies or geographic limitations, further affect the outcomes.

Alignment with Existing Literature: Our results resonate with the scholars who researched the long-term effects of planned economies. Kolomak (2018) also found that Soviet industrial legacies are enduring determinants of urbanization, but observed diminishing returns in excessively concentrated regions. The negative effect of government expenses aligns with Åslund's (2013) criticism of the inefficiencies of public investment in the post-Soviet years, where spatial mismatch is exacerbated by misallocation of funding.

Furthermore, this out-migration from industrial regions agrees with the results of Mkrtchyan and Karachurina (2021), who reported that labor is migrating away from decaying monotowns into service economy hubs like Moscow. Our study further enhances these insights by quantifying how Soviet industrial legacies and post-planning fiscal policies interact in shaping the regional divide.

Thus, validating the dual role of variables from the Soviet period as both a factor of encouragement and restriction points to the need for policies that simultaneously engage with historical path dependence and foster market-induced diversification, a core argument of Libman and Obydenkova (2020) in recent studies on post-socialist transition.

Soviet and Post Soviet Urbanization and Regional Productivity (URP)

Figure 4.6 Regression Summary Statistics

Statistic	Value
Dep. Variable	rgp_per_capita

R-squared	0.028
R-squared (Between)	0.018
No. Observations	286
F-statistic (robust)	2.747
P-value	0.0433
Jarque-Bera (JB):	12.988
Prob(JB):	0.00151

The interaction between urbanization and the post-Soviet period has a coefficient of -15,480, with a standard error of 36,700, a t-statistic of -0.422, and a p-value of 0.673. The interaction is therefore not statistically significant. The negative sign indicates that the estimated association between urbanization and GRP per capita is lower in the post-Soviet period relative to the reference period, but the lack of statistical significance means that the study does not provide sufficient evidence of a statistically different relationship between the two periods.

These results therefore do not establish that Soviet-planned urbanization produced higher regional productivity than post-Soviet urbanization. Rather, they indicate that the estimated differences between the two periods are not statistically distinguishable in this model. The results also suggest that urbanization alone provides limited explanatory power for regional differences in GRP per capita, reinforcing the importance of other regional economic and structural factors.

Urbanization and Regional Productivity: Soviet and Post-Soviet Comparison

Figure 4.7 Regression Results for Urbanization and Regional Productivity

Parameter	**Coefficient**	**Std. Err.**	**T-stat**	**P-value**	**Lower CI 0.025**	**Upper CI 0.975**
Intercept	−3,575.98	24,500	-0.141	0.888	−53,600	46,500
Urbanization	14,590	36,700	0.398	0.0691	0.000576	85,430
Post soviet	15,370	25,400	0.604	0.546	−34,700	65,400
Urbanization Post	−15,480	36,700	-0.422	0.673	−87,600	56,700

Urbanization in the Soviet Era

The statistically weak positive correlation implies that Soviet-planned urbanization had no substantial effects on GRPP. Kolomak (2018), on the other hand, argues that, rather than urbanization accounting for productivity differentials, it was truly the industrial legacies stemming from that Soviet system that drove productivity up.

POST-SOVIET: The market shift that took place after the collapse of the USSR in 1991 does not in itself display any productivity premiums, thus opposing the notions of presumed efficiency gains. Guriev and Vakulenko (2015) have similarly remarked on how regional disparities had been sustained even after the reforms. The interaction term (Urbanization × Post-Soviet): The negative sign shows that market-led urbanization to some extent, undermined productivity linkages relative to Soviet ones, but is unable to draw firm conclusions due to lack of statistical significance. Here we find resonance with Åslund's (2013) assertions about the decay of infrastructure in the post- Soviet period.

None of these coefficients reach significance levels, thus offering further reassurance that neither Soviet nor post-Soviet urbanization models were able to impart a significant stimulus to productivity; rather, the observed dispositional differences in GRPP stem from unobserved contextual grounds (Soviet industrial legacies), as stressed in Libman and Obydenkova (2020) regarding post-socialist transitions. Our results reiterate the weak performance of urbanization- only models to disentangle planned versus market consequences.

Model fit and Significance: The small R-squared (0.028) signifies that only 2.8% of the variation in GRP per capita can be accounted for by urbanization, together with the post-Soviet transition. This indicates that most of the regional productivity differences result from factors not included in this model, such as industrial legacies, growth of the private sector, or global commodity prices.

The weak joint significance of the predictors measured by the F-statistic (2.747, p=0.043) almost met the 5% significance threshold. This is corroborated by other studies, such as Kolomak (2018), where urbanization's direct impact on productivity was found to depend on the context and through so-called confounding factors including institutional and spatial ones.

COEFFICIENT ANALYSIS: Urbanization: The positive coefficient (14,590) is statistically insignificant (p=0.691) implying that it is not supported by any strong evidence that urbanization enhanced productivity in any way, be it in either era. This would qualify in juxtaposition with Kolomak´s previous findings where productivity was largely attributable to urbanization, while it brings support to Mkrtchyan and Karachurina (2021), stating that it was instead the industrial legacies from the Soviet era that formed productivity and not urbanization in and of itself.

THE POST-SOVIET: The positive coefficient (15,370, p=0.546) suggests there was no significant productivity premium for market-driven urbanization beyond Soviet planning; in effect, the

contrary is thereby argued, namely, that the post-1991 efficiency gains are being challenged. This is consistent with Guriev and Vakulenko's (2015) observation that, following market reform, regional disparities had been exacerbated.

This agrees with the literature we consulted: Our findings can be interpreted within a larger context pointing to the ever-present and potent influence of Soviet legacies. Libman and Obydenkova (2020), for instance, have argued that post-socialist disparity relies heavily on the asymmetric productivity of the regions established in the Soviet period.

Examine how Soviet industrialization continues to influence urbanization in market economies

Figure 4.8 Regression Model Summary Statistics

Statistic	Value
Dep. Variable	Urbanization
R-squared	0.981

R-squared (Between)	0.980
No. Observations	286
F-statistic (robust)	1676

The model does exhibit very high explanatory power ($R^2 = 0.981$), explaining 98% of urbanization variation. The F-statistic (1676, $p \approx 0$) indicates significant joint effects of the predictors on urbanization: Besides that with 272 observations and negative AIC/BIC values (-481.9/-449.5), this model fits this quite nicely, although such high R^2 might indicate overfitting or predictor variables directly associated to urbanization (like prior-built urban infrastructure indices).

Figure 4.9 Regional and Federal District Analysis

Parameters	coef	Std err	t	P>|t|	0.025	0.975
Intercept	109.6246	0.949	115.570	0.000	107.757	111.492
Far Eastern	-28.2227	0.246	-114.721	0.000	-28.707	-27.738
North Caucasian	18.1934	0.159	114.703	0.000	17.881	18.506
Northwestern FD	7.6365	0.069	109.924	0.000	7.500	7.773
Siberian FD	30.7690	0.267	115.392	0.000	30.244	31.294
Southern FD	11.0167	0.098	112.921	0.000	10.825	11.209
Ural	28.0666	0.243	115.265	0.000	27.587	28.546
Volga FD	22.6732	0.197	115.044	0.000	22.285	23.061
Industrial_legacy	0.0023	1.97e-05	115.499	0.000	0.002	0.002

The third empirical analysis examines whether industrial structures associated with the Soviet period remain statistically associated with regional urbanization in the post-Soviet period. In contrast to relying only on Federal District differences, this analysis includes the **Industrial_legacy** variable as a direct measure of the historical industrial structure used in the study.

The model uses urbanization as the dependent variable and reports an R-squared of 0.981 and a between R-squared of 0.980. The model therefore explains a large proportion of the variation in the reported urbanization measure. The robust F-statistic is 1676, indicating strong joint statistical significance of the explanatory variables.

The coefficient on the Industrial_legacy variable is 0.0023 and is statistically significant at the reported level ($p<0.001$). This positive coefficient indicates a statistically significant association between the industrial legacy measure and regional urbanization. The result provides direct empirical evidence relevant to the hypothesis that industrial structures established during the Soviet period remain associated with contemporary patterns of urbanization.

The Federal District coefficients also indicate substantial spatial differences. The estimated coefficients are -28.22 for the Far Eastern Federal District, 18.19 for the North Caucasian Federal District, 7.64 for the Northwestern Federal District, 30.77 for the Siberian Federal District, 11.02 for the Southern Federal District,

28.07 for the Ural Federal District, and 22.67 for the Volga Federal District. All are reported as statistically significant.

These Federal District coefficients should, however, be interpreted as evidence of **regional heterogeneity** rather than as direct measures of the Soviet planned economy. The stronger evidence for the persistence of Soviet industrialization comes from the statistically significant Industrial_legacy variable. The Federal District coefficients provide additional information about how urbanization differs across geographical areas.

Taken together, the results are consistent with the presence of spatial persistence in regions with historically established industrial structures. The findings suggest that the historical industrial configuration remains associated with contemporary urbanization, although the regression does not by itself establish that Soviet planning is the sole cause of these regional differences.

Test of Research Hypotheses

The hypotheses are assessed using the empirical results reported in Sections 4.1.6–4.1.8. The interpretation distinguishes between statistical associations identified by the models and broader historical interpretations concerning the legacy of the Soviet planned economy.

H01: Industrial structures associated with the Soviet period are significantly associated with regional urbanization, while government expenditure is also related to differences in urbanization across regions.

The first random-effects model uses urbanization as the dependent variable and industrial output and government expenditure as explanatory variables. Industrial output has a positive and statistically significant coefficient of 1.445x10^-5 ($p=0.0101$), while government expenditure has a negative and statistically significant coefficient of -0.0107 ($p<0.001$).

The results therefore provide statistical evidence of significant associations between these variables and regional urbanization. Industrial output is treated as a proxy for contemporary industrial structure associated with the historical industrial legacy, rather than as a direct measure of the Soviet planned economy. The findings are therefore consistent with the view that industrial structures associated with the Soviet period remain relevant to regional urbanization.

However, the model does not directly estimate the effect of the Soviet planned economy on migration or establish that industrial output caused migration patterns. Migration is examined separately through descriptive trends and correlations. Therefore, the results should be interpreted as evidence of an association between industrial structure, government expenditure, and urbanization rather than as a direct causal estimate of the effect of the planned economy on migration.

H02: The relationship between urbanization and regional productivity differs between the Soviet and post-Soviet periods.

The second model uses GRP per capita as the dependent variable and includes urbanization, a post-Soviet period indicator, and an interaction between urbanization and the post-Soviet period.

The interaction coefficient is -15,480 with a p-value of 0.673. The coefficient is therefore not statistically significant at conventional significance levels. Similarly, the post-Soviet period coefficient is not statistically significant ($p=0.546$).

The results therefore do not provide sufficient statistical evidence that the relationship between urbanization and GRP per capita differed significantly between the Soviet and post-Soviet periods in the estimated model. Accordingly, the original hypothesis that Soviet-planned urbanization resulted in higher regional productivity than market-driven urbanization is not supported by the reported regression results.

The appropriate conclusion is not that either system definitively produced higher productivity, but rather that

the available model does not identify a statistically significant difference between the two periods.

H03: Former Soviet industrialization patterns continue to be associated with urbanization trends in the post-Soviet Russian economy.

The third model provides a direct test of this hypothesis through the Industrial_legacy variable. The estimated coefficient for Industrial_legacy is 0.0023 and is statistically significant at the reported level ($p<0.001$). This indicates a positive statistical association between the industrial legacy measure and urbanization.

The Federal District coefficients additionally demonstrate substantial regional differences in urbanization. The coefficients are positive for the North Caucasian, Northwestern, Siberian, Southern, Ural, and Volga Federal Districts and negative for the Far Eastern Federal District.

The Industrial_legacy result provides stronger evidence for H03 than the Federal District coefficients alone because it directly incorporates the historical industrial-structure measure used in the study. The Federal District results should therefore be viewed as supplementary evidence of regional heterogeneity.

Overall, the findings are consistent with the hypothesis that industrial structures associated with the Soviet period continue to be reflected in contemporary regional urbanization. Nevertheless, the results should be interpreted as statistical associations rather than proof of a single causal mechanism.

CONCLUSION

SUMMARY OF FINDINGS

Lasting Industrial and Spatial Legacies

The findings indicate substantial regional differences in urbanization, migration, and economic performance across Russia. The migration trends show stronger population inflows toward major economic and urban centres, particularly the Central Federal District, while several peripheral and historically industrial regions experienced periods of weaker migration or population loss.

The empirical results also indicate that industrial structure remains associated with regional urbanization. Industrial output has a positive and statistically significant association with urbanization in the random-effects model, while the Industrial_legacy variable is also positive and statistically significant in the regional urbanization model. These findings are consistent with the persistence of industrial structures established or strengthened during the Soviet period.

However, these results should not be interpreted as showing that the Soviet planned economy alone caused contemporary regional differences. Industrial output and the Industrial_legacy variable are observable measures used to capture aspects of industrial structure, while regional development is also influenced by other economic, demographic, geographical, and institutional factors.

Urbanization and Regional Productivity

The analysis of GRP per capita shows that the relationship between urbanization and regional productivity is relatively weak in the reported productivity model. The model has an R-squared of 0.028, indicating that the variables included in this specification explain only a small share of the variation in GRP per capita.

The interaction between urbanization and the post-Soviet period is negative but statistically insignificant ($p=0.673$). The post-Soviet period coefficient is also statistically insignificant ($p=0.546$). These results do not provide sufficient evidence that the relationship between urbanization and regional productivity differed significantly between the Soviet and post-Soviet periods.

The first random-effects model, however, finds a positive and statistically significant association between

industrial output and urbanization (coefficient (1.445x0^-5, p=0.010). Government expenditure has a negative and statistically significant association with urbanization (coefficient -0.0107, p<0.001). These results demonstrate that industrial activity and public expenditure are statistically related to urbanization, although they do not establish causal effects.

Path Dependence and Regional Differences

The third empirical model provides evidence of a statistically significant relationship between the Industrial_legacy variable and urbanization. This result, together with the differences observed across Federal Districts, is consistent with the persistence of historical industrial structures in contemporary regional urbanization.

The Federal District results show particularly substantial differences between the Siberian, Ural, Volga, and Far Eastern regions. These differences should be interpreted as regional heterogeneity rather than as direct measures of the effect of Soviet planning.

Overall, the study suggests that the transition from the Soviet planned economy to a market-oriented economy did not eliminate the spatial and industrial structures inherited from the earlier period. At the same time, the statistical results show that these historical structures are only one part of a broader set of factors associated with contemporary regional development.

Contributions of the paper

This study contributes to the literature by examining the relationship between Soviet-era industrial structures and contemporary urbanization in Russia using regional data. Rather than treating the Soviet planned economy as a directly observable variable, the study examines measurable characteristics such as industrial output and the historical industrial legacy, together with government expenditure, migration, and urbanization.

The study also contributes by distinguishing between urbanization as an outcome and GRP per capita as a measure of regional economic performance. This distinction makes it possible to examine both the factors associated with urbanization and the relationship between urbanization and regional productivity.

Finally, the analysis highlights substantial regional heterogeneity across Russia and provides evidence that historical industrial structures remain statistically associated with contemporary patterns of urbanization.

Possible Practical Implications

The findings have several practical implications for regional development.

First, the persistence of differences across historically industrial regions suggests that regional development strategies should take existing industrial and urban structures into account rather than applying identical approaches to all regions.

Second, the migration trends indicate the importance of considering population redistribution when evaluating regional development. Regions experiencing persistent population losses may require strategies that address employment opportunities, infrastructure, and economic diversification.

Third, the statistically significant relationship between industrial legacy and urbanization suggests that the historical structure of regional economies remains relevant to contemporary urban development. Regional planning can therefore benefit from considering the existing industrial and settlement structure when designing development strategies.

Finally, the results concerning government expenditure should be interpreted carefully. Although government expenditure is negatively associated with urbanization in the estimated model, this finding alone does not

demonstrate that public expenditure is inefficient or that reducing expenditure would improve regional outcomes. Further analysis would be required to determine the mechanisms behind this relationship.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations are proposed:

i. Promote balanced regional development
Regional development strategies should take account of substantial differences in economic structure, migration patterns, and urbanization across Russian regions. Greater attention to regions experiencing persistent population losses may help address uneven regional development.

ii. Support economic diversification in historically industrial regions
Regions with strong historical dependence on particular industries may benefit from diversification strategies that create additional employment opportunities and reduce dependence on declining or highly concentrated industrial activities.

iii. Align urban development with existing industrial and settlement structures
The statistical association between industrial legacy and urbanization suggests that historical industrial structures continue to matter for contemporary urban development. Urban planning should therefore consider existing industrial infrastructure, settlement patterns, and demographic trends when developing future strategies.

iv. Improve the effectiveness of regional public expenditure
The negative statistical association between government expenditure and urbanization indicates the need for further attention to how public resources are allocated across regions. However, the present study does not establish that expenditure itself causes lower urbanization. Future regional investment decisions should therefore be accompanied by careful evaluation of the objectives, distribution, and outcomes of public spending.

v. Address persistent migration pressures
The observed migration differences between central and peripheral regions indicate the importance of employment opportunities, infrastructure, and access to services in shaping population redistribution. Policies aimed at strengthening regional economic opportunities may help reduce excessive concentration in a small number of major urban centres.

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