

The Pulling Effect of Infrastructure Construction on Economic Growth from the Perspective of Fixed Asset Investment Statistics

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Abstract: Based on the specific perspective of fixed asset investment statistics, combined with data from Shandong Province, this study explores the pulling effect of infrastructure construction on economic growth. The analysis reveals that Shandong's fixed asset investment in infrastructure has maintained a continuous growth trend. By directly stimulating demand in related industries and indirectly optimizing the business environment and regional development conditions, infrastructure investment provides strong support for economic growth. Finally, with the goal of improving infrastructure efficiency and promoting high-quality development, this paper proposes prospects such as optimizing the investment structure, broadening financing channels, and strengthening project management.

1. From the Perspective of Economic Theory

From the perspective of economic theory, infrastructure investment stimulates economic growth through both direct demand pull and indirect environmental improvements, thereby naturally generating a significant multiplier effect without being intended as an active stimulus. On the one hand, during the construction process, infrastructure drives the development of related industries, expands employment, and increases income, which in turn promotes a virtuous cycle of consumption and investment. On the other hand, the improvement of infrastructure systems enhances the regional business environment and reduces operating costs for enterprises, thereby promoting capital agglomeration and industrial upgrading. Throughout this process, fixed asset investment statistics not only provide an important basis for observing the scale and development trends of infrastructure construction but also offer solid data support for evaluating its impact mechanisms on economic growth.

2. Current Situation of Fixed Asset Investment in Infrastructure in Shandong

2.1 Overall Investment Scale and Growth Trend

In recent years, Shandong has attached great importance to infrastructure construction, as reflected in the continuous increase in its fixed asset investment. Since 2018, the province's infrastructure

investment has steadily risen. In 2023, infrastructure investment grew by 22.9% year-on-year, contributing 4.6 percentage points to the overall investment growth. This significant upward trend highlights the province's emphasis on infrastructure, providing a solid material foundation for upgrading transportation, energy, water conservancy, and other key areas^[1].

2.2 Investment by Sector

- **Transportation:** Transportation infrastructure has long been a key focus of Shandong's investment. In 2023, road transport investment increased by 29.8%, contributing 6.8 percentage points to infrastructure growth. High-speed rail projects, such as the Shandong section of the Jinan-Zhengzhou High-speed Railway, have greatly shortened intercity travel time, effectively connecting provincial capitals with major economic centers and improving overall mobility. By 2024, Shandong's expressway mileage exceeded 8,000 km, achieving the development goal of "ring roads in every city, dual highways in every county, and full coverage for towns." This network not only improves the efficiency of logistics and passenger travel but also accelerates the integration of urban and rural areas, enhancing regional economic coordination. Meanwhile, inland waterways and port upgrades have further enhanced waterway transport efficiency and facilitated regional trade. The modernization of key ports such as Qingdao, Yantai, and Rizhao has bolstered Shandong's role as a maritime hub in northern China, with improved container throughput and logistics service capacity. Integration of multimodal transport—road, rail, and water—has also reduced overall transport costs, boosted the competitiveness of local industries, and supported the development of new trade corridors such as the "Qilu Eurasian Freight Trains," strengthening Shandong's connection with both domestic and international markets..

- **Energy:** In 2023, investment in electricity and heat production and supply grew by 38.5%. With the rapid development of new energy, Shandong has actively promoted wind power and photovoltaic projects, including large-scale offshore wind farms such as those in Yantai and Dongying, as well as distributed rooftop solar systems in rural and urban areas. These initiatives have significantly increased the share of clean energy in the provincial energy mix and stimulated the growth of related industries such as equipment manufacturing and maintenance services. At the same time, the power grid has been strengthened through ultra-high-voltage transmission projects, ensuring stable energy supply to meet growing economic demand, while also enhancing cross-regional power allocation and facilitating the large-scale integration of renewable energy resources.

- **Water Conservancy:** Water conservancy investment occupies an important position in Shandong. Major projects such as the second phase of the Yellow River-to-East Water Diversion have optimized water resource allocation and safeguarded regional water security. Efforts in river management and reservoir reinforcement have improved flood control, irrigation capacity, agricultural conditions, rural development, and ecological protection.

3. Mechanisms of Infrastructure Construction Pulling Economic Growth in Shandong

3.1 Direct Demand Pull

Infrastructure construction generates strong demand for upstream industries such as steel, cement, and building materials. For example, each 100 million yuan invested in transportation infrastructure requires about 5,000 tons of steel and 20,000 tons of cement. Similarly, energy projects such as wind and solar power require specialized steel, photovoltaic panels, and electrical equipment. This large-scale demand drives industrial production, capacity expansion, and job creation^[2].

From the perspective of the investment multiplier effect, infrastructure investment produces significant returns. Assuming Shandong's marginal propensity to consume is 0.6, every 100 million

yuan of infrastructure investment ultimately drives a 250 million yuan increase in total output (multiplier = $1/(1 - 0.6)$). This effect circulates within the economy, magnifying the role of infrastructure investment in promoting growth^[3].

3.2 Indirect Promotion of Economic Growth

- **Improved Business Environment:** From the perspective of fixed asset investment statistics, the indirect promotion of economic growth by infrastructure construction is first reflected in the optimization of the business environment. Taking transportation infrastructure as an example, Jinan has in recent years continuously improved the layout of expressways, intercity railways, and urban express road networks, significantly enhancing the efficiency of cargo transportation and personnel movement. According to monitoring data from the Shandong Provincial Transportation Department, with the support of a comprehensive transport network, enterprises in Jinan have reduced logistics costs by an average of about 20%. This not only shortens cargo turnover time but also accelerates nationwide distribution and market coverage. For industries with high time-sensitivity—such as agricultural product processing, equipment manufacturing, and pharmaceuticals—such reductions in cost and improvements in efficiency directly strengthen market competitiveness.

- At the same time, a stable supply of energy infrastructure is also key to improving the business environment. The development of electricity and natural gas networks ensures the continuity of industrial production, preventing interruptions or shutdowns caused by insufficient energy supply. For instance, in the chemical industrial parks of Jining and Weifang, local authorities have accelerated the construction of large peak-shaving gas-fired power plants and smart grids, thereby securing continuity in the production chains of energy-intensive enterprises. This not only reduces operational risks but also minimizes unexpected losses. A stable and reliable energy environment has also attracted large numbers of foreign enterprises. Qingdao is a typical case: relying on its port logistics system and stable energy supply, the city has gradually formed an industrial base centered on manufacturing and modern logistics, attracting investment projects from Japan, South Korea, Europe, and the United States. Multinational enterprises favor Qingdao not only because of convenient port transportation but also because they can achieve long-term development in a low-risk, highly efficient business environment.

- **Promoting Regional Development:** The indirect effect of infrastructure construction is also reflected in promoting coordinated regional development and narrowing regional disparities. In underdeveloped areas such as southwestern Shandong, industrial development used to lag behind due to poor transport connections and restricted factor mobility, with insufficient employment opportunities and clear gaps in economic development compared with developed regions such as Jinan, Qingdao, and Yantai. However, with the gradual improvement of high-speed rail and expressway networks, these areas' locational disadvantages have been significantly reduced. For example, in Heze, southwestern Shandong, the opening of the Jinan–Zhengzhou high-speed railway and the Rizhao–Lankao expressway has enabled the successful transfer of textile, food processing, and light manufacturing industries from both within and outside the province. The entry of these industries has not only brought new tax revenue but also created large numbers of jobs, promoted local employment, and alleviated the pressure of rural labor migration.

- Meanwhile, the balanced development of infrastructure helps optimize the allocation of factor resources. After transport improvements, logistics radii in southwestern Shandong have been significantly shortened, allowing agricultural products that once lacked market competitiveness to reach coastal and urban markets more quickly, thereby increasing farmers' incomes. More importantly, the interconnection of infrastructure within the region has promoted urban–rural integration. The paving of rural roads and the spread of information and communication networks have facilitated the

rapid growth of rural e-commerce, enabling agricultural products to achieve nationwide sales through digital platforms. For example, in Shanxian and Juye counties, local authorities have relied on logistics parks and cold-chain storage facilities to establish distribution centers for vegetables and livestock products. These products are now sold to the Beijing–Tianjin–Hebei and Yangtze River Delta regions, forming typical industrial cluster effects.

4. Problems and Countermeasures of Infrastructure Investment in Shandong

4.1 Existing Problems

- **Unbalanced investment structure:** Shandong's infrastructure construction has placed strong emphasis on transportation and energy, driving rapid development of road networks, power grids, and other key projects. However, investment in digital infrastructure, public service facilities, and green and low-carbon projects remains relatively insufficient. For instance, investment proportions in smart transportation, information and communication networks, and education and healthcare facilities are comparatively low, resulting in an unbalanced investment structure that constrains the formation of a more comprehensive foundation for economic growth.
- **Limited financing channels:** Although Shandong has in recent years explored government–private partnership models, infrastructure financing is still dominated by fiscal funds and bank loans, with insufficient participation from private capital. In particular, large-scale projects face significant financial pressure, and some medium- to long-term projects encounter unstable financing, which undermines the sustainability and effectiveness of investment.
- **Regional development disparities:** Infrastructure construction is heavily concentrated in the eastern coastal areas, with high-speed rail, ports, and energy projects predominantly located there. In contrast, western Shandong and the southern part of the province lag behind in transportation, water conservancy, and digital infrastructure. These disparities restrict the flow of production factors and the relocation of industries, preventing the province's infrastructure from fully unleashing its overall driving effect on economic growth.
- **Investment efficiency requires improvement:** Some projects suffer from insufficient planning and feasibility studies, with repetitive and homogeneous construction leading to low resource allocation efficiency. Meanwhile, certain completed projects face problems in operation and management, such as underutilization, delayed maintenance, and low capital recovery efficiency, which negatively affect the long-term returns and economic impact of investment.

4.2 Countermeasures and Suggestions

- **Optimizing the investment structure:** While continuing to strengthen traditional infrastructure in transportation and energy, Shandong should gradually increase investment in new infrastructure and public service facilities. Greater emphasis should be placed on areas such as 5G networks, artificial intelligence, and data centers, while also addressing shortcomings in education, healthcare, and elderly care facilities. This would help shift infrastructure development from “quantitative expansion” to “qualitative improvement.”
- **Expanding financing channels:** The province should actively promote the use of innovative financial instruments such as publicly offered infrastructure REITs, and encourage the participation of private capital, insurance funds, and industrial funds to establish a diversified financing system. Regional investment and financing platforms should be developed, combining government guidance with market-oriented operations, so as to alleviate financing pressure on large projects and ensure investment sustainability.
- **Promoting balanced regional development:** More investment resources should be directed toward

relatively underdeveloped areas such as western and southwestern Shandong, prioritizing transportation, water conservancy, and digital infrastructure projects. This would improve local development conditions and narrow regional gaps. Through differentiated policies and financial support, factor flows of industries and labor can be better coordinated across the province, thus achieving balanced infrastructure development and maximizing overall economic benefits.

- **Enhancing investment efficiency:** At the project planning stage, more emphasis should be placed on scientific and forward-looking assessments to avoid duplicate construction and inefficient investment. For completed projects, operation and maintenance should be strengthened, with smart management systems introduced to improve utilization and revenue. At the same time, a sound investment efficiency evaluation and feedback mechanism should be established to ensure that infrastructure continues to play a sustained role in promoting economic growth.

4.3 Comprehensive Outlook

In sum, although Shandong's infrastructure construction has achieved remarkable results in terms of fixed asset investment scale and its contribution to economic growth, greater efforts are still needed in structural optimization, financing innovation, regional balance, and efficiency improvement. By combining policy guidance with market mechanisms, Shandong can shift infrastructure investment from scale expansion toward high-quality development, thereby providing stronger support for steady economic growth and industrial upgrading.

5. Conclusion

In summary, Shandong's infrastructure construction, supported by continuous fixed asset investment, has significantly promoted economic growth through both direct demand pull and indirect environmental improvements. Looking ahead, Shandong should stabilize traditional infrastructure while expanding investment in new infrastructure, optimize the investment structure, attract more social capital to broaden financing channels, and strengthen project lifecycle management to improve efficiency. Ultimately, these measures will continue to inject momentum into the province's high-quality economic development.

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