



**UNIVERSITA' DEGLI STUDI DI PADOVA**

**DIPARTIMENTO DI SCIENZE ECONOMICHE ED AZIENDALI  
"M.FANNO"**

**CORSO DI LAUREA MAGISTRALE / SPECIALISTICA IN  
Entrepreneurship and Innovation**

**TESI DI LAUREA**

**"Regional Development Trap in China"**

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**MATRICOLA N. 2051190**

**ANNO ACCADEMICO 2023 – 2024**

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## APPENDIX

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# Regional Development Trap in China

Tianyang Chen

## Abstract

This thesis investigates the phenomenon of regional development traps in China, focusing on the persistent economic disparities between coastal and inland regions despite the country's rapid national growth. It explores the historical, geographical, and policy-related factors contributing to these disparities and examines various theoretical frameworks, including neoclassical growth theory, endogenous growth theory, new economic geography, institutional economics, dependency theory, and structuralist theory.

Using a comprehensive dataset and rigorous empirical methodologies, the study identifies regions trapped in underdevelopment and analyzes the characteristics and determinants of these traps. Key findings highlight the significant role of innovation, educational infrastructure, and global market integration in mitigating development traps. The research emphasizes the importance of targeted policy interventions to promote balanced regional development, proposing strategies to enhance investment in underdeveloped areas, improve governance structures, and foster innovation.

By addressing regional development traps, this thesis aims to contribute to more equitable economic growth, enhanced social stability, and an improved quality of life across China. The study also fills a gap in existing literature by providing an empirical analysis of development traps in China and offers insights for future research and policy-making to achieve sustainable and inclusive regional development.

Keyword: Regional Development Traps, China, Economic Disparities, Economic Growth

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# 1 Introduction

The phenomenon of regional development traps in China has become a significant concern, especially given the country's rapid national growth juxtaposed with persistent economic disparities between its coastal and inland regions. This thesis aims to investigate these regional development traps, exploring the historical, geographical, and policy-related factors that contribute to these disparities. By examining various theoretical frameworks and employing rigorous empirical methodologies, the study seeks to identify the characteristics and determinants of regions trapped in underdevelopment.

China's economic transformation since the economic reforms of 1978 has been nothing short of remarkable. The country has transitioned from a predominantly agrarian and centrally planned economy to an industrial powerhouse with a more market-oriented economic structure. This shift has propelled China to become the world's second-largest economy, significantly improving the living standards of its population. However, the benefits of this growth have been unevenly distributed, leading to substantial regional disparities.

Coastal regions, which were the primary beneficiaries of the initial economic reforms and foreign investment, have experienced rapid development and modernization. In contrast, many inland and western regions have lagged behind, facing challenges such as lower investment levels, inadequate infrastructure, and slower economic progress. These disparities have created a critical need for targeted policy interventions to promote balanced regional development and prevent certain areas from falling into development traps.

The concept of development traps, where regions fail to sustain economic dynamism and remain stuck at a certain level of income, productivity, and employment, provides a valuable framework for understanding these disparities. Development traps are often reinforced by structural factors such as poor governance, inadequate infrastructure, limited market access, and low levels of human capital. In China, these traps are particularly evident in several inland regions where economic stagnation persists despite the country's overall growth.

This thesis aims to fill a gap in the existing literature by providing a detailed empirical analysis of regional development traps in China. It leverages a comprehensive dataset and employs robust methodologies to uncover the underlying causes of these traps. The study emphasizes the significant role of innovation, educational infrastructure, and global market integration in mitigating development traps and highlights the importance of enhancing investment in underdeveloped areas, improving governance structures, and fostering innovation.

The structure of the thesis is as follows:

Chapter 1 Introduction provides an overview of China's economic transformation and sets the context for understanding the regional disparities that have emerged. It introduces the concept of development traps and outlines the research objectives and significance of the study.

Chapter 2 Institutional and Theoretical Background delves into the institutional and theo-

retical background, exploring the historical context of China's economic development and the various theoretical frameworks that inform the study. It discusses the relevance of neoclassical growth theory, endogenous growth theory, new economic geography, institutional economics, dependency theory, and structuralist theory to the issue of regional development traps in China.

Chapter 3 Literature Review presents a comprehensive literature review, examining previous studies on regional development traps and related concepts such as poverty traps and the middle-income trap. It identifies gaps in the existing literature and positions the current study within the broader academic discourse.

Chapter 4 Empirical Analysis details the empirical analysis conducted in the study. It describes the data sources and variables used, the methodology employed, and the main results obtained. This chapter also visualizes the regions identified as trapped or non-trapped and analyzes the characteristics of these regions.

Chapter 5 Conclusion concludes the thesis by summarizing the key findings and discussing their policy implications. It proposes targeted interventions to address regional development traps and outlines challenges in implementing these policies. The chapter also suggests directions for future research to further understand and mitigate regional disparities in China.

By addressing regional development traps, this thesis aims to contribute to more equitable economic growth, enhanced social stability, and an improved quality of life across China. It provides valuable insights for policymakers and researchers working towards sustainable and inclusive regional development.

## **1.1 Overview of China's Economic Transformation**

China's rise from a poor developing country to an economic powerhouse has been nothing short of spectacular. Since the inception of economic reforms in 1978, the country's GDP growth has averaged over 9 percent annually, lifting more than 800 million people out of poverty. This transformation from a state-dominated planned economy to a mixed economy has made China the world's largest trading nation and an upper-middle-income country<sup>1</sup>. However, despite these achievements, significant regional disparities persist, posing challenges to sustainable and inclusive development.

To visually illustrate China's remarkable economic growth, the following graphs show the trajectory of China's GDP per capita, population growth, and trade-to-GDP ratio from 1980 to 2020 (Figure 1). These graphs highlight the significant strides China has made in its economic development over the past four decades.

The graph on GDP per capita demonstrates the consistent and impressive growth China has achieved. Starting from a low base in the early 1980s, the GDP per capita has seen a nearly exponential rise, reflecting the overall economic improvement and increasing standards of living

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<sup>1</sup>The World Bank In China. Available at: <https://www.worldbank.org/en/country/china/overview>



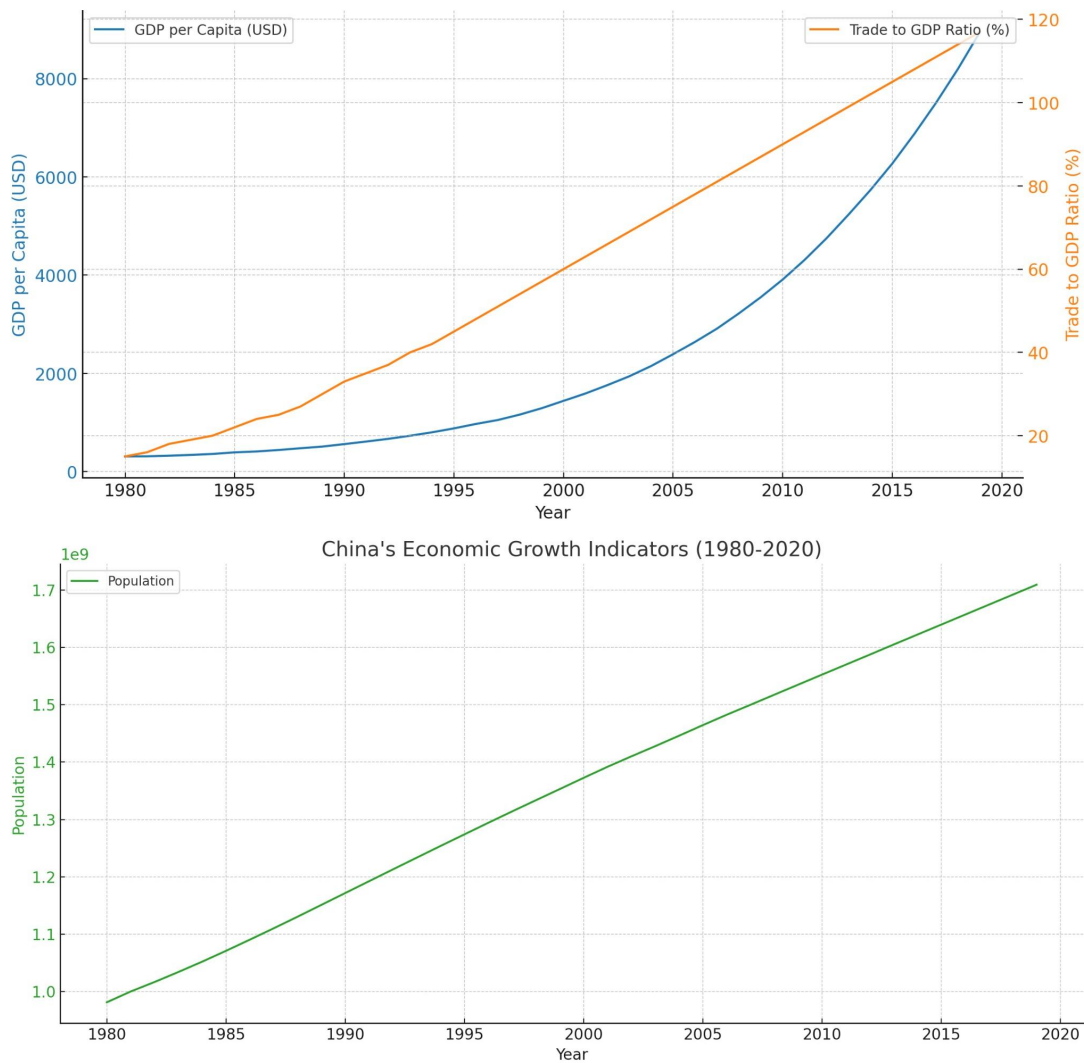


Figure 1: China's economic growth indicators from 1980 to 2020, including GDP per capita, population, and trade-to-GDP ratio  
 Source: World Bank(2023), <https://data.worldbank.org/> National Bureau of Statistics of China, <https://data.stats.gov.cn/english/>

for a large portion of the population.

Simultaneously, China's population growth has been steady, contributing to the overall economic expansion. The substantial population provides both a workforce and a market, which has been critical in supporting China's industrialization and modernization efforts.

The trade-to-GDP ratio graph underscores the importance of trade in China's economic strategy. The steady increase in this ratio highlights how China has become deeply integrated into the global economy, with trade playing a crucial role in driving economic growth.

The economic reforms initiated by Deng Xiaoping in 1978 marked a pivotal turning point in China's development trajectory. Prior to these reforms, the economy was predominantly agrarian and centrally planned, characterized by inefficiency and stagnation. The introduction of market-oriented reforms, such as the decentralization of economic decision-making and the establishment of Special Economic Zones, spurred rapid industrialization and modernization.

These reforms were implemented in phases, starting with rural areas and later extending to urban centers, facilitating a gradual but profound transformation of the economic landscape (Naughton, 2006). The resulting economic growth is vividly captured in the graphs, which show how these strategic reforms translated into tangible economic benefits.

The success of these reforms is evident not only in the qualitative improvements across various sectors but also in the quantitative economic indicators. The significant boost in productivity and rural incomes from agricultural decollectivization can be observed in the upward trend of GDP per capita. The establishment of SEZs in coastal regions such as Shenzhen, Zhuhai, and Xiamen played a crucial role in attracting foreign capital and technology, transforming these areas into bustling industrial hubs. This development is also reflected in the increasing trade-to-GDP ratio, indicating a higher degree of economic integration and globalization.

These zones attracted foreign capital and technology, catalyzing economic growth and transforming these areas into bustling industrial hubs. Over time, the reforms expanded to include state-owned enterprise restructuring, financial sector liberalization, and the development of a more market-oriented regulatory framework (Naughton, 2018).

## **1.2 Regional Disparities in China**

The success of these reforms is evident in the dramatic increase in GDP and the significant improvements in living standards across much of China. However, the benefits of growth have been unevenly distributed, leading to substantial regional disparities. Coastal regions, which were the primary beneficiaries of early reforms and foreign investment, have seen rapid economic growth and development. In contrast, many inland and western regions have lagged behind, struggling with lower investment, less developed infrastructure, and slower economic progress.

The coastal-inland divide in China is a critical issue that has persisted despite various government efforts to promote balanced development. Coastal regions, particularly the Pearl River Delta, Yangtze River Delta, and Bohai Economic Rim, have benefited from preferential policies, better infrastructure, and greater access to international markets. These advantages have resulted in higher income levels, better healthcare, and superior educational facilities compared to inland regions (Kanbur & Zhang, 2005).

Recent data indicates that these regional disparities have not only persisted but in some aspects have intensified over the past decades. A study from China Briefing highlights the increased GDP growth disparities in the first half of 2019, where coastal provinces continued to outpace inland regions significantly. This trend underscores the challenges in addressing the structural issues behind these disparities, despite numerous policy interventions<sup>2</sup>.

Moreover, an analysis from the AMRO-Asia highlights the complex causes of growing re-

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<sup>2</sup>Disparities in China' s Regional Growth: A Look at H1 2019 GDP Data. Available at: <https://www.china-briefing.com/news/china-regional-growth-disparities-increased-h1-2019-gdp-growth-numbers/>

gional disparities, including the central government's fiscal policies and preferential treatment of the coastal regions that date back to the initial economic reforms. This analysis suggests that solutions must involve multifaceted approaches that consider both economic reforms and targeted development programs to alleviate these disparities<sup>3</sup>.

In contrast, regions like Xinjiang, Gansu, and Inner Mongolia face significant challenges. These areas not only suffer from inadequate infrastructure and limited investment but also from less access to high-quality education and healthcare services. The geographical and climatic constraints further exacerbate these issues, making it difficult for these regions to attract and retain investment and talent. Recent findings from Liao and Wei in their working paper on regional inequality in China confirm that these areas have not significantly closed the gap with more developed regions, emphasizing a persistent disparity in economic opportunities and public services (Liao & Wei, 2016).

Regional disparities are not unique to China; they are a common challenge in many large, diverse countries. However, the scale and persistence of these disparities in China present significant challenges for policymakers. Globally, regional disparities can lead to social and economic tensions, hinder national cohesion, and complicate governance. In China, these disparities threaten to undermine the country's long-term development goals and social stability (C. C. Fan & Sun, 2008).

### **1.3 The Concept of Development Traps**

The concept of a development trap has gained considerable attention in academic and policy circles worldwide, particularly in the context of regional economic disparities. A development trap occurs when a region or country fails to sustain economic dynamism and remains stuck at a certain level of income, productivity, and employment. This stagnation can be due to various structural factors, such as inadequate infrastructure, poor governance, limited market access, and low levels of human capital (Diemer et al., 2022). Understanding these traps is crucial for addressing regional disparities and promoting balanced economic growth.

China's regional disparities are influenced by historical, geographical, and policy-related factors that have shaped uneven development patterns across its vast territory. Historically, coastal regions have benefited from early economic reforms, better infrastructure, and greater access to international markets, resulting in rapid industrialization and economic growth. In contrast, inland and western regions have lagged due to geographical disadvantages, limited investment, and slower adoption of reforms (Kanbur & Zhang, 2005). This divergence has created significant economic inequalities between regions, which are further exacerbated by institutional factors such as the hukou system, which restricts rural residents' access to social services and economic opportunities in urban areas (Chan, 2009).

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<sup>3</sup>From Shanghai to Gansu: Growing Regional Disparities in China –Causes and Remedies. Available at: <https://amro-asia.org/from-shanghai-to-gansu-growing-regional-disparities-in-china-causes-and-remedies/>

Understanding the factors contributing to these disparities is crucial for designing effective policy interventions. Addressing regional disparities requires a multi-faceted approach that includes investment in infrastructure, education, and healthcare; reforms to the hukou system; and targeted economic policies that promote balanced regional development. By fostering more equitable growth, China can enhance social stability and ensure that all regions contribute to and benefit from national development.

The concept of development traps provides a valuable framework for understanding why certain regions fail to achieve sustained economic growth. Development traps are characterized by a lack of economic dynamism, where regions are unable to progress beyond a certain level of income, productivity, and employment. These traps are often reinforced by structural factors such as poor governance, inadequate infrastructure, limited market access, and low levels of human capital (Diemer et al., 2022).

In the context of China, development traps can be observed in several inland regions where economic stagnation persists despite national growth. These regions often lack the necessary infrastructure and institutional capacity to support sustained development. Addressing these traps requires targeted interventions that address the specific needs and challenges of each region, promoting more equitable growth (S. Fan et al., 2011).

## **1.4 Research Objectives and Significance**

The primary objective of this research is to identify and analyze the characteristics and determinants of regional development traps in China. By leveraging a comprehensive dataset and employing rigorous empirical methodologies, the study aims to uncover the underlying causes of regional disparities and propose targeted policy interventions to alleviate these issues.

This research is significant for several reasons. Firstly, addressing regional disparities is crucial for maintaining national cohesion and social stability. By promoting balanced regional development, China can enhance the quality of life for all its citizens and ensure more equitable access to economic opportunities (Ravallion, 2010).

Secondly, the study's focus on innovation, education, and global market integration aligns with China's broader development goals. By fostering innovation and enhancing human capital in underdeveloped regions, China can achieve more sustainable and inclusive growth (M. S. Aiyar et al., 2013).

Lastly, this study fills a gap in the existing literature by providing a detailed empirical analysis of regional development traps in China. It offers new insights into the dynamics of regional disparities and contributes to the development of more effective policy interventions aimed at promoting balanced regional development (S. Fan et al., 2002).

This research is significant for several reasons. Firstly, regional economic disparities pose a substantial challenge to national cohesion and social stability. Addressing these disparities

can contribute to a more harmonious and stable society. Secondly, development traps hinder the overall economic potential of the country. Regions stuck in underdevelopment cannot fully contribute to national growth, and unlocking their potential can lead to a more robust and sustainable economy. Thirdly, the focus on innovation, education, and global market integration aligns with China's broader development goals, providing valuable insights into achieving these objectives at the regional level. Lastly, this study fills a gap in the existing literature by providing an empirical analysis of regional development traps in China, offering a new perspective on addressing regional disparities (S. Fan et al., 2011; Ravallion, 2010).

The dissertation employs a modified version of methodologies developed by Diemer et al. for identifying and measuring development traps, tailored to the Chinese context (Diemer et al., 2022). These modifications account for China's unique economic structure, regional policies, and data availability. By creating continuous measures of risk for regions, the study captures the intensity of development trap risks rather than relying on a binary classification. This approach allows for a more nuanced understanding of regional disparities and the specific factors contributing to development traps (Breinlich et al., 2014).

Empirical analysis in the dissertation uses data from various governmental and international economic databases, including regional GDP per capita, R&D expenditure, patent filings, employment rates, export and import values, and educational infrastructure indicators. The analysis involves visualizing the risk levels of regions using the DT1 and DT2 measurements and comparing the characteristics of trapped and non-trapped regions. The results indicate that regions with higher investment in R&D, better educational infrastructure, and greater global market integration are more resilient to development traps. These findings lead to policy recommendations aimed at increasing investment in underdeveloped regions, promoting innovation, and enhancing governance structures (M. S. Aiyar et al., 2013).

In conclusion, this dissertation provides a detailed analysis of regional development traps in China, highlighting the importance of innovation, education, and global market integration in promoting balanced regional development. By addressing these traps, policymakers can enhance economic equity and stability, contributing to a more prosperous and cohesive society. Future research should incorporate qualitative methods to capture complex, non-quantifiable factors influencing regional development and conduct comparative studies with other countries to provide broader insights and validate the findings in different contexts.

## 2 Institutional and Theoretical Background

China's rise from a poor developing country to an important economic power has been spectacular. Since China began to open up and reform its economy in 1978,<sup>4</sup> GDP growth has averaged over 9 percent a year, and more than 800 million people have lifted themselves out of poverty.<sup>5</sup> These reforms were pivotal in transforming China's economy, but they also laid the groundwork for significant regional disparities that persist today. This section will delve deeper into the historical and theoretical contexts to understand these disparities better.

Since 1978 and for three decades afterward, China has been transitioning from a state-dominated planned socialist economy to a mixed economy. Despite recent backsliding, China has now become the world's largest trading nation and an upper-middle-income country.

The concept of a development trap has garnered significant attention in academic and policy circles worldwide, especially in understanding regional disparities in economic growth. A development trap is generally defined as a situation where a region or country fails to sustain economic dynamism and remains stuck at a certain level of income, productivity, and employment. This stagnation can occur due to various structural factors, such as inadequate infrastructure, poor governance, limited access to markets, and low levels of human capital.

Globally, development traps have been studied extensively in different contexts. For instance, in Europe, the development trap concept has been applied to understand why certain regions within the European Union lag behind despite the overall economic integration and prosperity of the bloc. The European regional development trap framework, as discussed by Diemer et al., highlights the persistent economic disparities within the EU, driven by factors like industrial decline, demographic changes, and insufficient innovation capacity (Diemer et al., 2022).

Similarly, the concept of a middle-income trap is relevant in discussing the economic trajectories of many developing countries. The middle-income trap describes a situation where a country's growth slows after reaching middle-income levels, making it difficult to transition to high-income status. This phenomenon often occurs because the competitive advantages that drove initial growth, such as low-cost labor, diminish, and the country struggles to compete with both low-wage economies and highly skilled, innovative economies.

In the context of poverty traps, this concept explains why some low-income countries fail to grow despite various efforts and interventions. Factors such as lack of capital, poor infrastructure, low educational attainment, and weak institutions contribute to a self-reinforcing cycle of poverty. Escaping such traps often requires substantial policy interventions and structural reforms to create an environment conducive to sustainable growth.

Applying the global understanding of development traps to China requires considering the

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<sup>4</sup>Deng Xiaoping and his leadership cohort launched the policies of “reform” (meaning market-oriented economic reform at home) and “opening” (to economic—and broader—engagement with the outside world).

<sup>5</sup>World Bank, *China Overview*, Apr 20, 2023, available at <https://www.worldbank.org/en/country/china/overview>

country's unique economic, social, and political landscape. China's regional disparities are influenced by a combination of historical, geographical, and policy-related factors that have shaped the uneven development patterns across its vast territory.

## **2.1 The History of China's Economic Development**

### **2.1.1 China's Economy Prior to Reforms**

The pre-reform era of China's economy, spanning from 1949 to 1978, was marked by significant challenges and imbalances. Initially, the focus was predominantly on agricultural productivity, which remained low. To mitigate food shortages, China had to import substantial quantities of grain and cotton annually. The broader industrial landscape was similarly imbalanced. For instance, the per capita output of essential industrial products like electricity, raw coal, pig iron, steel, and cotton fabric was dramatically lower compared to the United States—by factors of 141, 41, 144, 418, and 8.4 times, respectively<sup>6</sup>.

During this period, China's economic development was extremely uneven, with industrial production largely concentrated in the Northeast and major coastal cities. Over 90% of power plants were located in these areas, and more than 70% of the nation's cotton spinning spindles and weaving machines were in Shanghai, Qingdao, and Tianjin. Additionally, over 75% of wool spinning was centralized in Shanghai (Yang, 2002).

China was gradually moving towards to a highly centralized planned economic system during this period. China's economy was centrally controlled under the leadership of Chairman Mao Zedong. A large share of production output was controlled directly by the central state. And the production goals, prices of goods, and resources are also mainly controlled by the state. Production and construction plans were separately managed by central authorities and local governments, leading to imbalances and disconnection in development among various departments.

As part of the efforts to centralize the economy and boost industrial output, Mao launched China's First Five-Year Plan,<sup>7</sup> which was primarily based on keeping foreign imports to a minimum and rapidly increasing the outputs of heavy industry. Agricultural outputs were used to feed the urban population and support industrial growth. By the end of 1949, 2858 industrial enterprises practicing bureaucratic capitalism were confiscated, leading to the establishment of state-owned industries, which accounted for 78.3% of the national industrial capital. At the end of the "First Five-Year Plan," the number of enterprises directly managed by central authorities increased from 2,800 in 1953 to 9,300 in 1957.

From 1950 to 1978, the population of China experienced rapid growth, while the economy developed at a relatively slow pace. Overall, China did achieve certain accomplishments in economic development during this period. However, there were substantial fluctuations and

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<sup>6</sup>Institute for Chinese Economic Practice and Thinking, Tsinghua University, Summary of 70 years of economics in New China, Sep 21, 2019, available at <http://www.accept.tsinghua.edu.cn/2020/1113/c22a249/page.htm>

<sup>7</sup>The First Five-Year Plan began in 1953 and was completed ahead of schedule in 1957.

significant setbacks. Compared to other economies, China's economic growth rate remained relatively slow, with lower growth quality. In 1978, China was among the poorest countries in the world, with a real GDP per capita significantly lower than that of many other nations. The real GDP per capita was only one fortieth of the U.S. level and one tenth of the Brazilian level (Zhu, 2012).

In summary, the early stages of the People's Republic of China were marked by a focus on agricultural development and a highly centralized planned economic system under Chairman Mao Zedong's leadership. Despite efforts to rapidly increase industrial outputs through initiatives like the First Five-Year Plan, the economy faced extreme imbalances and slow growth rates. By 1978, China was one of the poorest countries globally, with significant disparities compared to other economies. These challenges set the stage for the transformative reforms initiated under Deng Xiaoping's leadership, which would ultimately propel China towards unprecedented economic growth and development.

### **2.1.2 China's Economic Growth and Reforms**

China's economic history since the 20th century is marked by significant transitions in economic policy under different leaderships. This section will delve deeper into these transitions and their impacts on regional development.

During the early years of the People's Republic of China, Mao Zedong's leadership focused on centralized planning and collectivization. The First Five-Year Plan (1953-1957) aimed at rapidly developing heavy industry while maintaining strict control over agriculture. However, these policies led to significant imbalances and inefficiencies, particularly evident during the Great Leap Forward (1958-1962) and the Cultural Revolution (1966-1976), which caused severe disruptions in economic activity and widespread famine.

China launched several economic reforms that significantly transformed the economy, resulting in marked improvements in growth and development metrics and the country's economic and political trajectory. The economic reforms initiated by Deng Xiaoping in 1978 marked a drastic shift from Maoist policies. Deng's policies emphasized "Reform and Opening Up," transitioning China towards a market-oriented economy. The reforms introduced market mechanisms and reduced state control, leading to profound changes in various aspects of China's economic and social structure. After the reforms and opening-up policies were initiated in 1978, China consistently surged ahead in economic development, eventually becoming the world's second-largest economy.

China's Reform Era began in 1978 with Deng Xiaoping's Four Modernizations, which focused on strengthening four critical areas of the Chinese economy: Agriculture, Industry, Defense, and Science and Technology. The Four Modernizations was formally adopted as the country's highest priority at the Third Plenary Session of the 11th Central Committee of the Chinese Communist Party (CCPCC) in late 1978. After this, all the other tasks shall be subordinated to that of economic development. This set of priorities differed a lot from the cultural



revolution and had a profound impact.

Under the leadership of Deng Xiaoping, the Chinese government began to pursue an open-door policy, in which it adopted a stance to achieve economic growth through the active introduction of foreign capital and technology while maintaining its commitment to socialism. This policy aim to recover China's economy from the devastating by the Cultural Revolution, and also to raise the living standards of its people through economic growth.

The leadership in China began to believe that acquiring substantial funds from foreign sources could expedite China's modernization process. A number of areas were established by government for foreign investment, such as the special economic zones, open coastal cities, the economic and technology development zones, the open border cities, and the high-tech industry development zones. Special Economic Zones (SEZs) were established in coastal regions such as Shenzhen, Zhuhai, and Xiamen in the late 1970s, which catalyzed significant economic growth by attracting foreign investment and promoting trade along the southern coast. In 1984, a decision was made to open 14 cities to more intense engagement with the international economy. Those zones became the engines driving China's tremendous and sustained economic growth, Shenzhen, which grew from a town of about 30,000 in 1979 to a metropolis of some 7,500,000 in little more than a quarter century.<sup>8</sup> This shift in attitude piqued the interest of foreign bankers and entrepreneurs and attracted massive inflows of foreign investment, primarily from companies in Hong Kong and Taiwan.

In contrast, the inland and western regions lagged due to their geographical disadvantages, limited access to international markets, and slower adoption of reforms. The historical focus on heavy industry in the northeastern provinces, known as the "Rust Belt,"<sup>9</sup> led to economic stagnation as these industries declined and faced challenges in transitioning to new economic activities.

These reforms led to significant regional disparities, as coastal regions developed rapidly while inland regions lagged behind. For example, Guangdong province, particularly the Pearl River Delta, experienced explosive growth due to its early adoption of market reforms and proximity to Hong Kong. The establishment of SEZs in Shenzhen transformed the region from a small fishing village into a bustling metropolis within a few decades. Guangdong's economy diversified into manufacturing, electronics, and services, attracting both domestic and international investment. The region's infrastructure and human capital have significantly improved, further fueling its growth and integration into the global economy. In contrast, Xinjiang, located in the remote northwest, faced numerous challenges. Despite its rich natural resources, including oil and minerals, Xinjiang's economic development has been hindered by geographical isolation, ethnic tensions, and inadequate infrastructure. While the central government has implemented policies to promote development in Xinjiang, including infrastructure projects like

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<sup>8</sup>Britannica, *Economic policy changes*, available at <https://www.britannica.com/place/China/Economic-policy-changes>

<sup>9</sup>*Stories about the Dongbei rust belt are resonant in China*, available at <https://www.economist.com/culture/2024/03/07/stories-about-the-dongbei-rust-belt-are-resonant-in-china>

the Belt and Road Initiative, the region still struggles with significant disparities in income and quality of life compared to the coastal provinces. The heavy-handed approach to maintaining social stability has also affected economic growth and investment in the region.

China's vast geographical expanse encompasses diverse terrains, climates, and resources, contributing to regional economic disparities. The eastern coastal regions have access to major ports, facilitating trade and investment. These areas have developed into economic powerhouses with advanced infrastructure, higher levels of human capital, and greater access to technology and innovation.

Conversely, the central, western, and northeastern regions face geographical challenges such as rugged terrain, harsh climates, and lower population densities. These factors hinder infrastructure development, limit economic opportunities, and exacerbate the difficulty of integrating these regions into the national and global economy.

Many measures were also undertaken concerning the domestic economy. The gradual abandonment of the collective farming system is remarkable. The government's emphasis shifted towards favoring family farming. Initially, families were granted the opportunity to contract collective land for a limited duration. Over time, this policy underwent significant adjustments as the contractual periods were extended and an innovative provision for subcontracting emerged, allowing individual families to own substantial tracts of land. This strategic shift in agricultural policy was quite meaningful. The emphasis on family farming aims to promote individual entrepreneurship and increase the productivity associated with small-scale family farming businesses. The impact of this policy evolution on economic growth was noteworthy. By decentralizing land ownership and empowering individual families, the agricultural sector witnessed increased dynamism and productivity, ultimately contributing to a broader economic revitalization. The shift from collective to family farming not only marked a pivotal moment in Chinese agrarian history but also played a pivotal role in propelling the nation towards sustained economic growth.

Farmers also had more choices in crop cultivation. Gradually, many individuals completely abandoned agriculture and shifted towards establishing small-scale industries or setting up transportation companies and other services. As a result, there were significant changes in the work patterns, land leasing practices, and prosperity levels in rural areas after 1978.

The reform movement experienced a downturn in 1985. Factors such as fiscal decentralization and the implementation of the dual-track pricing system<sup>10</sup> contributed to inflation, consequently fostering corruption. Simultaneously, the exposure of Chinese citizens to foreign ideas and higher living standards heightened pressure on the government to expedite domestic reform efforts.

The 1990s and early 2000s, under the leadership of Jiang Zemin and Hu Jintao, saw further

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<sup>10</sup>In China, the government followed dual-track pricing until abolished in November 1989, known as “shuang-guizhi” in Chinese. State-controlled (planned) prices, which were lower, accompanied the market prices, which were higher.

economic liberalization and integration into the global economy. China's accession to the World Trade Organization (WTO) in 2001 was a landmark event that accelerated trade and investment. However, this period also highlighted the growing regional disparities. Coastal provinces continued to thrive, while many inland provinces remained underdeveloped.

China's desire to join the WTO, which it achieved in December 2001, played a pivotal role in revitalizing the non-state sector and establishing the groundwork for institutional reforms. These reforms, marked by heightened competition, proved instrumental in fostering economic growth.

While China was advancing its domestic trade, it also wanted to open to the outside world. Under central planning, trading rights were monopolized by the state, with only a limited number of enterprises permitted to engage in trade with foreign counterparts, which means China remained isolated from the global economy. However, with the success of the Special Economic Zones, non-national enterprises emerged as a driving force in foreign trade as trading rights were expanded. The number of domestic companies involved in foreign trade surged from 12 in 1978 to over 5,000 a decade later.

By the year 2001, upon China's accession to the WTO, State-owned enterprises underwent restructuring, and various sectors were opened up to foreign competition. This restructuring process aimed to make China's economy more market-oriented and competitive globally. The number of domestic companies engaged in foreign trade had reached 35000.<sup>11</sup> The trade-to-GDP ratio<sup>12</sup> of China experienced growth during the period leading up to its accession to the WTO, with the reduction of tariffs and non-tariff barriers (Figure 2).

Accession to the WTO opened up new opportunities for China's trade. The removal of trade barriers and the implementation of WTO rules facilitated increased exports and imports. China became known as the "world's factory," leveraging its low-cost labor and manufacturing capabilities to become a global trade powerhouse. China's entry into the WTO marked a significant transition from a policy of economic nationalism to one of active economic engagement with the global community.

WTO accession also stimulated greater inflows of foreign direct investment(FDI) into China. Foreign companies were attracted to China's vast market, abundant labor force, and improving business environment. This inflow of FDI contributed to the modernization and expansion of China's industries. China's attractiveness as a destination for foreign investment relative to other countries over 2001-2003 was growing rapidly from 3% to 9.7% (Figure 3). In the five years since joining the WTO, China's FDI inflows increased from \$47 billion in 2001 to \$72.4 billion in 2005. Moreover, since 2002, China has consistently held the position of the world's largest recipient of FDI inflows.

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<sup>11</sup>CATO Institute, China's Post-1978 Economic Development and Entry into the Global Trading System, Oct 10,2023, available at <https://www.cato.org/publications/chinas-post-1978-economic-development-entry-global-trading-system>

<sup>12</sup>The trade-to-GDP ratio is used to measure the importance of international transactions relative to domestic transactions. A higher ratio generally indicates a higher degree of economic integration with the global economy.

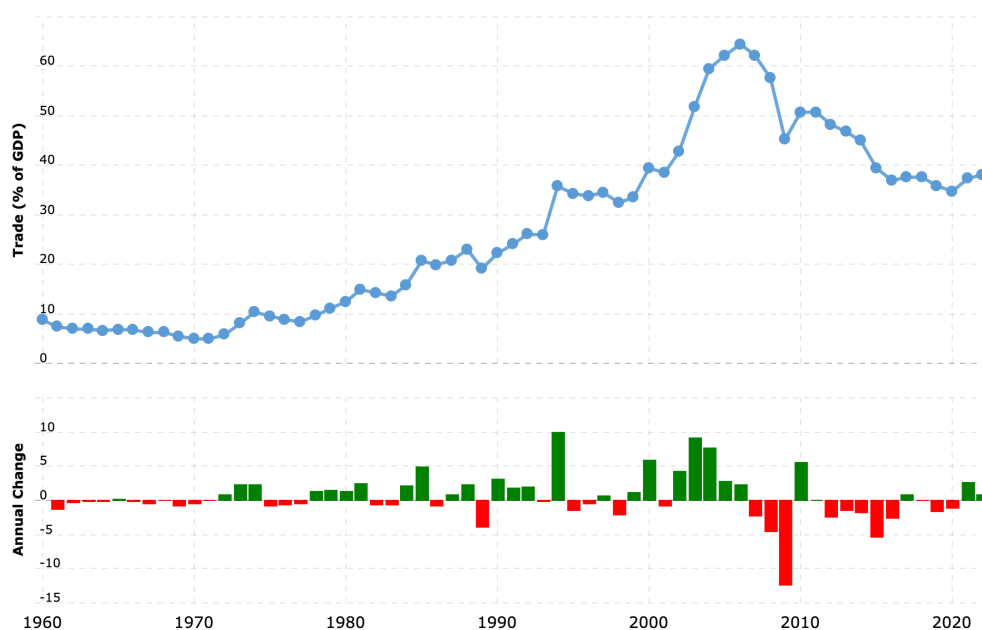


Figure 2: China Trade to GDP Ratio 1960-2024

Source: World Bank, <https://www.macrotrends.net/countries/CHN/china/trade-gdp-ratio>

Moreover, China’s membership in the WTO facilitated its integration into global supply chains. Many multinational corporations set up manufacturing facilities in China to take advantage of its skilled workforce and efficient logistics. This integration further boosted China’s export-oriented growth model.

China’s openness was at a high level, which is beneficial for stabilizing China’s industrial and supply chains. Faced with the complex changes in the international environment, the competition for industrial and supply chain dominance is becoming increasingly prominent. Since joining the WTO, many multinational corporations set up manufacturing facilities in China to take advantage of its skilled workforce and efficient logistics. General trade and autonomous manufacturing capabilities have continuously improved, resulting in a competitive advantage at scale. This has greatly promoted China’s industrialization process and established its position as a global manufacturing center.

This integration further boosted China’s export-oriented growth model. Five years after China’s accession to the WTO, the number of containers entering and leaving Chinese vessels doubled from 40 million to over 80 million. By 2011, a decade after China became a member of the WTO, the number of containers entering and leaving China more than doubled again, reaching over 129 million.<sup>13</sup>

Since Xi Jinping took office in 2012, there has been a renewed focus on addressing regional disparities and promoting more balanced development. The “New Era” policies emphasize innovation-driven development, poverty alleviation, and environmental sustainability. Initiatives like the Belt and Road Initiative aim to enhance connectivity and economic integration

<sup>13</sup>BBC NEWS Chinese, China’s WTO accession a game changer: Western expectations and China’s impact, Dec 11, 2021, available at <https://www.bbc.com/zhongwen/simp/business-59620392>

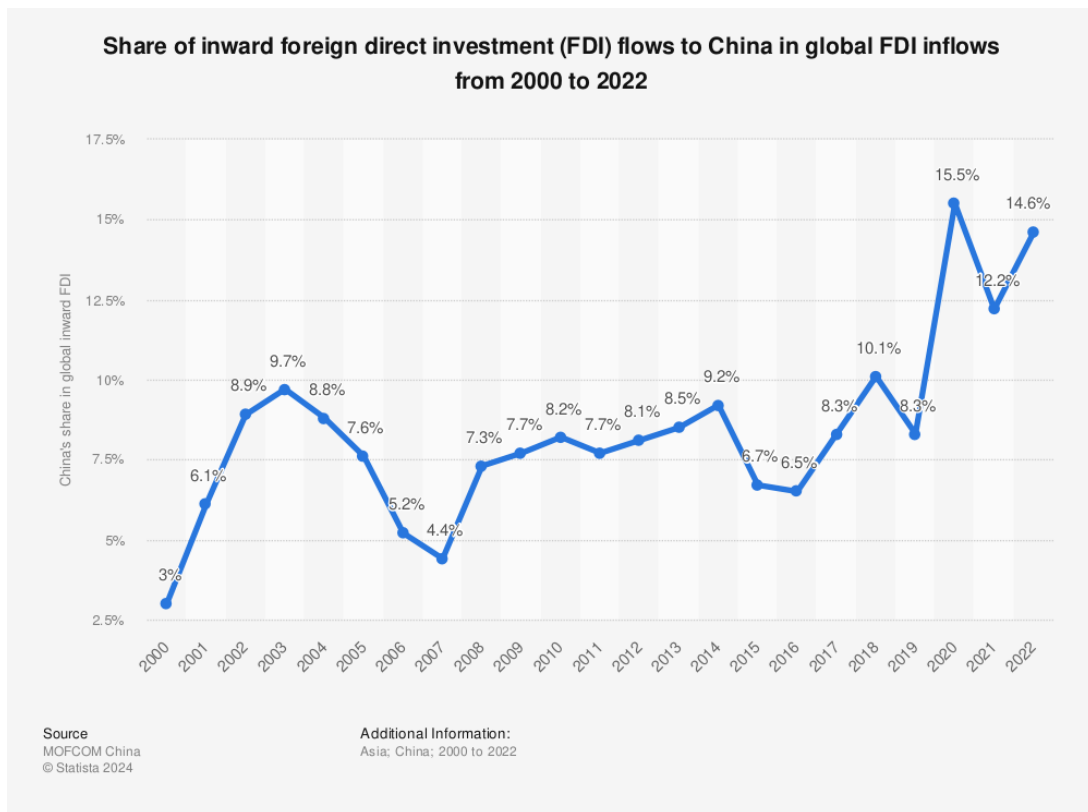


Figure 3: Share of inward foreign direct investment (FDI) flows to China in global FDI inflows from 2000 to 2022

Source: Statista, <https://www.statista.com/statistics/1287543/china-share-in-global-inward-fdi-flows/>

between coastal and inland regions, although the effectiveness of these policies in reducing regional disparities remains to be seen.

In a word, China’s Reform Era, initiated in 1978 with Deng Xiaoping’s Four Modernizations, marked a transformative period in the country’s economic history. Through strategic reforms such as the shift towards family farming, the opening of special economic zones, and accession to the WTO, China experienced remarkable economic growth and integration into the global economy. These reforms not only revitalized the domestic economy but also attracted significant foreign investment, propelled industrialization, and established China as a key player in global trade and supply chains. The Reform Era laid the foundation for China’s emergence as a global economic powerhouse, setting the stage for its continued growth and development in the 21st century. These transitions in economic policy have profoundly impacted regional development patterns in China. The stark contrast between the rapid industrialization and urbanization of coastal regions like Guangdong and the slower, more challenging development of inland regions like Xinjiang underscores the importance of tailored policy interventions. Understanding these historical and regional nuances is crucial for formulating effective strategies to address China’s regional development traps.

The institutional reforms initiated under Deng Xiaoping’s leadership not only transformed the national economy but also had profound regional implications. The decentralization of eco-

conomic decision-making empowered local governments to pursue region-specific growth strategies, fostering competition and innovation at the regional level (Xu, 2011). Special Economic Zones, such as Shenzhen, became testing grounds for market-oriented policies, attracting foreign investment and catalyzing rapid industrialization (Wei, 2013). These zones significantly outpaced other regions in economic growth, highlighting the uneven distribution of reform benefits.

However, the initial focus on coastal regions exacerbated regional disparities. Inland and western regions, burdened by geographical constraints and a lack of infrastructure, lagged in development. Subsequent policies, such as the “Go West” strategy, aimed to rectify these imbalances by encouraging investment in less developed regions (S. Fan et al., 2011). Despite these efforts, the persistent gap underscores the complex interplay between policy, geography, and institutional capacity in shaping regional outcomes.

The coastal regions’ success can be attributed to several key factors: strategic location, early reforms, and substantial foreign direct investment. Regions like Guangdong and Fujian benefited from proximity to Hong Kong and Taiwan, which facilitated trade and investment flows. Moreover, the introduction of SEZs provided a conducive environment for business, characterized by tax incentives, streamlined regulations, and improved infrastructure.

In contrast, inland regions struggled with limited access to markets and resources. The “Go West” strategy, launched in 2000, aimed to bridge this development gap by investing in infrastructure, education, and healthcare in western provinces. While this policy has led to some improvements, challenges remain due to deep-seated structural issues and weaker local governance (Lu & Chen, 2006).

China’s accession to the WTO in 2001 further integrated the country into the global economy, amplifying regional disparities. Coastal regions, already ahead in terms of infrastructure and market access, reaped significant benefits from increased trade and investment. Inland regions, however, continued to face barriers to full integration into global value chains, including inadequate infrastructure and lower levels of human capital.

The impact of institutional reforms on regional development is also evident in the variation of local governance structures. Coastal regions, with stronger institutions and more effective local governance, have been able to implement reforms more efficiently and attract more investment (Acemoglu & Robinson, 2012). In contrast, weaker institutions and governance challenges in inland regions have hindered their ability to capitalize on national policies and global economic opportunities.

In conclusion, China’s economic reforms have produced remarkable growth and development, but their benefits have been unevenly distributed across regions. The success of coastal areas contrasts sharply with the struggles of inland provinces, highlighting the need for targeted policies that address the unique challenges of less developed regions. Future policies should focus on strengthening institutions, improving infrastructure, and fostering innovation to promote

more balanced regional development.

## **2.2 The concept of the regional development trap**

In recent years, the concept of a development trap has attracted considerable attention in academic and policy circles, particularly with regard to regional disparities in economic growth. Although the concept of a development trap was first introduced to identify the development trap in the European regions, it has important implications for understanding the economic challenges faced by various regions in China. This chapter discusses the applicability of the development trap framework in the context of regional development in China.

Building upon the framework outlined in Diemer et al., a regional development trap can be defined as a condition where a region struggles to sustain economic dynamism in terms of income, productivity, and employment (Diemer et al., 2022). This stagnation occurs while the region also lags behind its national and international counterparts. In simpler terms, a region is considered trapped in development if the prosperity of its residents fails to improve relative to both its past performance and the prevailing economic conditions in national and global markets.

The concept of a development trap, initially applied in the European context, is also relevant to China's regional development. In both scenarios, regions can become stuck in cycles of underdevelopment or slow growth despite ongoing efforts to improve their economic situations (Diemer et al., 2022).

Similar to Europe, China exhibits significant regional disparities in economic development. Certain regions are economically prosperous and relatively wealthy, whereas others face challenges such as low income, reduced productivity, and high unemployment rates. By scrutinizing these disparities, patterns indicative of development traps can be identified.

And according to Diemer et al.'s research in his paper (Diemer et al., 2022), these traps can exist at high, middle, and low-income levels within the national distribution of regions. In other words, development traps can affect regions, regardless of their initial economic status. Even regions that start off with higher levels of income and development can fall into a trap if they fail to maintain or improve their economic performance relative to other regions.

By analyzing these regional disparities and identifying the underlying causes of development traps, policymakers can gain insights into how to address these challenges and promote more balanced and sustainable development across China's regions. This analysis can help guide targeted interventions and policies aimed at mitigating the factors contributing to development traps and fostering inclusive growth.

The uneven distribution of resources and investment has caused significant disparities in economic development. Two forms of inequality characterize the Chinese landscape. The first, extensively studied, pertains to the urban-rural divide. The second form of inequality, which exists between coastal and inland provinces.

China's economic policies after reform and opening up favored urban residents, leading to increased inequality between urban and rural areas. Inter-provincial migration, economic liberalization, and government involvement and control of economic activities all contribute to widening urban-rural inequality. The structure of government spending also has a significant impact on rural-urban inequality (Lu & Chen, 2006).

For instance, government spending has historically been skewed towards urban development, infrastructure, and services, thereby exacerbating the existing urban-rural divide. Investments in urban areas often focus on sectors such as technology, finance, and manufacturing, which attract both domestic and foreign capital, leading to a concentration of wealth, resources, and opportunities in these areas. Conversely, rural areas suffer from under-investment in critical sectors such as agriculture, education, and healthcare, which further widens the gap in living standards and economic opportunities between urban and rural residents.

Moreover, the hukou system<sup>14</sup> has institutionalized the urban-rural divide by restricting the ability of rural residents to access social services, education, and employment opportunities in urban areas. Workers migrating to coastal regions for employment retained their hukou at their birthplace, leading to a potential decline in agricultural output as rural "surplus labor" diminished. This could result in reduced agricultural production and increased agricultural imports over time if the rural workforce was not replenished. Migrant workers often sent remittances back to their families in rural villages, but these were considered transfer earnings and not counted towards the villages' output, leading to a statistical decline in rural income. Consequently, remittances from urban migrants were crucial support against poverty in rural areas. Despite recent reforms, the legacy of the hukou system continues to impact rural migrants, limiting their access to the full benefits of urban development and contributing to a transient workforce that is often underemployed and vulnerable to economic shifts.

The second form of inequality, less discussed but equally significant, relates to the disparities among different provinces and regions within China. This inter-regional inequality is evident in the contrasting economic fortunes of the coastal regions versus the inland provinces. Coastal provinces, benefiting from their geographical advantages, openness to trade, and early adoption of market reforms, have experienced rapid industrialization and economic growth. In contrast, many inland provinces, with limited access to global markets and lower levels of investment, have lagged behind, struggling with industrial upgrading and economic diversification.

This regional disparity is further compounded by fiscal policies and investment allocations that favor already prosperous regions, creating a feedback loop that entrenches the advantages of wealthier areas. For example, richer provinces are able to attract more FDI and secure higher levels of government funding for infrastructure projects, which in turn stimulate local economies and attract skilled labor, leaving poorer regions in a continuous struggle to catch up.

In the context of China, the neoclassical growth model's convergence hypothesis is that poor

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<sup>14</sup>Hukou, which roughly translates as 'Household Registration System' or 'Residence System,' forced individuals to register with local authorities to gain residency, which in turn determined where they worked.



nations or regions tend to catch up with the rich ones in terms of the level of per capita product or income, offers a framework for understanding the economic disparities between coastal and inland provinces (Yang, 2002). China's rapid economic growth has been unevenly distributed, with coastal regions experiencing accelerated development due to earlier economic reforms, greater openness to international trade, and significant inflows of foreign direct investment. In contrast, inland provinces have lagged behind, constrained by geographical disadvantages, lower levels of investment, and limited access to global markets.

However, the principles of convergence suggest that these inland regions possess a potential for catch-up growth, especially as the marginal returns to capital in the more developed coastal regions begin to diminish. The challenge, then, is to create the conditions that will allow for this convergence to occur, such as by improving infrastructure, enhancing education and skill development, and fostering a more favorable business environment in inland provinces.

Institutional factors also play a crucial role in shaping regional development outcomes within China. Variations in local governance structures, regulatory environments, and policy implementation capacity can influence regional development outcomes. Strong and effective institutions are essential for creating an enabling environment for investment, innovation, and sustainable development. Conversely, weak institutions characterized by corruption, bureaucratic inefficiency, and regulatory barriers can create a vicious cycle wherein regions struggle to attract investment, foster innovation, and achieve sustainable growth. As a result, these regions may become trapped in a state of underdevelopment, unable to break free from the constraints imposed by institutional deficiencies.

In conclusion, the concept of development trap offers a valuable framework for understanding regional disparities and economic challenges within China. By examining factors such as structural transformation, institutional dynamics, policymakers can devise targeted interventions to address development traps and promote more inclusive and sustainable growth across China's regions.

Understanding the regional development trap requires a multifaceted theoretical approach. The neoclassical growth theory suggests that regions with lower initial levels of capital should experience higher marginal returns, leading to convergence over time (Solow, 1956). However, this theory often falls short in explaining persistent disparities, particularly in the presence of structural and institutional barriers.

Endogenous growth theory, as proposed by Romer and Lucas, emphasizes the role of human capital, innovation, and knowledge spillovers (Lucas Jr, 1988; Romer, 1986). This perspective is particularly relevant for China's coastal regions, which have leveraged educational and technological advancements to sustain high growth rates. Contrarily, inland regions with lower investments in these areas continue to lag, illustrating the uneven application of endogenous growth principles across different regions.

New Economic Geography, introduced by Krugman, highlights the significance of spatial

agglomeration and economies of scale (Krugman, 1991). Coastal regions benefited from early agglomeration effects, attracting more firms and investments due to their superior infrastructure and market access. The positive feedback loop created by agglomeration has entrenched regional disparities as inland regions struggle to achieve similar levels of economic clustering.

Institutional economics, as articulated by North, provides another critical lens. Variations in local governance, regulatory environments, and policy implementation significantly influence regional development outcomes (North, 1990). Strong institutions in coastal regions have facilitated better business environments and attracted more investment, whereas weaker institutions in inland areas have perpetuated underdevelopment (Acemoglu & Robinson, 2012).

Dependency theory and structuralist theory offer additional insights. Dependency theory suggests that the economic exploitation of peripheral regions by more developed areas can lead to persistent underdevelopment (Prebisch, 1962). In China, this dynamic is evident in the extraction of resources from inland to coastal regions. Structuralist theory emphasizes the importance of targeted investments in infrastructure and industrial bases for underdeveloped regions to catch up (Hirschman, 1958). China's "Go West" policy embodies this approach but faces challenges due to existing institutional weaknesses and geographical disadvantages.

These theoretical frameworks collectively enhance our understanding of the complex factors contributing to regional development traps in China. By integrating insights from these theories, policymakers can design more effective strategies to promote balanced regional development and address the structural and institutional barriers that perpetuate disparities.

## **2.3 Theoretical Frameworks in Regional Development Studies**

This subsection explores the theoretical frameworks that underpin regional development studies, comparing various theories and discussing their relevance to the context of regional disparities in China. Understanding these theories provides a robust foundation for analyzing the dynamics of regional development traps and formulating effective policy interventions.

### **2.3.1 Neoclassical Growth Theory**

Neoclassical growth theory, primarily based on the Solow-Swan model, posits that economic growth is driven by labor, capital, and technological progress. According to this theory, regions with lower levels of capital will experience higher marginal returns to investment, leading to convergence in income levels over time (Solow, 1956). However, this theory has limited applicability in explaining persistent regional disparities in China, as it assumes perfect mobility of capital and labor, which is often not the case due to institutional and infrastructural barriers.

The application of neoclassical growth theory in China highlights the limitations of assuming perfect mobility of capital and labor. Empirical studies indicate that capital mobility in China is often restricted by institutional barriers and regional protectionism, preventing the expected convergence of income levels (Bai et al., 2006). Moreover, labor mobility is constrained by the

hukou system, which limits rural-urban migration and exacerbates regional income disparities (Chan, 2009). Therefore, while neoclassical theory provides a useful framework, its assumptions need to be adjusted to account for China's unique institutional context.

Research by Barro and Sala-i-Martin further illustrates that convergence is conditional upon structural factors such as education and infrastructure (Barro & Sala-i-Martin, 1992). In the case of China, these factors vary significantly across regions, leading to divergent growth patterns (Zhang, 2002). Coastal regions have benefited from higher levels of education and better infrastructure, facilitating faster growth compared to inland regions.

The core assumption of the neoclassical growth theory, developed by Solow, is that economies will eventually converge in terms of per capita income levels due to diminishing returns to capital and technological diffusion (Solow, 1956). In the context of China, this theory suggests that inland regions with lower initial capital and technology levels should grow faster than more developed coastal areas, as they benefit from higher returns on new investments and the adoption of existing technologies. However, empirical evidence from China shows that convergence is not automatic; institutional factors, policy frameworks, and initial conditions significantly influence the rate and extent of convergence among regions.

### **2.3.2 Endogenous Growth Theory**

Endogenous growth theory, developed by Romer and Lucas, emphasizes the role of human capital, innovation, and knowledge spillovers in driving economic growth (Lucas Jr, 1988; Romer, 1986). This theory suggests that investments in education, R&D, and technology can lead to sustained economic growth without diminishing returns. In the Chinese context, coastal regions with higher investments in human capital and innovation have seen more robust economic growth compared to inland regions, supporting the relevance of endogenous growth theory.

Endogenous growth theory's emphasis on human capital and innovation resonates strongly with the development trajectories of China's coastal regions. Regions like Beijing and Shanghai have become hubs of technological innovation, driven by significant investments in education and R&D (Hu & Jefferson, 2004). However, the theory also suggests that, without similar investments, inland regions are likely to fall further behind. Disparities in educational infrastructure and innovation capabilities contribute significantly to regional economic gaps.

Additionally, endogenous growth theory suggests that knowledge spillovers are crucial for sustained economic growth. Coastal regions, with their higher concentration of universities, research institutions, and technology firms, have benefited from these spillovers (C. C. Fan & Scott, 2003). In contrast, inland regions lack the critical mass of innovative activities necessary to generate substantial knowledge spillovers, further entrenching regional disparities.

Endogenous growth theory, particularly the models developed by Romer and Lucas, argues that investment in human capital and innovation leads to sustained economic growth by continuously increasing productivity levels (Lucas Jr, 1988; Romer, 1986). In China, regions like

Shanghai and Beijing embody this theory's predictions, as they have heavily invested in education and R&D, creating innovation hubs that drive their economies. These areas benefit from positive feedback loops where human capital and innovative capacities reinforce each other, leading to growth that does not exhibit diminishing returns.

### **2.3.3 New Economic Geography**

The New Economic Geography (NEG) theory, introduced by Krugman, focuses on the role of spatial agglomeration and economies of scale in regional development (Krugman, 1991). NEG theory explains how economic activity tends to concentrate in specific regions due to factors like market size, transportation costs, and the benefits of proximity to other firms and industries. This theory is particularly relevant to China, where coastal regions have developed into economic hubs due to their favorable geographical location, infrastructure, and early exposure to global markets.

The New Economic Geography Theory underscores the role of agglomeration economies in regional development. Coastal regions' success can be attributed to their ability to attract and retain a critical mass of economic activities, creating a self-reinforcing cycle of growth. However, NEG also points out the difficulties in replicating these conditions in less favorable geographical locations. Policies aimed at decentralizing growth must consider these spatial dynamics to avoid exacerbating existing disparities.

New Economic Geography, as proposed by Krugman, explains how economic activities tend to cluster in specific locations due to scale economies and transportation costs (Krugman, 1991). This clustering effect often leads to regional disparities, as seen in China where economic hubs like the Pearl River Delta have developed dynamic industrial clusters that attract further investment, talent, and resources, overshadowing more remote areas which struggle to attract similar levels of economic activity.

### **2.3.4 Institutional Economics**

Institutional economics, as articulated by North, highlights the importance of institutions in shaping economic performance (North, 1990). This theory posits that institutions—defined as the rules, norms, and organizations that govern economic activity—are critical determinants of economic development. In China, variations in local governance, regulatory frameworks, and institutional quality significantly impact regional economic outcomes. Regions with stronger institutions tend to attract more investment and achieve higher levels of economic growth.

Institutional economics provides a framework to understand how regional governance and institutional quality affect economic performance. Strong institutions in coastal regions have facilitated efficient markets and attracted significant FDI, contributing to sustained economic growth. Conversely, weaker institutions in inland regions often result in bureaucratic inefficiencies and corruption, deterring investment and slowing development (Acemoglu & Robinson, 2012). Enhancing institutional quality across regions is crucial for balanced development.

Studies by Rodrik, Subramanian, and Trebbi highlight the primacy of institutions in economic development (Rodrik et al., 2004). They argue that effective institutions provide the foundation for market economies, secure property rights, and reduce transaction costs. In the Chinese context, variations in local institutional quality have led to divergent regional economic outcomes, with coastal regions outperforming their inland counterparts due to better governance and institutional frameworks.

Institutional economics highlights the role of formal and informal rules and their enforcement in shaping economic performance. For China, this theory underscores the importance of effective governance, regulatory quality, and the rule of law in fostering economic development. Coastal regions benefit from more developed institutions, which attract foreign investment and promote efficient markets, whereas inland regions often face institutional constraints that hinder economic growth.

### **2.3.5 Dependency Theory**

Dependency theory, rooted in the works of Prebisch and Frank, argues that economic disparities between regions are perpetuated by the exploitative relationships between developed and underdeveloped areas (Frank, 1967; Prebisch, 1962). According to this theory, wealthier regions extract resources and labor from poorer regions, reinforcing a cycle of dependency and underdevelopment. While traditionally applied to international relations, this theory can also be relevant within China, where wealthier coastal regions may exploit the resources of poorer inland regions.

Dependency theory's application to China's regional disparities highlights the exploitative dynamics between developed coastal regions and underdeveloped inland areas. Coastal regions' dominance in high-value industries often results in the extraction of resources from inland regions without corresponding investments. This pattern reinforces the peripheral status of inland regions, perpetuating a cycle of underdevelopment (Rodrik, 2012).

Frank's analysis of dependency emphasizes that peripheral regions often become dependent on the economic activities of core regions, leading to unequal development (Frank, 1967). In China, this is evident in the flow of labor and resources from inland to coastal areas, which undermines the development potential of inland regions. Addressing these imbalances requires policies that promote equitable resource distribution and regional integration.

Dependency theory suggests that economic development in certain regions can be stunted as more developed areas extract resources and capital from less developed ones. In the context of China, this dynamic is evident as wealthier eastern regions draw labor and resources from poorer western regions, maintaining a form of economic dependency that prevents the latter from developing their own economic base.

### **2.3.6 Structuralist Theory**

Structuralist theory, advocated by scholars like Hirschman and Myrdal, emphasizes the importance of structural factors in economic development, such as infrastructure, industrial base, and social capital (Hirschman, 1958; Myrdal & Sitohang, 1957). This theory suggests that targeted investments in these areas can help underdeveloped regions catch up. In China, structuralist policies have been employed through initiatives like the Western Development Strategy, which aims to improve infrastructure and economic conditions in inland regions.

Structuralist theory advocates for targeted investments in underdeveloped regions to stimulate economic growth. China's efforts through the "Go West" strategy align with this approach, focusing on infrastructure and industrial development in inland areas. However, the success of such policies depends on addressing underlying institutional weaknesses and ensuring equitable resource distribution (Hirschman, 1958).

Myrdal's theory of cumulative causation explains how initial advantages in infrastructure and investment can lead to a self-reinforcing cycle of growth (Myrdal & Sitohang, 1957). In China, coastal regions have benefited from early and substantial investments, creating a virtuous cycle of development. Conversely, inland regions have faced a lack of initial investments, leading to persistent underdevelopment (Dennis Wei, 2002). Effective policy interventions must break this cycle by providing substantial and sustained support to underdeveloped regions.

Structuralist theory advocates for the role of state intervention in correcting market failures and promoting industrialization in underdeveloped regions. In China, this approach is reflected in policies aimed at developing the western and central provinces through targeted infrastructure projects and subsidies to industries. While these efforts have led to some economic improvements, the theory also highlights the challenges of overcoming deeply entrenched structural imbalances that can impede the effectiveness of such policies.

## **2.4 Research question and objectives**

The central research question of this dissertation is: What are the characteristics and determinants of regional development traps in China, and how can policy interventions be designed to alleviate these disparities? This study seeks to explore the multifaceted nature of economic inequality among China's regions and identify the factors contributing to the persistence of these development traps. By analyzing both economic and social indicators, the research aims to provide a comprehensive understanding of why certain regions remain underdeveloped despite national economic growth.

The specific objectives of this research are threefold. First, it aims to define and identify the regions in China that are currently experiencing development traps. Second, it seeks to understand the underlying causes and characteristics of these traps, including factors such as innovation capacity, educational infrastructure, and global market integration. Third, the study aims to propose targeted policy recommendations that can help mitigate these regional disparities and

promote more balanced economic development across the country.

The significance of this research lies in its potential to inform policy decisions that can enhance regional development and reduce economic inequalities. By identifying the key factors that contribute to development traps, policymakers can design more effective interventions tailored to the specific needs of different regions. This can ultimately lead to a more equitable distribution of economic growth and improved living standards across China.

## **2.5 Significance of the study**

Understanding the dynamics of regional development traps in China is crucial for several reasons. Firstly, regional economic disparities pose a significant challenge to national cohesion and social stability. Disparities between coastal and inland regions, as well as urban and rural areas, can lead to social tensions and undermine the overall development goals of the country. By addressing these disparities, the study aims to contribute to a more harmonious and stable society.

Secondly, regional development traps hinder the overall economic potential of the country. Regions that are trapped in underdevelopment cannot fully contribute to national economic growth. By identifying and addressing the factors that cause these traps, the study can help unlock the economic potential of these regions, leading to a more robust and sustainable national economy.

Thirdly, the study's focus on innovation, education, and global market integration aligns with China's broader development goals. The Chinese government has emphasized the importance of innovation-driven development and the need to integrate more deeply into the global economy. This research can provide valuable insights into how these goals can be achieved at the regional level, thereby supporting national policy objectives.

Finally, the study fills a significant gap in the existing literature by providing a detailed, empirical analysis of regional development traps in China. While there is considerable research on economic development and inequality in China, few studies have focused specifically on the concept of development traps and their implications. This research thus contributes to a deeper understanding of regional economic dynamics and offers a new perspective on how to address regional disparities.

## **2.6 Limitations**

Despite its comprehensive approach, this study has several limitations that should be acknowledged. One significant limitation is the availability and quality of data. While the study uses data from reliable sources such as the China Statistical Yearbook, there are inherent limitations in the data, including potential inconsistencies and gaps. These data issues can affect the accuracy and reliability of the findings.

Another limitation is the focus on quantitative analysis. While quantitative methods provide valuable insights into the patterns and determinants of regional development traps, they may not fully capture the complex, qualitative factors that also play a role. Factors such as local governance, cultural dynamics, and historical contexts are difficult to quantify but are crucial for a comprehensive understanding of regional development.

Additionally, the study's focus on China means that its findings may not be fully applicable to other countries with different economic structures and development trajectories. While the findings can offer valuable lessons, caution should be exercised in generalizing the results beyond the Chinese context.

Lastly, the proposed policy recommendations, while based on robust empirical analysis, are inherently speculative and need to be tested and refined through real-world application. The effectiveness of these policies will depend on various factors, including political will, administrative capacity, and the specific contexts of the regions in question.

In conclusion, this dissertation provides a detailed and nuanced analysis of regional development traps in China, offering valuable insights into the factors that contribute to these economic disparities. The findings underscore the importance of innovation, education, and global market integration in promoting balanced regional development. By addressing the identified development traps, policymakers can enhance economic equity and stability, contributing to a more prosperous and cohesive society.

Future research should build on this study by incorporating qualitative methods to capture the complex, non-quantifiable factors influencing regional development. Additionally, comparative studies involving other countries could provide broader insights and validate the findings in different contexts. Longitudinal studies tracking the impact of policy interventions over time would also be valuable in refining and improving strategies to mitigate regional development traps.



## 3 Literature Review

### 3.1 Overview of studies on regional development trap

This literature review aims to offer a comprehensive overview of existing literature on regional development, with a specific focus on introducing the concept of the regional development trap. This section aims to provide a comprehensive review of the existing literature on regional development traps, focusing on theoretical frameworks, comparative analyses, and case studies from different global contexts.

Recent literature in regional economics has provided new models and empirical data that significantly improve our understanding of the mechanisms behind regional development and growth. Specifically, in the field of development and growth economics, traps refer to persistent conditions marked by low development levels, prolonged periods of slow growth, or erratic cycles between growth and recession, leading to stagnant income. Entering such a detrimental equilibrium is often linked to self-perpetuating mechanisms influenced by institutional deficiencies or stagnation in productivity. Escaping from such a trap usually requires substantial policy interventions or structural reforms (Azariadis & Stachurski, 2005; Budina et al., 2023).

Traps, within the context of development and growth economics, are conceptually separate from barriers to convergence. While traps focus on persistently low development levels, convergence models describe a process where economic disparities across regions decrease, leading towards a steady-state equilibrium. As analyzed by Robert J. Barro, empirical evidence suggests that poorer states tend to converge and experience faster growth towards richer states in terms of both per capita income and product (Barro et al., 1991). And in Stefano Magrini's book, he asserts that while many regional convergence studies utilize methodologies initially designed for analyzing cross-national convergence, it's important to acknowledge that regions and nations are distinct concepts. From this particular viewpoint, convergence tends to be limited to geographically contiguous areas (Magrini, 2004).

In contrast, the concept of a trap highlights how low-income economies may become stuck in persistent underdevelopment, unable to close income and productivity gaps with leading economies without significant interventions.

A widely entertained hypothesis in economic studies suggests that productivity growth rates among countries tend to vary inversely with their productivity levels. Over a century-long observation of industrialized countries, this hypothesis has garnered support, particularly noting that while productivity levels converged, especially in the first 25 years post-World War II, the rate of convergence was inconsistent across different periods (Abramovitz, 1986). Jan Fagerberg's paper investigates how technology contributes to the growth disparity between high-growth and low-income countries (Fagerberg, 1994). He also explained the relationship between innovation and catching up in *The Oxford Handbook of Innovation*. The theory "catch-up" denotes a nation's capacity to diminish productivity and income differentials in comparison to a leading

nation, whereas “convergence” signifies the broader trend towards diminishing global disparities in productivity and income levels. Historically, successful catch-up research has not solely relied on the adoption of prevailing technologies within established sectors. They have also hinged on innovation, particularly in organizational practices, and penetration into emerging industries (Fagerberg & Godinho, 2006).

In exploring catch-up theories, it becomes evident that they do not adhere to a singular trajectory for narrowing the gap. Instead, these theories recognize numerous location-specific pathways toward achieving this goal. However, trap models stand out for their focus on a distinct breakdown within the catch-up process. This breakdown manifests as growth slowdowns following a period of rapid economic expansion. Particularly concerning is the persistence of these slowdowns, which appear to indefinitely defer the catch-up process. This emphasis on identifying and understanding growth slowdowns underscores the critical role of sustained momentum in economic development trajectories. In the literature, Ben-David and Papell offer an explicit methodology for assessing the significance and timing of economic growth slowdowns (Ben-David & Papell, 1998). Their study, which examines a broad spectrum of countries, reveals a prevailing pattern of significant structural breaks in postwar growth rates across most nations. Notably, they observe that while many industrialized countries encountered growth slowdowns in the early 1970s, exceptions such as the United States, Canada, and the United Kingdom are noted. Moreover, their findings indicate that developing countries, particularly those in Latin America, endured more severe slowdowns, which commenced approximately a decade later compared to their more developed counterparts. Eichengreen et al. offers further insights into the dynamics of growth slowdowns, particularly in fast-growing middle-income countries (Eichengreen et al., 2014). Instead of a sudden deceleration of growth in middle-income countries at a particular income level, growth may decelerate in successive phases. Thus, more countries may experience a slowdown in growth, and middle-income countries may experience it at lower income levels than previously estimated. In addition, the passage mentions the importance of education levels and technological progress in reducing the risk of a growth slowdown. This implies that middle-income countries need to invest in raising education levels and promoting technological progress to avoid falling into a growth slowdown. In the study of economic growth, growth slowdown is a crucial phenomenon, the possibility of which is not limited to a specific level but may occur throughout the economic system. We must therefore be careful to identify and understand this slowdown in growth that may signal the existence of an economic trap. This phenomenon is not merely an empirical concept, but is usually closely associated with a deceleration in income growth. Such deceleration can be caused by a variety of factors, including but not limited to convergence effects, catch-up processes, and the presence of economic traps. Notably, economic growth slowdowns are closely associated with theories of convergence, catch-up, or traps. Each theory provides a unique explanation and conceptual formulation of the empirical phenomenon of growth slowdown, further highlighting the complexity and importance of the phenomenon. Therefore, in delving into the phenomenon of economic growth, it is important that we consider the perspectives of different theories simultaneously and

work towards finding the most plausible framework for explaining the phenomenon.

In a recent paper, Diemer et al. defined the European regional development trap as a situation where a region fails to maintain economic vitality in terms of income, productivity, and employment, while also lagging behind its national and European counterparts in these aspects (Andreas Diemer & Storper, 2022). In other words, if a region's level of development fails to improve compared to its past performance and the economic conditions within the country and across Europe, then that region can be said to be trapped in a development dilemma. Furthermore, Diemer et al. applied this concept to regions in Europe that fell into this situation from different starting levels of economic development, determining the extent to which regions were trapped in the development trap by distinguishing between high, middle, and low-income levels (Andreas Diemer & Storper, 2022).

The concept of regional development traps can be understood within several theoretical frameworks. One prominent theory is the New Economic Geography (NEG), which emphasizes the role of spatial economic factors and agglomeration economies in regional development. According to Krugman, economic activities tend to concentrate in certain regions, leading to regional disparities (Krugman, 1991).

This theory suggests that regions with initial advantages, such as better infrastructure or access to markets, will continue to attract more investment, creating a self-reinforcing cycle of growth and development.

Another theoretical perspective is the Cumulative Causation Theory, proposed by Myrdal, which highlights the positive feedback mechanisms in economic development (Myrdal & Sitohang, 1957). This theory posits that economic disparities between regions are perpetuated by cumulative processes where growth in one region leads to further growth, while stagnation in another region leads to further decline.

These theories, among others, provide a foundational understanding of the mechanisms driving regional development traps. By examining the interplay of economic, social, and spatial factors, scholars can identify the root causes of persistent regional disparities.

Distinguishing between general growth slowdowns and the middle-income trap is crucial for understanding economic development. Growth slowdowns can happen in any economy, regardless of its income level, due to various factors such as global economic conditions, internal policies, or technological changes.

A comparative analysis of regional development theories reveals significant insights into the dynamics of regional growth and stagnation. For instance, the Core-Periphery Model developed by Friedmann delineates how economic power concentrates in core regions while peripheral regions lag behind (Friedmann, 1966). This model has been widely applied to study regional inequalities in various countries, demonstrating how policy interventions and infrastructural investments can alter the development trajectory of peripheral regions.

Additionally, the Growth Pole Theory proposed by Perroux emphasizes the role of key industries and urban centers as catalysts for regional development (Perroux, 1955). This theory provides a framework for understanding how targeted economic activities can stimulate growth in surrounding areas, potentially mitigating regional development traps.

### **3.1.1 Case Studies from Other Countries**

Expanding our analysis to include other large, diverse countries provides valuable insights into the dynamics of regional development and the efficacy of different policy interventions. By comparing China's regional development challenges with those of India, Brazil, and the United States, we can identify common patterns and unique differences that may inform more effective strategies for addressing regional disparities.

India, like China, is characterized by significant regional disparities in economic development. The literature on regional development in India highlights several key factors contributing to these disparities, including historical inequalities, variations in infrastructure, and differences in state-level governance (Ahluwalia, 2000). Studies have shown that states such as Maharashtra, Gujarat, and Tamil Nadu have experienced rapid industrialization and economic growth due to better infrastructure, favorable policies, and higher human capital (Bagchi, 2011). In contrast, states like Bihar and Uttar Pradesh lag behind due to poor governance, inadequate infrastructure, and lower educational attainment.

Brazil's regional development is similarly marked by stark contrasts, particularly between the prosperous southeastern region, including São Paulo and Rio de Janeiro, and the poorer northeastern region. The literature attributes these disparities to historical factors, such as the legacy of colonial exploitation and the concentration of economic activities in certain regions (Azzoni, 2001). Additionally, studies highlight the role of federal policies and investments in exacerbating or mitigating regional inequalities.

The United States presents a unique case of regional development due to its federal structure and relatively high level of economic development. However, significant regional disparities persist, particularly between the thriving metropolitan areas on the coasts and the struggling regions in the Rust Belt and rural areas. Research indicates that factors such as industrial decline, shifts in the global economy, and differences in state policies contribute to these disparities (Moretti, 2012). The decline of manufacturing in the Midwest, for example, has led to economic stagnation and population decline, while coastal cities have benefited from the growth of technology and service industries (Ganong & Shoag, 2017).

Examining case studies from different countries can provide valuable lessons on how regional development traps have been addressed in various contexts. For instance, the Southern Italy Mezzogiorno region has long been a subject of study due to its persistent underdevelopment compared to Northern Italy. Policy interventions such as the Cassa per il Mezzogiorno aim at reducing regional disparities through infrastructural investments and industrialization (Trigilia et al., 1992).

Similarly, the Appalachian region in the United States has experienced long-term economic challenges. The establishment of the Appalachian Regional Commission (ARC) in 1965 aimed to improve economic conditions through strategic investments in education, infrastructure, and healthcare (Obermiller & Philliber, 1994). These case studies highlight the importance of coordinated policy efforts and the role of government agencies in addressing regional development traps.

In conclusion, the literature on regional development traps offers a rich array of theoretical insights and practical case studies. By integrating these comparative perspectives, we can gain a more comprehensive understanding of the mechanisms driving regional development and disparities, thereby informing more nuanced and effective policy interventions and learning from global examples. So policymakers can design more effective strategies to promote balanced regional development and overcome the challenges of development traps.

### **3.1.2 Recent Studies on Regional Development Traps**

Recent literature has continued to explore the nuances of regional development traps, incorporating new data and methodologies. For instance, studies by Rodríguez-Pose and Crescenzi and Iammarino et al. have expanded the understanding of how innovation and infrastructure investment impact regional development (Iammarino et al., 2019; Rodríguez-Pose & Crescenzi, 2008).

Rodríguez-Pose and Crescenzi investigate the role of innovation in regional economic growth across Europe, finding that regions with higher innovation capacity tend to experience more robust economic growth (Rodríguez-Pose & Crescenzi, 2008). This study's methodology involves using regional innovation system (RIS) indicators and regression analysis to establish the relationship between innovation and growth. The study highlights the importance of localized innovation policies tailored to regional strengths and needs.

Iammarino et al. focus on the impact of infrastructure investment on regional disparities, using a comprehensive dataset that includes transport infrastructure, digital connectivity, and educational facilities (Iammarino et al., 2019). Their findings suggest that well-targeted infrastructure investments can significantly reduce regional disparities. The methodology employed involves spatial econometric models to account for geographical spillover effects, providing a nuanced understanding of how infrastructure impacts regional development.

While these recent studies offer valuable insights, they are not without limitations. Rodríguez-Pose and Crescenzi have been critiqued for their reliance on RIS indicators, which may not fully capture the informal innovation activities prevalent in less developed regions (Rodríguez-Pose & Crescenzi, 2008). Additionally, their regression models may suffer from endogeneity issues, where the causality between innovation and growth could be bidirectional.

Similarly, Iammarino et al. face challenges in accurately measuring the quality and utilization of infrastructure (Iammarino et al., 2019). Their spatial econometric models, while sophis-

ticated, may not fully account for the long-term impacts of infrastructure investments, which can take decades to materialize. Moreover, there is a risk of overlooking the socio-political factors that influence the allocation and effectiveness of infrastructure projects.

### **3.1.3 Poverty Trap**

In development economics, the term “poverty trap” refers to a situation where a country is stuck in a prolonged state of economic stagnation and is unable to escape poverty. Gill and Kharas point out that low-income countries often find themselves trapped in a vicious cycle of low investment, low growth, and low income (Gill et al., 2007). Due to insufficient capital accumulation, these countries suffer from low productivity, which in turn makes it difficult to attract investment, ultimately leading to economic stagnation. Furthermore, factors such as weak infrastructure, an underdeveloped market system, and a lack of human capital in low-income countries further exacerbate the predicament of the poverty trap.

Ravallion highlights the geographic disparities in global poverty, suggesting that spatial factors contribute significantly to the persistence of poverty traps (Ravallion, 2010). For instance, remote and rural areas often face severe disadvantages in accessing markets, healthcare, and education, which perpetuates the cycle of poverty. Similarly, Fan, Zhang, and Zhang discuss the role of public investments in alleviating rural poverty in China, emphasizing the need for targeted infrastructure development (S. Fan et al., 2002). They argue that investments in transportation, irrigation, and electrification can significantly boost productivity and income levels in rural areas. The role of infrastructure in breaking the poverty trap is well-documented across various contexts. In China, significant regional disparities in infrastructure development have contributed to uneven economic growth. Coastal regions have benefited from extensive infrastructure investments, which have spurred rapid economic development and integration into global markets. These regions enjoy better access to ports, roads, and communication networks, enabling them to attract more investment and maintain higher productivity levels. Conversely, inland regions lag behind, trapped in a cycle of underdevelopment due to insufficient infrastructure (S. Fan et al., 2002). This disparity hinders economic integration and perpetuates regional inequalities, as underdeveloped regions struggle to attract investment and improve productivity.

Human capital is another critical factor in the poverty trap. Investments in education can contribute to economic mobility and long-term growth. And then lift regions out of poverty by enhancing the skills and productivity of the labor force. However, low-income regions often suffer from poor educational infrastructure and limited access to quality education, which hinders human capital development and perpetuates poverty (Lucas Jr, 1988). This issue is particularly evident in rural areas of China, where disparities in educational attainment contribute to the persistent income gap between urban and rural populations (C. C. Fan & Sun, 2008). In these rural regions, insufficient investment in educational facilities, a lack of qualified teachers, and inadequate educational resources limit opportunities for students. Consequently, the workforce remains under-skilled, limiting their productivity and ability to engage in higher-paying

economic activities. Moreover, the lack of educational attainment in rural areas reinforces the cycle of poverty. Families in poverty are less able to afford educational expenses, leading to lower enrollment and higher dropout rates among children. This perpetuates low skill levels across generations, making it difficult to break out of the poverty trap (Glewwe & Kremer, 2006). Addressing these educational disparities is crucial for enhancing human capital and fostering economic growth in underdeveloped regions.

Implementing targeted interventions, such as improving school infrastructure, providing training for teachers, and offering families financial incentives to keep their children in school, can significantly improve educational outcomes. For example, in some countries, conditional cash transfer programs have achieved good results by providing financial support to low-income families conditional on their children's regular school attendance (Fiszbein & Schady, 2009).

Economic diversification is essential for regions to escape the poverty trap. Diversification mitigates risks associated with dependence on a limited number of economic activities and enhances resilience against economic shocks. Regions with diversified economies are better equipped to withstand these shocks and sustain long-term growth, contributing to poverty reduction and balanced development. Economic diversification also fosters resilience and promotes sustainable development, especially in regions that are heavily dependent on a narrow range of industries (Hesse et al., 2009).

In China, efforts to diversify the economies of inland provinces have been critical in reducing regional disparities and promoting balanced development (Kanbur & Zhang, 2009). These regions, historically reliant on agriculture and traditional industries, have started to develop new sectors such as manufacturing and services, which has helped to stabilize their economies and reduce poverty.

One study by Imbs and Wacziarg supports this notion, demonstrating that countries with more diversified economies tend to have higher growth rates and are better able to reduce poverty (Imbs & Wacziarg, 2003). This diversification allows for a more robust economic structure that can absorb shocks and sustain growth even during global economic downturns.

Another relevant study by Hausmann, Hwang, and Rodrik highlights the importance of producing a diverse range of goods as a strategy for economic growth (Hausmann et al., 2007). They argue that countries should focus on developing new industries that can generate higher income and create more job opportunities, which is crucial for breaking out of the poverty trap. Finally, a recent study by Papageorgiou, Spatafora, and Wang investigates the relationship between diversification and economic performance in developing countries (Papageorgiou & Spatafora, 2012). They find that diversification is strongly associated with higher levels of income and reduced poverty, underscoring the importance of policies that promote a diverse economic base.

In summary, economic diversification plays a pivotal role in escaping the poverty trap by reducing dependence on a limited number of economic activities, enhancing resilience against economic shocks, and promoting sustainable growth.

After breaking out of the poverty trap and achieving a middle-income level, developing countries may again fall into stagnation and be unable to enter the ranks of high-income countries. This phenomenon is known as the “middle-income trap.” The emergence of this phenomenon is typically attributed to the loss of competitiveness in two aspects for middle-income countries

### **3.1.4 Middle-income Trap**

The middle-income trap has been a subject of great interest in the field of economics. The phenomenon is often seen in countries that have experienced a period of rapid growth followed by stagnation or even recession, or that have persisted in a state of low growth rates. This means that the GDP per capita of these countries has not risen steadily as expected but has fluctuated up and down. For example, after a period of high growth, many developing countries may fall into a period of stagnation without being able to further increase their GDP per capita.

Scholars have put forward a variety of explanations and perspectives on this phenomenon. Some researchers attribute the middle-income trap to factors such as stagnant technological development, insufficient investment and market structure problems. For example, stagnant technological development may hinder the ability of an economic system to further innovate and increase productivity, leading to slower or stagnant growth. In addition, underinvestment may mean that countries are unable to sustain investments in infrastructure development and human capital, which in turn affects long-term economic growth. Problems with market structure may also lead to inefficient allocation of resources, which in turn hinders economic growth.

However, some scholars have also criticized and questioned the concept of the middle-income trap. They point out that the concept may oversimplify the complexity of economic development and ignore the variability among different countries and regions. In addition, some argue that the middle-income trap is not inevitable but depends on factors such as a country’s policy choices and institutional environment. Therefore, in order to better understand the nature of the middle-income trap, we need to conduct more in-depth studies to examine the impact of various factors on economic growth and explore effective policy measures to avoid or overcome the occurrence of the trap.

The middle-income trap is a phenomenon in which a country reaches a certain stage of development and then its economic growth stagnates, making it difficult to move into the ranks of high-income countries. Behind this phenomenon is the fact that the country lags behind in the competition between two different economic groups: low-wage economies and high-skill developed economies. As Gill and Kharas noted in their paper “The Middle-Income Trap Turns Ten,” middle-income countries often fall into two common traps: clinging to uncompetitive labor-intensive exports or prematurely pursuing knowledge economies without the necessary foundation, both leading to subpar growth and a form of the middle-income trap (Gill & Kharas, 2015).

On the one hand, middle-income countries need to face stiff competition from low-wage



economies. Low-income countries have often been able to achieve rapid growth in the short term, which has been characterized as an “economic miracle” because of their lower costs. However, their early success will be unsustainable if they are unable to support their rising wage levels through greater technological innovation and higher overall productivity. These low-income countries are usually emerging markets or developing countries with abundant labor resources and low labor costs, giving them a significant cost advantage in areas such as manufacturing and putting enormous pressure on the export-oriented industries of middle-income countries. In order to maintain competitiveness, middle-income countries have to reduce production costs, which often leads to reduced profits and weak economic growth.

On the other hand, middle-income countries also face competitive pressure from highly skilled, developed economies. With their advanced technologies, well-developed infrastructures, and highly qualified personnel, developed countries have a significant advantage in terms of innovation capacity, production efficiency, and product value added. Although middle-income countries have achieved remarkable economic development in the past, compared with developed countries, there is still a large gap between them in terms of technology level, R&D capability, and talent pool. This makes it difficult for middle-income countries to make breakthroughs in the fields of high-tech industries and high-end manufacturing and prevents them from effectively participating in international competition, which increases the risk of falling into the middle-income trap.

Falling into the middle-income trap is manifested in the form of long-term economic growth slowdown (Diemer et al., 2022). That is, as economies approach middle-income levels, they are unable to continue to implement earlier growth strategies of shifting labor from agriculture to export-oriented industries and taking advantage of easily accessible foreign technology. These economies are caught between being less productive and innovative than high-income economies, but having higher labor and land costs than low-income economies. Upon reaching middle-income levels, the comparative advantage of these economies in traditional labour-intensive industries fades away and they are unable to compensate for this disadvantage by moving into cutting-edge knowledge- and innovation-intensive industries, making it difficult for them to achieve further development.

Gill et al. introduced the concept of the “middle-income trap” in their publication “An East Asian Renaissance: Ideas for Economic Growth” (Gill et al., 2007). Since then, this concept has attracted significant attention and served as a focal point in economic growth research over the past two decades.

### **3.1.5 Catch-up Theory**

The concept of “catch-up” in economic development, as explored by Jan Fagerberg and Manuel M. Godinho in their article, refers the process by which a country reduces the gap in productivity and income relative to a leading nation (Fagerberg & Godinho, 2006). This notion is distinct from “convergence,” which pertains to a global trend of decreasing disparities in productivity

and income. And Fagerberg and Godinho's analysis underscores that successful catch-up is not merely a matter of adopting existing technologies in established industries. And it necessitates significant innovation, especially organizational innovation, and advances in emerging sectors.

Catch-up theory is deeply rooted in the broader field of economic development and growth theory. According to Abramovitz (Abramovitz, 1986), countries with greater "social capabilities" and technological backwardness have a greater potential for rapid growth, provided that they are able to effectively absorb and implement advanced technologies. He points out that these countries are able to reduce the gap between themselves and the developed countries and achieve rapid economic growth through the introduction and application of advanced technologies.

Recent empirical studies have further explored the dynamics of catch-up and convergence. Madsen, Islam, and Ang find that technological adoption plays a crucial role in the catch-up process, with productivity improvements being significantly influenced by the diffusion of innovations (Madsen et al., 2010). Additionally, Hanushek and Woessmann emphasize the role of human capital and institutional quality in facilitating catch-up and convergence, noting that countries with better education systems and governance structures tend to experience faster growth (Hanushek & Woessmann, 2012). This view is supported by more recent studies like those by Aiyar and Ebeke, which show that improvements in education and institutional quality are strongly correlated with economic growth and convergence (S. Aiyar & Ebeke, 2020).

China's experience offers a compelling case study of the catch-up process. Ang examines China's remarkable economic growth and emphasizes the pivotal role of institutional reforms, technological advancements, and strategic global economic integration (Ang, 2018). Similarly, Kanbur and Zhang highlight the significant regional disparities within China, noting that inland provinces have consistently lagged behind their coastal counterparts despite the country's overall economic progress (Kanbur & Zhang, 2005). They argue that implementing targeted policies to enhance infrastructure and human capital in these lagging regions is crucial for achieving balanced and inclusive development.

Innovation is a critical component of the catch-up process. Fu, Pietrobelli, and Soete emphasize that latecomer countries need to develop their own innovation capabilities rather than merely relying on technology transfer from advanced countries (Fu et al., 2011). This view is supported by Lee, who argues that successful catch-up requires not only technological adoption but also the development of indigenous technological capabilities and continuous learning (Lee, 2013). Additionally, Freeman highlights the importance of national innovation systems in facilitating technological catch-up and sustained economic growth (Freeman, 1995).

Organizational and institutional factors are also pivotal in the catch-up process. Rodrik, Subramanian, and Trebbi highlight the importance of institutions in fostering innovation and growth, suggesting that strong property rights, efficient regulatory frameworks, and effective government policies are crucial for sustaining long-term growth (Rodrik et al., 2004). Similarly,

Acemoglu and Robinson argue that inclusive institutions that promote economic opportunities and incentives are essential for enabling catch-up and convergence (Acemoglu & Robinson, 2012).

Despite the potential for rapid growth, the catch-up process is fraught with challenges. Felipe, Abdon, and Kumar point out that many countries fall into the “middle-income trap,” where growth slows significantly after reaching middle-income status due to structural inefficiencies and lack of innovation (Felipe et al., 2012). Similarly, Gill and Kharas identify factors such as demographic changes, weak institutions, and inadequate infrastructure as impediments to sustained growth and catch-up (Gill & Kharas, 2015).

Recent research continues to explore the factors influencing catch-up and regional development. Studies by Rodrik emphasize the role of industrial policy and strategic economic planning in facilitating catch-up (Rodrik, 2013). These studies argue that targeted interventions to support emerging industries and enhance technological capabilities are critical for sustaining long-term growth. Similarly, Lin highlights the importance of industrial upgrading and diversification, advocating for government policies that foster competitive industries and innovation (Lin, 2011).

The catch-up theory in economic development highlights the complex interplay of technological adoption, innovation, institutional quality, and strategic policy interventions. Empirical evidence from various countries, including China, underscores the importance of these factors in reducing the productivity and income gap relative to leading nations. As countries continue to navigate the challenges of economic development, the insights from catch-up theory provide valuable guidance for formulating effective growth strategies.

### **3.2 Gaps in the existing literature**

Despite the advancements in understanding regional development traps, significant gaps remain, limiting a comprehensive understanding of these phenomena. Narrowing these gaps is essential for the formulation of more effective policies and strategies to reduce regional disparities and promote sustainable development. One major gap is the lack of longitudinal studies that track the impact of policy interventions over extended periods. Longitudinal data would provide a more accurate picture of how regional development evolves and the sustained impact of different policies.

Future research should also focus on incorporating qualitative methods to complement quantitative analyses. Case studies, interviews, and ethnographic research can provide deeper insights into the local contexts and socio-political dynamics that quantitative data alone cannot capture.

Additionally, there is a need for more comprehensive datasets that include informal economic activities and social capital indicators. These factors play a crucial role in regional development but are often overlooked due to data limitations.

Much of the existing literature on regional development traps in China focuses on isolated case studies or specific regions. These studies often lack comparative analyses with other emerging economies or even within different regions of China itself. Comparative studies are essential as they can provide deeper insights into the role of varying institutional, cultural, and policy contexts. For instance, while comparing China's inland provinces with similar regions in India or Brazil could highlight unique challenges and successful strategies that are transferable across contexts (Kanbur & Zhang, 2005; Rodrik, 2013). Such comparisons can also reveal how different socio-economic and political environments influence the effectiveness of development policies, offering broader lessons for policymakers.

Many studies on poverty and middle-income traps in China rely heavily on cross-sectional data, offering only snapshots of economic conditions at specific points in time. While these studies provide valuable information, they do not capture the long-term dynamics of economic development and the sustained impacts of policy interventions. Moreover, to complement the insights from comparative studies, longitudinal studies that track changes over extended periods are crucial for understanding the long-term effects of structural changes and policy measures. Such studies could provide robust evidence on how short-term successes or failures evolve into long-term trends, informing more effective and sustainable policy-making (Eichengreen et al., 2013; Pritchett, 2000).

While innovation is recognized as a critical factor in escaping development traps, there is limited research on the systemic nature of innovation, particularly how national and regional innovation systems interact to foster or hinder economic growth. Specifically, the literature often fails to explore how various elements of national and regional innovation systems—such as universities, research institutions, government policies, and private sector dynamics—interact to foster or hinder economic growth. A comprehensive understanding of these systems could aid in designing better policies to support innovation-driven development (Fu et al., 2011). For instance, analyzing how collaborative networks between academia and industry drive regional innovation can offer insights into enhancing these partnerships.

There is a notable lack of rigorous evaluations of the effectiveness of various policy interventions aimed at addressing development traps. Numerous studies propose theoretical solutions without sufficient empirical validation through pilot programs, controlled experiments, or comprehensive impact assessments. Empirical research is needed to test the effectiveness of proposed policies and refine strategies based on evidence from real-world applications (Felipe et al., 2012). Evaluating the outcomes of different policy approaches in various regions can help identify best practices and inform future policy design.

Many studies do not adequately consider the specific historical, cultural, and geographical contexts of different regions within China. For example, the unique historical experiences of regions like Tibet or Xinjiang, or the specific economic structures of coastal versus inland provinces, are often not fully integrated into analyses. Recognizing and addressing these regional specificities is essential for crafting policies that are both effective and culturally sensi-

tive (Lu & Chen, 2006; Yang, 2002). Tailoring development strategies to the unique needs and contexts of each region can significantly enhance their effectiveness.

In the context of China, future studies should explore the effectiveness of recent policy initiatives such as the Belt and Road Initiative and the Regional Comprehensive Economic Partnership. Examining these policies' impacts on regional disparities can provide valuable lessons for other countries facing similar challenges.

Addressing these gaps in the literature is critical to advancing our understanding of regional development traps and developing more effective strategies to overcome them. Future research should focus on comparative analysis, longitudinal studies, systemic innovation perspectives, rigorous policy evaluation, and regional specificities. This will enable a more comprehensive and nuanced understanding of the complexities of regional development and economic catch-up.

## 4 Empirical Analysis

This section provides an in-depth examination of the empirical findings related to regional development traps in China. It includes a comprehensive overview of the data sources, detailed methodological explanations, additional visualizations, and a thorough discussion of the characteristics of regions at different risk levels of development traps.

### 4.1 Data sources and variables

The data utilized in this study were obtained from various reliable sources, including the National Bureau of Statistics of China and provincial statistical yearbooks. Key variables analyzed include regional GDP per capita, R&D expenditure, patent filings, employment rates, export and import values, and educational infrastructure indicators. Each variable provides insights into different aspects of regional development and the potential risks of falling into development traps.

Building on the methodologies developed by Diemer et al., which identified and measured development traps in European regions, we adapted this approach to the Chinese context (Diemer et al., 2022). Given the distinct economic, geographical, and policy environments in China, modifications were necessary to accurately capture the regional development dynamics. These modifications included adjustments to account for the distinct market integration, regulatory frameworks, and economic data availability in China.

European regions often share physical proximity to multiple national borders, facilitating easy access to both national and cross-border markets. This geographical proximity encourages trade and economic interactions between regions and nations. To better understand the unique challenges faced by China, it is useful to compare it with non-EU countries, which share a similar lack of regional integration mechanisms. Unlike the EU, many non-EU countries do not have a common market or customs union with neighboring countries. This absence of a unified market means that regions in these countries face trade barriers, tariffs, and regulatory differences when conducting business across borders. As a result, economic integration between regions is hindered, making it challenging to replicate the interconnection seen within the EU.

EU policies and regulations are designed to standardize and align standards and regulations across member states, fostering a more consistent business environment. This standardization effort serves to diminish trade barriers within the EU, thereby promoting regional integration and economic cooperation. However, outside the EU, regulatory frameworks vary significantly between countries, and the diversity in regulations can create barriers to trade and investment. And Regional cooperation and integration can be influenced by political tensions, historical conflicts, and geopolitical considerations in non-EU countries.

What's more, non-EU countries may lack the substantial regional development funds and support mechanisms available within the EU. The European cohesion policy allocates significant financial resources to support infrastructure, innovation, and economic development in less

developed regions. Non-EU countries may have fewer resources and institutional frameworks dedicated to addressing regional disparities and promoting economic convergence.

Therefore, we adapted Diemer et al.'s model to reflect China's unique economic structure and regional policies. Specific modifications included adjusting for differences in market integration, regulatory frameworks, and available economic data.

As Breinlich discussed in his literature, the need to refine the concept of development traps beyond a simple binary classification suggests the creation of a continuous measure of risk for each observation. This measure would capture the intensity of development trap risks rather than just determining whether an economy is trapped or not. The identification of regions trapped in development leverages literature on international growth slowdowns, which typically considers per capita income. However, recent studies emphasize the importance of incorporating additional indicators such as employment growth, labor force participation, and sectoral shifts in manufacturing to provide a more comprehensive analysis (Breinlich et al., 2014).

Breinlich also mentioned that the notion of development traps should consider additional factors beyond income, such as low growth in employment, labor force participation, or declining manufacturing shares (Breinlich et al., 2014). By incorporating these factors, the trapped status can be better understood, and the complexity of development traps can be measured more precisely.

To evaluate development traps, we selected GDP per capita (adjusted to constant 2005 prices) and the employment-to-population ratio as key indicators. These variables were chosen due to their robust representation of economic output and labor market dynamics, critical factors in assessing regional economic health and potential traps. This multidimensional continuum approach suggests that development traps are not solely determined by income levels but also by factors such as employment opportunities and labor force participation rates. By incorporating multiple dimensions, this approach aims to capture the complexity of development traps more accurately than a single-variable approach.

Using GDP per Capita as one dimension provides insight into the economic output of a region or country. And we use the GDP per Capita at constant prices in 2005 to remove the changes caused by inflation or deflation, allowing for easier comparisons across different regions. As for the employment-to-population ratio, it reflects labor market dynamics and the extent to which people are participating in the workforce.

Therefore, in this paper, we acquired demographic statistics, GDP per Capita at constant prices in 2005, and Employment-to-Population from the China Statistic Yearbook. Our aim was to encompass the broadest available time frame, spanning from 2003 to 2018. However, due to the nature of the analysis, which involves calculating accelerations over the preceding ten years, we were only able to compute China's regional development trap between 2013 and 2018. Growth accelerations were calculated over 5-year periods to align with established methodologies in the literature (M. S. Aiyar et al., 2013). This period is sufficient to capture significant

economic changes while minimizing short-term volatility.

## 4.2 Methodology

The methodology adopted in this study involves a combination of quantitative techniques to measure the risk of development traps. The analysis employs a modified version of the methodologies developed by Diemer et al., tailored to the Chinese context (Diemer et al., 2022). This involves the creation of continuous measures of risk for regions, capturing the intensity of development trap risks rather than relying on a binary classification.

Let the average compound annual growth rate in a variable of interest  $y$  in region  $i$  at time  $t$  over the period  $n$  be represented as

$$g_{i,t,t-n} = n^{-1} \times \ln \frac{y_{i,t}}{y_{i,t-n}}.$$

Thus, Growth acceleration is represented as

$$a_{i,t}^R = g_{i,t,t-n} - g_{i,t-n,t-2n},$$

where  $g_{i,t,t-n}$  represents the compound growth rates for each of the two variables  $y$ , which are GDP per capita and the employment-to-population ratio. For region  $i$  and period  $t$ , measured at 5-year intervals. The term  $a_{i,t}^R$  represents the acceleration of growth rates of these variables over 5-year intervals for each region. Therefore, the acceleration of growth in a given year is calculated over the preceding 10-year period.

Moreover, Diemer et al. also introduced two equations from the growth rates (Diemer et al., 2022), which are

$$a_{i,t}^C = g_{i,t,t-n} - g_{t,t-n}^C$$

and

$$a_{i,t}^{EU} = g_{i,t,t-n} - g_{t,t-n}^{EU}.$$

Diemer et al. referred to these equations as accelerations, which indeed represent the deviations between regions and their respective countries and the European Union (Diemer et al., 2022). Specifically,  $a_{i,t}^C$  denotes the deviation of the growth rate of region  $i$  relative to the average growth rate of its country  $C$  at the same time and region, while  $a_{i,t}^{EU}$  represents the deviation of the growth rate of region  $i$  relative to the average growth rate of the entire European Union at the same time and region.

However, due to the reasons we mentioned before, the deviation of region  $i$  from the average growth rate of Europe is omitted from our research. Therefore, our analysis relies solely on



regional acceleration  $a_{i,t}^R$  and disparities from the average growth rate of the country  $a_{i,t}^C$ .

The calculated deviations from national growth rates provide critical insights into the relative performance of regions within China. Understanding these deviations helps identify areas where regional policies need to be adjusted to prevent development traps, aligning with the broader theoretical framework of regional economic divergence and convergence. To quantify regional development traps, we measure deviations in growth rates using the formula

$$a_{i,t}^C = g_{i,t,t-n} - g_{t,t-n}^C, \text{ with } i \in C.$$

This approach allows us to capture the acceleration of growth relative to national averages, providing a nuanced view of regional performance and identifying areas where development is lagging.

To comprehensively capture specific variation among regions, Diemer et al. accounted for deviations from both national and European performance (Diemer et al., 2022). If an entire country experiences slowdowns in the considered dimensions, attributing the status of being trapped to any specific region within that country is inappropriate, as the trap occurs at a national level. Consequently, a poorly performing region within a similarly struggling national economy is less likely to be identified as trapped by our measure, aligning with our conceptual definition. Although we only consider regional and national situations, what we can draw from this is the importance of being mindful when analyzing data. It is essential to note that identifying whether a region is trapped in a development trap becomes more challenging when both regional and national economic performances are poor.

In Diemer et al.'s study, they used two different ways to measure the risk of falling into a development trap (Diemer et al., 2022). In the first measurement, they used three dummies  $D_{i,t}^{y,R}$ ,  $D_{i,t}^{y,C}$ ,  $D_{i,t}^{y,EU}$  to indicate variables, if the value of accelerations is positive, then the value of the dummy will be 1, and 0 otherwise. Therefore, we use two dummies  $D_{i,t}^{y,R}$ ,  $D_{i,t}^{y,C}$  to indicate the regional acceleration and the national deviation. This results in four different dummy values in total for two variables: GDP per capita and employment-to-population ratio. To better compare and observe the results, we use 1 to subtract the average of dummies dummy values. As the value of DT1 approaches 1, the likelihood increases that region  $i$  will enter into a regional development trap.

The first measure, DT1, assesses the risk of falling into a development trap by using dummy variables to indicate positive accelerations in regional and national economic performance. In contrast, DT2 calculates the risk by directly summing accelerations and standardizing these values. The first measure of risk of falling into a development trap (DT1) is defined as

$$DT1_{i,t} = 1 - \frac{\sum_y D_{i,t}^{y,R} + \sum_y D_{i,t}^{y,C}}{4}.$$

As an alternative to DT1, Diemer et al. introduced DT2, which calculates each acceleration by summing the values directly rather than using dummy variables (Diemer et al., 2022). The primary distinction lies in substituting dummy variables with the accelerations themselves. Subsequently, these values are standardized using the mean ( $\mu$ ) and standard deviations ( $\sigma$ ) of the initial year. The DT2 values reported in this study are for the period 2013–2018. Thus, the revised version of  $DT2_{i,t}$  can be computed as

$$DT2_{i,t} = -1 \times \frac{[(\sum_y a_{i,t}^{y,R} + \sum_y a_{i,t}^{y,C}) \times 4^{-1}] - \mu_{2013}^{RawDT2}}{\sigma_{2013}^{DT2}}.$$

As the value of DT2 increases, the associated risk also increases.

The alternative measure, DT2, offers a nuanced perspective on development traps by considering accelerations directly, thereby introducing greater variation compared to DT1. This approach can inform policymakers about the underlying dynamics of regional development more effectively, enabling the design of tailored interventions that address specific regional challenges. Notably, Diemer et al. acknowledge challenges in interpreting outliers when measuring by DT2, underscoring DT1 as their primary focus (Diemer et al., 2022).

### 4.3 Main results

The main results section delves into the empirical findings from the analysis, providing a detailed discussion on the regional development traps in China. This section includes expanded data visualizations, an in-depth comparison of measurements, and a comprehensive analysis of the implications of these findings.

#### 4.3.1 Visualization of trapped and non-trapped regions

China's vast territory and diverse geography present unique challenges and opportunities for regional development. Understanding the dynamics of regional development traps is crucial for policymakers, which can enable them to promote balance among regions and sustainable development. Drawing inspiration from methodologies applied in European regions by Diemer et al., this chapter aims to depict a detailed picture of regional development traps in China (Diemer et al., 2022).

In this chapter, we present the findings from our empirical analysis of regional development traps in China. Our analysis spans from 2003 to 2018, a period marked by significant economic transformation in China. We evaluated regional economic performance through GDP per capita and the employment-to-population ratio. Our aim is to identify regions at risk of development traps and discuss the implications of these findings for regional policy-making.

To provide a comprehensive understanding, we begin with an overview of the key statistics for the variables used in the analysis: GDP per capita (adjusted to constant 2005 prices) and the employment-to-population ratio from 2003 to 2018. These variables form the basis for our

subsequent visualization of trapped and non-trapped regions. Table 1 presents the descriptive statistics, revealing significant regional disparities essential for interpreting the risk indices.

Table 1: Descriptive Statistical Summary

Variable	Mean (Standard Deviation)	Median	Min	Max
GDP per Capita (2005 prices)	34772.2946 (17609.7675)	34510.62	10598.8359	65720.6699
Employment-to-Population (%)	0.1448 (0.0633)	0.1292	0.0691	0.2681

We identify regions in China at high, medium-high, medium-low, and low risk of falling into development traps by utilizing two distinct indices: DT1 and DT2, allowing policymakers to tailor interventions accordingly.

DT1 assesses the risk of a region falling into a development trap by examining deviations in economic performance from national averages. It captures the likelihood of a region's growth trajectory negatively diverging compared to more prosperous areas. This measure is crucial as it highlights regions whose growth trajectories are likely to stagnate or decline compared to more prosperous areas. By focusing on deviations from national averages, DT1 provides a clear picture of which regions are lagging behind and may require targeted economic policies to stimulate growth.

The concept of measuring economic divergence is rooted in the broader economic theory of convergence and divergence. Convergence theory suggests that poorer economies' per capita incomes will tend to grow at faster rates than richer economies. However, when regions within a country exhibit significant divergence from national growth trends, it indicates underlying structural issues preventing them from catching up.

For instance, studies on regional inequality in China by Kanbur and Zhang highlight the significant disparities between coastal and inland regions, underscoring the relevance of the DT1 index in identifying areas at risk of falling behind (Kanbur & Zhang, 2005). Similarly, the World Bank emphasizes the importance of addressing regional inequalities to achieve balanced economic growth, noting that uneven development can hinder overall national progress (Coulibaly et al., 2009).

The DT2 index goes beyond measuring divergence by quantifying the intensity and depth of economic stagnation. This index considers prolonged periods of high unemployment and slow growth, providing a broader measure of development trap risks. DT2 captures not only the current economic performance but also the historical context of economic challenges, making it a more comprehensive tool for assessing long-term development risks.

The importance of considering both the intensity and duration of economic stagnation is well-documented in the literature on development economics. Pritchett discusses the concept of "divergence, big time," where some regions or countries experience prolonged periods of economic stagnation, leading to persistent poverty and underdevelopment (Pritchett, 2000). By incorporating these factors, the DT2 index provides a more detailed picture of regions that are not just currently underperforming but have been struggling over a more extended period.

In their study on the middle-income trap, Eichengreen, Park, and Shin emphasize the need to look at long-term economic trends to understand why some countries fail to sustain growth after reaching middle-income status (Eichengreen et al., 2013). Similarly, Felipe, Abdon, and Kumar argue that the intensity and duration of economic stagnation are critical factors in determining whether a region or country is caught in a development trap (Felipe et al., 2012).

Based on the DT1 index, regions such as Henan, Liaoning, Heilongjiang, Tianjin, Ningxia, Hebei, and Jiangsu exhibit the highest risks of falling into development traps, consistent with their previously observed slow growth accelerations and economic challenges. These high-risk regions show negative or slow growth accelerations, indicating potential stagnation risks. For instance, Henan's DT1 score is 0.92, reflecting its substantial deviation from national growth trends and highlighting its economic challenges.

Conversely, the DT2 index identifies regions like Sichuan, Heilongjiang, Liaoning, Chongqing, Inner Mongolia, Ningxia, and Guizhou as having high risks. Sichuan, with a DT2 score of 1.18, exemplifies regions facing severe and prolonged economic stagnation, indicating the need for long-term, intensive policy interventions to address deep-rooted economic vulnerabilities.

Regions categorized under medium-high risk for DT1 include Shanxi, Inner Mongolia, Zhejiang, Guangxi, Yunnan, Qinghai, Jilin, and Jiangxi. These regions display moderate deviations from national economic performance but still face significant challenges that could lead to economic stagnation if not addressed. Shanxi, for example, has a DT1 score of 0.71, reflecting its struggle to keep pace with national growth rates despite moderate economic performance.

For DT2, medium-high risk regions include Hunan, Shanxi, Jilin, Jiangsu, Qinghai, Jiangxi, Tianjin, and Yunnan. The broader measure of DT2 captures underlying economic issues, such as industrial dependency and inadequate infrastructure, that might not be immediately apparent from basic economic metrics. Hunan's DT2 score of 0.49 suggests it faces substantial risks related to economic diversification and innovation capacity.

Medium-low risk regions for DT1, such as Hunan, Guangdong, Sichuan, Shaanxi, Beijing, Xinjiang, Shandong, and Shanghai, exhibit relatively stable economic performance with lower deviations from national averages. However, they still require continuous monitoring and targeted interventions to sustain their growth trajectories. Guangdong, with a DT1 score of 0.58, highlights the need to address specific regional challenges to prevent potential stagnation.

For DT2, medium-low risk regions include Shaanxi, Guangxi, Hebei, Henan, Hainan, Gansu, Zhejiang, and Hubei. These regions show moderate risks of prolonged economic stagnation, necessitating policies that focus on long-term economic sustainability and resilience. Shaanxi's DT2 score of 0.38 reflects moderate economic risks that need strategic interventions to ensure continued growth.

Low-risk regions identified by DT1 include Tibet, Gansu, Fujian, Hainan, Hubei, Chongqing, Anhui, and Guizhou. These regions exhibit positive economic indicators, indicating stable growth trajectories and lower risks of falling into development traps. Tibet's DT1 score of 0.46

exemplifies regions with strong economic performance relative to national trends.

In contrast, the DT2 index identifies Tibet, Shandong, Fujian, Anhui, Xinjiang, Beijing, Guangdong, and Shanghai as low-risk regions. These regions show lower risks of prolonged economic stagnation, reflecting their robust economic structures and capacities for sustained growth. Beijing's DT2 score of 0.03 underscores its strong economic fundamentals and resilience against long-term stagnation.

In order to visually illustrate the distribution of regional development traps in China more intuitively, we used two maps to identify the development traps of regions in China. Figure 4 presents the geographic distribution of development trap risks across Chinese regions from 2013 to 2018. Figure 5 presents the distribution of Chinese provinces<sup>15</sup>. These visualizations highlight spatial disparities, indicating regions with a higher susceptibility to development traps. The maps facilitate a deeper understanding of regional vulnerabilities and inform targeted policy interventions. This time frame contains the longest period of data available within the regions. The average risk scores depicted in the figure offer insights into the spatial disparities of development traps, facilitating comprehension of the regions most prone to such challenges.

The map of DT1 highlights regions with dark color to indicate that these regions are at the high risk of falling into development trap. For instance, regions like Henan, Liaoning, Heilongjiang, Tianjin, Ningxia, Hebei, and Jiangsu exhibit high risks according to DT1, indicating they are diverging negatively from national growth trends. These regions have not kept pace with the rapid economic growth seen in more prosperous areas, but the reasons for this vary significantly due to their distinct geographic and economic contexts. Henan, Liaoning, Heilongjiang, Tianjin, Ningxia, and Hebei are the darkest colors on the map, and these regions are geographically close and are all in the northern part of China.

Henan, situated in central China, stands as a region with a substantial population and profound historical significance as both a cultural and agricultural nexus. Despite its rich heritage and fertile lands, Henan has lagged in industrialization and modernization. This developmental delay has culminated in slower economic growth compared to the more rapidly advancing coastal regions. The province's heavy reliance on traditional agriculture and lack of significant industrial infrastructure have hindered its ability to compete in an evolving economic landscape.

In the northern part of China, Liaoning and Heilongjiang represent the traditional industrial base, and the Dongbeihu region has been particularly emblematic of these challenges, often referred to as the "Rust Belt." These two provinces have experienced economic stagnation due to antiquated industries and a significant deficit in technological innovation. The difficulties in transitioning from heavy industries to a service-oriented economy have exacerbated their economic stagnation. The legacy of state-owned enterprises, coupled with inefficient management and resistance to market-oriented reforms, has rendered economic revitalization in these regions particularly challenging.

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<sup>15</sup>Source: Wikipedia. (2021). China administrative claimed included. Retrieved from: [https://commons.wikimedia.org/wiki/File:China\\_administrative\\_claimed\\_included.svg](https://commons.wikimedia.org/wiki/File:China_administrative_claimed_included.svg)

The “Dongbeihu” , or Northeast China region, has historically been China’s industrial heartland. However, its reliance on heavy industries, such as steel and coal, combined with outdated production methods and a lack of investment in new technologies, has led to prolonged economic stagnation. The transition from a manufacturing-based to a service-oriented economy has been fraught with difficulties, exacerbating economic hardships. The entrenched presence of state-owned enterprises, plagued by inefficient management and resistance to market-oriented reforms, further complicates the economic revitalization efforts in this region.

In northwest China, Ningxia faces distinct challenges due to its geographic isolation and limited natural resources. The smaller economic base of this region further hampers its development, making it difficult to attract investment and sustain economic growth. Ningxia’s dependence on agriculture and resource extraction has restricted its economic diversification and growth potential.

Regions such as Ningxia and parts of Henan suffer from geographic isolation and inadequate infrastructure, limiting their integration into national and global markets. This isolation hampers economic diversification and access to investment.

Tianjin, despite being a major port city with strategic importance, has struggled with economic restructuring. Its over-reliance on heavy industries, such as steel and petrochemicals, has impeded its growth. Efforts to diversify the economy and promote new industries have progressed slowly, adversely affecting the city’s overall economic performance. The over-reliance on traditional industrial sectors has made it challenging for Tianjin to adapt to the changing economic landscape, thereby impeding its growth potential.

Hebei province, which encircles Beijing, the capital of China, is constrained by stringent environmental regulations and ongoing industrial restructuring. Hebei and Tianjin face significant environmental regulations due to their proximity to Beijing. While these regulations are necessary for improving air quality, the province’s economic performance has been significantly impacted by initiatives to reduce pollution and transition away from heavy industries. These necessary environmental measures, while beneficial for long-term sustainability, have posed short-term economic challenges for Hebei.

In contrast to the inland and northern regions, Jiangsu Province benefits from its coastal location and significant industrial and technological capabilities. Proximity to Shanghai has spurred robust economic activity. However, disparities persist within Jiangsu, particularly in its northern areas. These regions struggle with industrial overcapacity, stringent environmental constraints, and the pressing need for economic restructuring. This internal disparity highlights the challenges of achieving balanced regional development even within economically advanced provinces.

The geographic and economic disparities across these regions underscore the complex nature of regional development traps in China. While coastal areas like southern Jiangsu benefit from proximity to economic hubs like Shanghai, northern Jiangsu and inland regions struggle

with slower growth due to less favorable conditions. Northern provinces, with their industrial legacies, face different challenges compared to central and western regions that need better infrastructure and connectivity.

The map of DT2 identifies regions in the darkest color are Sichuan, Heilongjiang, Liaoning, Chongqing, Inner Mongolia, Ningxia, and Guizhou as facing severe and prolonged economic stagnation. These regions not only lag behind in current economic performance but have also struggled with persistent economic challenges over the years.

Sichuan Province is located in the southern part of China, but it is also located in the interior of China. Sichuan faces significant geographic barriers that impede economic integration with more prosperous coastal regions. The mountainous terrain complicates transportation and infrastructure development, limiting access to markets and contributing to economic isolation.

Guizhou is known for its rugged terrain and poor transportation networks. Guizhou has struggled to diversify its economy beyond traditional agriculture. Despite some development in tourism and energy sectors, the region remains economically vulnerable due to its reliance on low-value-added industries.

Both Sichuan and Guizhou provinces have significant rural populations with lower levels of education and skills. This human capital deficit limits the regions' ability to transition to more advanced and diversified economic activities. Additionally, these regions face higher poverty rates, which further constrain economic growth and development prospects.

Inner Mongolia and Ningxia are the northern provinces in China. These regions are characterized by vast, sparsely populated areas with harsh climatic conditions. The arid environment and extreme weather conditions further complicate agricultural productivity and infrastructure development. Limited infrastructure hinders economic activities and connectivity with other regions. As an autonomous region, Ningxia has specific governance structures that sometimes complicate policy implementation. The region's economic policies have not been as effective in attracting investment and fostering sustainable growth compared to other regions.

Heilongjiang and Liaoning, these northeastern provinces, have historically been heavily dependent on traditional industries such as coal mining, steel production, and heavy manufacturing. The decline of these industries due to economic restructuring and environmental regulations has led to significant economic challenges. The lack of diversification into more dynamic and sustainable sectors has exacerbated economic stagnation. The aging population and out-migration of younger, skilled workers in these regions contribute to labor market challenges and reduce the regions' economic dynamism. The demographic trends exacerbate the regions' economic stagnation and hinder long-term development prospects.

Although Chongqing has seen rapid urbanization and industrial growth, it still faces significant challenges related to governance and institutional capacity. The region's rapid expansion has often been unplanned, leading to inefficiencies and bottlenecks in infrastructure and public services.

Following the identification of regions at high risk of falling into development traps using DT1 and DT2 indices, it is essential to examine the regions identified as low-risk. This analysis provides a comprehensive understanding of the regional economic dynamics and highlights areas of relative strength that could offer insights into best practices for mitigating development traps in other regions.

The regions identified as having low risks of falling into development traps according to DT1 include Tibet, Gansu, Fujian, Hainan, Hubei, Chongqing, Anhui, and Guizhou. These regions exhibit positive economic indicators, suggesting stable growth trajectories and lower susceptibility to development traps. Conversely, DT2 identifies Tibet, Shandong, Fujian, Anhui, Xinjiang, Beijing, Guangdong, and Shanghai as regions with low risks of prolonged economic stagnation.

Tibet's low-risk status in both DT1 and DT2 can be attributed to several factors. Despite its geographic isolation and challenging terrain, Tibet has seen significant investments in infrastructure. A prime example of this is the Qinghai-Tibet Railway, a remarkable engineering feat that has dramatically enhanced connectivity and economic integration. This railway not only symbolizes technological advancement but also serves as a critical artery for trade and mobility, linking Tibet more closely with the rest of China. In addition to infrastructure development, government subsidies and supportive policies have been essential in promoting local economic growth. These measures are designed to boost the regional economy, helping to counteract the disadvantages posed by Tibet's remote location and harsh environment. By creating a more favorable economic climate, these policies have enabled sustained economic development, thereby reducing the overall risk profile of the region. In a word, the combination of strategic infrastructure projects like the Qinghai-Tibet Railway and targeted economic policies has been instrumental in establishing Tibet as a low-risk area in both DT1 and DT2, demonstrating the power of coordinated efforts to overcome natural and logistical challenges.

Fujian's proximity to Taiwan and its strategic coastal location have significantly contributed to its robust economic growth, which is characterized by a strong manufacturing base and a thriving export sector. Substantial FDI has played a crucial role in Fujian's economic development. This diversified economic structure has insulated Fujian from severe economic fluctuations experienced by other regions. Fujian's economic success highlights the importance of geographic advantages and strategic economic policies in mitigating development traps and fostering sustainable growth. The province's achievements demonstrate how targeted investment and export-oriented strategies can drive significant economic progress.

Hainan's low-risk status in DT1, but not in DT2, indicates that while current economic policies have been effective in boosting growth, long-term structural challenges remain. Continued efforts to diversify the economy beyond tourism and leverage its free trade zone status will be crucial for sustaining long-term growth.

Beijing, Shanghai, and Guangdong, these three regions' low-risk status in DT2 but not in



DT1 suggests that while they face short-term economic challenges, their robust economic structures and continuous innovation capacity provide long-term stability. This disparity highlights the importance of long-term planning and resilience in maintaining economic growth.

#### **4.3.2 The difference between the measurements of DT1 and DT2**

The disparities between regions identified as high-risk by the DT1 and DT2 indices underscore the distinct focuses and complementary perspectives of these metrics on regional economic challenges. DT1 is proficient at capturing immediate economic disparities by examining deviations in economic performance from national averages. This index effectively identifies regions that currently exhibit poor economic indicators relative to the broader national context, highlighting areas in urgent need of economic stimulus and short-term interventions.

Conversely, DT2 provides a more nuanced and comprehensive measure by considering the intensity and duration of economic stagnation. This index captures long-term structural issues that might not be immediately apparent from current economic performance metrics, thus offering deeper insights into persistent regional challenges. For instance, Sichuan is flagged as high-risk in DT2 due to its prolonged geographic and infrastructure challenges that limit economic integration and diversification. The province's mountainous terrain and inadequate transportation networks have consistently hindered its economic connectivity with more prosperous coastal regions, leading to sustained economic isolation and underdevelopment.

Similarly, Heilongjiang and Liaoning are identified by DT2 due to their dependence on declining industries and demographic challenges. Historically reliant on coal mining, steel production, and heavy manufacturing, these northeastern provinces face significant economic stagnation as these traditional industries decline. Additionally, demographic trends such as an aging population and the outmigration of younger, skilled workers further exacerbate their long-term economic difficulties. Despite potentially better short-term economic indicators captured by DT1, these regions' structural issues necessitate long-term, strategic interventions to foster economic resilience and diversification.

The DT1 index serves as a crucial tool in identifying regions where immediate economic intervention is necessary. By analyzing deviations in economic performance from national averages, DT1 highlights areas experiencing acute economic distress. These regions often display poor economic indicators such as low GDP per capita, high unemployment rates, and reduced industrial output. The insights from DT1 are vital for policymakers aiming to implement short-term economic stimulus and immediate relief measures.

For instance, regions such as Guizhou and Gansu frequently appear in DT1 assessments due to their significant deviation from national economic performance. Guizhou's economy is hindered by a lack of industrial diversification and a reliance on traditional agriculture, resulting in lower productivity levels and economic output. Similarly, Gansu suffers from inadequate infrastructure and limited access to markets, exacerbating its economic isolation and underperformance. These regions exhibit immediate economic distress, necessitating short-term policy

measures to boost their economic activities and address current deficiencies.

In contrast, DT2 offers a deeper understanding of long-term economic challenges by examining the intensity and duration of economic stagnation. This index is adept at identifying regions where chronic structural issues impede sustained economic growth. The DT2 index considers factors such as demographic trends, industrial dependence, and geographic disadvantages, providing a more nuanced view of economic health over an extended period.

Sichuan is a prominent example of a region identified by DT2 as high-risk due to its prolonged geographic and infrastructure challenges. The province's mountainous terrain and underdeveloped transportation networks have historically limited economic integration and diversification. Despite recent improvements, these long-standing issues continue to hinder Sichuan's economic potential, emphasizing the need for sustained structural interventions.

Heilongjiang and Liaoning are similarly highlighted by DT2 for their dependence on declining industries and demographic challenges. The economic histories of these provinces are marked by a heavy reliance on traditional industries such as coal and steel, which have faced significant downturns. Additionally, aging populations and the outmigration of younger, skilled workers exacerbate the economic stagnation, presenting formidable barriers to long-term growth. While these regions may exhibit better short-term indicators in DT1, their deep-rooted structural issues are captured effectively by DT2.

The distinct characteristics and economic histories of these regions underscore the importance of employing multiple indices to capture the full spectrum of development trap risks. DT1 and DT2 together provide a holistic view of economic vulnerabilities, offering insights into both immediate and long-term challenges.

Regions like Sichuan, Heilongjiang, and Liaoning illustrate the critical need for a dual approach. While DT1 highlights the necessity for immediate economic stimulus to address acute disparities, DT2 emphasizes the importance of long-term, structural interventions to mitigate deep-rooted economic challenges. This dual approach ensures that policy responses are both timely and sustainable, addressing both the symptoms and underlying causes of economic distress.

On the other end of the spectrum, regions identified as low-risk by DT1 and DT2 indices provide insights into areas that have managed to sustain economic stability and growth. The regions identified as low-risk according to DT1 include Tibet, Gansu, Fujian, Hainan, Hubei, Chongqing, Anhui, and Guizhou. Conversely, DT2 identifies Tibet, Shandong, Fujian, Anhui, Xinjiang, Beijing, Guangdong, and Shanghai as regions with low risks of prolonged economic stagnation.

In conclusion, the comparative analysis of DT1 and DT2 indices reveals the multifaceted nature of economic risks across different regions. By leveraging both indices, policymakers can design more effective and targeted interventions, ensuring that both immediate and long-term economic challenges are addressed comprehensively. The insights derived from DT1 and DT2

are indispensable for fostering sustainable economic development and mitigating the risks of development traps across diverse regional contexts. This multifaceted approach is essential for mitigating the risks of development traps and ensuring equitable regional development.

The DT1 index highlights the need for policies that can quickly stimulate economic growth in lagging regions, such as infrastructure investments and business incentives. For regions identified by DT2, long-term strategies are necessary, including improving educational systems, fostering innovation, and promoting industrial diversification to build economic resilience and sustain growth.

By addressing these areas, policymakers can help mitigate the risks of development traps and promote balanced and sustainable economic growth across China's diverse regions. The findings underscore the need for a tailored and multifaceted approach to regional development that considers both immediate economic conditions and long-term structural challenges.

#### **4.4 Characteristics of Trapped and Non-trapped Regions**

The analysis identifies several distinct characteristics of regions at different risk levels of development traps. High-risk regions typically exhibit lower levels of infrastructure development, limited access to education and healthcare, and weaker institutional frameworks. These regions also tend to have lower levels of industrial diversification and innovation capacity.

Conversely, regions at low risk of development traps are characterized by robust infrastructure, high levels of human capital, and strong institutional frameworks. These regions benefit from significant investments in R&D, a diversified industrial base, and greater integration into global markets.

Case studies of specific high-risk and low-risk regions are provided to illustrate these characteristics in detail. For instance, the case study of Xinjiang highlights the challenges faced by high-risk regions, including geographical constraints and limited access to resources. On the other hand, the case study of Guangdong demonstrates the benefits of strong institutional support and strategic investments in infrastructure and innovation.

##### **4.4.1 The Importance of Identifying the characteristics of trapped and non-trapped regions**

It is essential for policymakers to understand these characteristics that differentiate trapped regions from non-trapped regions. Identifying these characteristics enables targeted interventions that address specific regional challenges. By analyzing the specific attributes of regions classified as trapped or non-trapped, policymakers can identify patterns and implement strategies to foster balanced and sustainable economic growth across China. This chapter focuses on the dimensions of regional expenditure on R&D to GDP ratio, population density, GDP per capita, patent to population ratio, export and import value to GDP, student to population ratio, and university to population ratio. These dimensions are categorized into economic structure, physical

capital and infrastructure, human capital and labor force characteristics, economic geography, and institutional quality. Through this categorization, we aim to provide a comprehensive analysis of the underlying factors contributing to regional development traps in China.

Economic structure plays a fundamental role in determining a region's development trajectory. The dimensions considered under economic structure include GDP per capita and the patent to population ratio.

GDP per capita is a critical indicator of economic performance and living standards. Regions with higher GDP per capita generally exhibit stronger economic health and resilience against economic downturns. In China, regions such as Beijing and Shanghai have significantly higher GDP per capita, reflecting their robust economic performance. Conversely, regions like Ningxia and Guizhou have lower GDP per capita, indicating economic challenges and a higher risk of falling into development traps. Studies on regional development have consistently highlighted the importance of GDP per capita as a determinant of regional prosperity (Kanbur & Zhang, 2005).

The number of patents per capita is a measure of a region's innovation capacity and technological advancement. Regions with a higher patent to population ratio are better positioned to leverage technological progress for economic growth. Coastal regions like Guangdong and Jiangsu lead in patent filings, demonstrating their advanced technological status and economic dynamism. In contrast, regions such as Shanxi and Jilin have fewer patents per capita, reflecting their lag in innovation and higher risk of stagnation (Fagerberg, 1994; Fu et al., 2011).

Physical capital and infrastructure are essential for supporting economic activities and improving productivity. The dimensions considered under this category include regional expenditure on R&D to GDP ratio and export and import value to GDP.

Investment in research and development is crucial for fostering innovation and sustaining long-term economic growth. Regions with higher R&D expenditure relative to their GDP are better equipped to develop new technologies and improve productivity. Coastal regions such as Guangdong and Zhejiang exhibit higher R&D expenditure, reflecting their focus on innovation-driven growth. In contrast, regions like Henan and Heilongjiang have lower R&D expenditure, indicating a lack of innovation capacity and higher vulnerability to development traps (Fu et al., 2011; Lee, 2013).

The ratio of export and import value to GDP indicates a region's integration into global markets. Regions with higher trade volumes are more likely to benefit from global economic opportunities and mitigate risks associated with domestic economic fluctuations. Coastal regions like Shanghai and Zhejiang have substantial trade volumes, highlighting their strong global market integration. On the other hand, regions such as Henan and Heilongjiang exhibit lower trade volumes, indicating limited global integration and higher risk of economic stagnation (Rodrik, 2013).

Human capital and labor force characteristics are critical determinants of regional economic

performance. The dimensions considered under this category include student to population ratio and university to population ratio.

The number of students relative to the population reflects the emphasis on education and skill development in a region. Regions with higher student to population ratios are better positioned to develop a skilled labor force capable of driving economic growth. Beijing and Shanghai have higher numbers of students per capita, supported by extensive educational facilities and policies promoting education. In contrast, regions like Ningxia and Gansu have fewer students per capita, indicating inadequate educational infrastructure and higher risk of development traps (Hanushek & Woessmann, 2012; Lucas Jr, 1988).

The number of universities per capita is an indicator of access to higher education and research opportunities. Regions with a higher number of universities relative to their population size are better equipped to foster innovation and support economic development. Beijing and Guangdong, for instance, have a significant number of universities, contributing to their strong economic performance. Conversely, regions such as Ningxia and Heilongjiang have fewer universities, reflecting limited access to higher education and increased risk of economic stagnation (Freeman, 1995; Hanushek & Woessmann, 2012).

Economic geography influences a region's access to resources, markets, and opportunities for economic activities. The dimension considered under this category is population density.

Population density affects the availability of labor, market size, and infrastructure needs. Regions with balanced population densities can effectively support economic activities and infrastructure development. Beijing and Shanghai are prime examples of regions with high but well-managed population densities, facilitating robust economic performance. In contrast, regions like Inner Mongolia and Ningxia face challenges due to their sparse populations, limiting their ability to attract investment and sustain economic growth (Kanbur & Zhang, 2005).

Institutional quality encompasses the effectiveness of governance, regulatory frameworks, and public services in supporting economic development. Although specific indicators for institutional quality are not explicitly covered in this chapter, their importance is acknowledged in the broader context of regional development traps. Effective institutions are essential for creating an enabling environment for investment, innovation, and sustainable development. Weak institutions characterized by corruption, bureaucratic inefficiency, and regulatory barriers can hinder regional growth and contribute to development traps (Acemoglu & Robinson, 2012; Rodrik et al., 2004).

Identifying the characteristics of trapped and non-trapped regions is vital. Understanding the specific factors that contribute to regional development traps enables policymakers to design targeted interventions. For example, regions with low R&D expenditure may benefit from policies that incentivize innovation and technological advancement. Similarly, regions with inadequate educational infrastructure may require investments in schools and universities to build human capital (Fu et al., 2011; Lee, 2013).

Identifying trapped regions allows for more efficient allocation of resources. Governments can prioritize funding and support to areas most in need, ensuring that investments yield maximum impact. This approach helps in reducing regional disparities and promoting balanced economic development (Kanbur & Zhang, 2005).

By addressing the underlying causes of regional development traps, policymakers can enhance the economic resilience of regions. Regions that are better equipped to innovate, integrate into global markets, and develop human capital are more likely to sustain growth and withstand economic shocks (Rodrik, 2013).

Promoting the development of trapped regions contributes to more inclusive economic growth. Reducing regional disparities ensures that all parts of the country benefit from economic progress, leading to improved living standards and social cohesion (Acemoglu & Robinson, 2012; Pritchett, 2000).

Addressing the factors contributing to regional development traps is essential for achieving long-term sustainable development. Regions that overcome these traps can achieve sustained economic growth, reduce poverty, and improve overall well-being (Eichengreen et al., 2013; Felipe et al., 2012).

In conclusion, the identification and analysis of characteristics differentiating trapped and non-trapped regions provide valuable insights for policymakers. By focusing on economic structure, physical capital and infrastructure, human capital and labor force characteristics, economic geography, and institutional quality, this chapter aims to offer a comprehensive understanding of regional development traps in China. Addressing these dimensions through targeted interventions can promote balanced and sustainable economic growth, ensuring that all regions contribute to and benefit from China's economic progress.

#### **4.4.2 Characteristics of Regions at Different Risk Levels of Falling into Development Traps by the Measurement of DT1 and DT2**

Understanding the characteristics of regions at varying risk levels of falling into development traps is essential for identifying the underlying factors that contribute to their economic performance. By analyzing these characteristics, we can gain insights into the strengths and weaknesses of different regions, informing targeted policy interventions to promote balanced and sustainable development. This section examines the characteristics of high risk, medium-high risk, medium-low risk, and low-risk regions using both DT1 and DT2 measurements.

In this section, we use histograms to compare the mean values of various economic dimensions among regions classified as high-risk, medium-high risk, medium-low risk, and low-risk according to both DT1 and DT2 measurements. For each dimension, such as R&D expenditure to GDP ratio, GDP per capita, and others, we calculate the mean values for the period from 2013 to 2018. These mean values are then plotted in histograms, where each bar represents the mean value for a specific risk category. This visual representation allows us to clearly see how

regions at different risk levels perform across various economic dimensions. As anticipated, we observe that low-risk regions generally exhibit the highest mean values for positive economic dimensions, such as R&D intensity, while high-risk regions tend to have the lowest mean values. This pattern underscores the importance of innovation and economic diversification in maintaining economic resilience and avoiding development traps. The histograms combining DT1 and DT2 measurements provide a more holistic view by ensuring that regions identified at each risk level are consistent across both immediate and long-term economic assessments.

The DT1 measurement focuses on immediate economic disparities by examining deviations in economic performance from national averages. This categorization helps identify regions that are currently struggling and those that are more resilient. The DT2 measurement provides a nuanced understanding by considering long-term economic stagnation and structural issues, offering a comprehensive view of regions' characteristics over time.

High-risk regions exhibit significant economic challenges and vulnerabilities, making them prone to falling into development traps. These regions, such as Henan and Heilongjiang, display distinct characteristics in both DT1 and DT2 measurements. High-risk regions have significantly lower GDP per capita compared to other regions (Figure 6 and Figure 7), indicating economic stagnation and persistent poverty. For instance, in DT1, regions like Henan and Heilongjiang show economic challenges reflected in their lower GDP per capita. Similarly, in DT2, these regions continue to struggle with low GDP per capita over the long term, highlighting their inability to sustain economic growth. Innovation capacity is markedly low in high-risk regions, as indicated by fewer patents per capita. This lack of technological advancement hampers economic diversification and growth. Both DT1 and DT2 measurements reveal that high-risk regions consistently underperform in terms of innovation (Figure 6 and Figure 7), with limited patent activity and a lack of investment in research and development.

While some high-risk regions may have relatively higher R&D expenditure, this does not necessarily translate into effective innovation due to inefficiencies in resource allocation and weak institutional frameworks. In DT1, regions like Henan show lower R&D intensity, while in DT2, even if there is some expenditure, it fails to drive significant economic progress. Lower levels of global market integration are evident, with high-risk regions exhibiting limited trade activity, making them more vulnerable to domestic economic fluctuations. Both DT1 and DT2 measurements indicate that high-risk regions have low export and import values relative to GDP (Figure 6 and Figure 7), reflecting their isolation from global markets and lack of economic dynamism.

High-risk regions have lower student and university ratios, indicating limited emphasis on education and skill development. The underdeveloped educational infrastructure further exacerbates their high-risk status. In DT1, regions like Henan and Heilongjiang show low student and university ratios, while in DT2, the lack of investment in education persists over time, contributing to a poorly skilled labor force. High-risk regions show wide variations in population density, with some areas being overly dense, straining infrastructure, while others are sparsely

populated, limiting economic activities. Both DT1 and DT2 measurements highlight these disparities (Figure 6 and Figure 7), with high-risk regions struggling to manage population distribution effectively.

Medium-high risk regions display moderate economic performance with ongoing challenges that could lead to economic stagnation if not addressed. These regions, such as Shanxi and Guangxi, exhibit characteristics that reflect their transitional state. Medium-high risk regions show moderate GDP per capita, indicating some economic progress but still facing significant challenges. In DT1, these regions have higher GDP per capita compared to high-risk regions, but still lag behind the most dynamic regions. In DT2, the economic performance remains stable but shows signs of potential stagnation. Innovation capacity is improving in medium-high risk regions, with higher patent to population ratios compared to high-risk regions. Both DT1 and DT2 measurements indicate growing but still insufficient innovation activities (Figure 6 and Figure 7).

Medium-high risk regions exhibit moderate R&D expenditure, reflecting a growing focus on technological advancement. In DT1, regions like Shanxi show increasing R&D intensity, while in DT2, the investment in R&D continues to grow but needs further enhancement. These regions have better trade volumes than high-risk regions but still need to improve their global market integration. Both DT1 and DT2 measurements show moderate export and import values relative to GDP (Figure 6 and Figure 7). Medium-high risk regions have higher student and university ratios compared to high-risk regions (Figure 6 and Figure 7), reflecting better educational infrastructure but still needing improvement. In DT1, these ratios are moderate (Figure 6), while in DT2, they show consistent but gradual improvement (Figure 7). Medium-high risk regions face ongoing challenges in managing population distribution, affecting infrastructure development and economic activities. Both DT1 and DT2 measurements highlight these issues, with regions like Shanxi and Guangxi needing better population management strategies.

Medium-low risk regions exhibit relatively stable economic performance with higher resilience against development traps. These regions, such as Guangdong and Beijing, display strong economic foundations and robust innovation capabilities. Regions like Guangdong and Beijing exhibit higher GDP per capita, indicating strong economic performance and stability. In DT1, these regions have significantly higher GDP per capita compared to high and medium-high risk regions (Figure 6). In DT2, their economic performance remains robust over the long term (Figure 7). Innovation capacity is strong in medium-low risk regions, with higher patent to population ratios. Both DT1 and DT2 measurements reveal that these regions are leaders in innovation and technological advancement.

Medium-low risk regions have substantial R&D expenditure, reflecting their focus on innovation-driven growth. In DT1, regions like Guangdong show high R&D intensity, while in DT2, their investment in R&D continues to drive economic progress. Strong trade volumes indicate better global market integration in medium-low risk regions. Both DT1 and DT2 measurements show high export and import values relative to GDP (Figure 6 and Figure 7). These regions have high



student and university ratios, reflecting significant investment in education and skill development. In DT1, these ratios are high, while in DT2, they continue to support the development of a skilled labor force (Figure 6 and Figure 7). Well-managed population densities facilitate economic activities and infrastructure development in medium-low risk regions. Both DT1 and DT2 measurements highlight the effective population management strategies in regions like Guangdong and Beijing.

Low-risk regions exhibit the strongest economic performance and resilience against development traps. These regions, such as Shanghai and Fujian, display characteristics that contribute to their robust economic health and sustainability. Low-risk regions have the highest GDP per capita (Figure 6 and Figure 7), reflecting their robust economic performance and resilience against development traps. In both DT1 and DT2 measurements, regions like Shanghai and Fujian consistently show high GDP per capita, indicating strong economic foundations and sustained growth. Innovation capacity is the highest in low-risk regions, with significantly higher patent to population ratios (Figure 6 and Figure 7). This indicates that these regions have strong innovation ecosystems that drive economic diversification and growth. Both DT1 and DT2 measurements reveal that low-risk regions are leaders in technological advancement and innovation activities.

Low-risk regions exhibit the highest R&D expenditure to GDP ratio (Figure 6 and Figure 7), emphasizing the importance of investment in research and development for economic resilience. In both DT1 and DT2 measurements, regions like Shanghai and Fujian show substantial R&D investment, reflecting their focus on fostering innovation-driven growth. Regions with low risk levels have higher export and import values relative to GDP, indicating better integration into global markets and more dynamic trade activities. Both DT1 and DT2 measurements highlight the strong global market integration of low-risk regions, contributing to their economic resilience. Low-risk regions have the highest ratios of students and universities to population, reflecting a strong emphasis on education and skill development. In both DT1 and DT2 measurements, these regions show high student and university ratios (Figure 6 and Figure 7), indicating a robust educational infrastructure that supports the development of a skilled and knowledgeable labor force. Well-managed population densities that optimize infrastructure and economic activities characterize low-risk regions. Both DT1 and DT2 measurements highlight the effective population management strategies in low-risk regions, facilitating sustained economic growth and stability.

For a comprehensive view, we identified regions that consistently fall into the same risk categories in both DT1 and DT2 measurements. This consistency ensures the robustness of our analysis by capturing both immediate and long-term economic conditions.

From the Figure 8, we extracted the regions categorized under the same risk levels in both DT1 and DT2 measurements. By focusing on these consistent regions, we ensure that our analysis captures the underlying economic conditions that contribute to their classification. This approach allows us to more accurately compare and contrast the economic characteristics across

different risk levels.

The detailed analysis of key economic dimensions for these regions, using combined DT1 and DT2 measurements, provides a nuanced understanding of their economic characteristics and highlights areas requiring policy intervention.

The R&D expenditure to GDP ratio serves as a critical indicator of a region's commitment to fostering innovation and technological advancement. The histogram for this dimension reveals that low-risk regions, such as Fujian and Anhui, exhibit the highest mean R&D expenditure to GDP ratio. This high investment in research and development underscores their strong focus on innovation, which drives economic growth and resilience. Conversely, high-risk regions, such as Henan and Heilongjiang, show the lowest mean R&D expenditure to GDP ratio. This limited investment reflects their struggle to enhance technological capabilities, which hinders their economic progress and increases their vulnerability to development traps.

GDP per capita is another fundamental economic indicator, reflecting the overall economic performance and living standards within a region. The histogram for GDP per capita demonstrates that low-risk regions enjoy the highest GDP per capita, signifying robust economic health and stability. Regions like Tibet and Gansu lead in this aspect, highlighting their effective economic policies and growth strategies. On the other hand, high-risk regions such as Ningxia and Liaoning have the lowest GDP per capita, indicating significant economic challenges and lower living standards. This disparity underscores the need for targeted economic reforms and support to elevate these regions' economic conditions.

Population density of urban areas is a critical factor influencing infrastructure development and resource allocation. The histogram shows that medium-high risk regions, such as Shanxi and Inner Mongolia, exhibit the highest population density. This high density can strain infrastructure and resources, necessitating efficient urban planning and management strategies. In contrast, low-risk regions manage population density effectively, balancing economic activities and infrastructure development. Regions like Hainan and Hubei demonstrate effective population management, contributing to their economic stability and growth.

The patent to population ratio serves as a proxy for a region's innovation capacity and technological advancement. The histogram for this dimension indicates that low-risk regions lead in innovation capacity, as evidenced by the highest patent to population ratio. Regions like Fujian and Hainan excel in this aspect, reflecting their strong innovation ecosystems. High-risk regions, such as Henan and Heilongjiang, lag significantly, showing the lowest patent activity. This lack of innovation hampers their economic diversification and growth, highlighting the need for policies that encourage research and development.

The student to population ratio and university to population ratio are critical indicators of a region's investment in education and human capital development. The histograms for these dimensions show that medium-low risk regions, such as Beijing and Guangdong, have the highest mean student and university ratios. This suggests robust educational infrastructure and signifi-

cant investment in human capital. These regions are likely to benefit from a well-educated and skilled workforce, contributing to their economic resilience. High-risk regions, such as Ningxia and Liaoning, have the lowest ratios, reflecting inadequate emphasis on education and skill development. This educational deficiency further exacerbates their economic vulnerabilities.

The export and import value to GDP ratio reflects a region's integration into global markets and economic dynamism. The histogram for this dimension reveals that low-risk regions, such as Fujian and Anhui, have the highest export and import values relative to GDP. This strong global market integration supports their economic resilience and growth. High-risk regions, such as Henan and Heilongjiang, exhibit the lowest values, indicating limited global market integration. This isolation from global markets contributes to their economic stagnation and increases their risk of falling into development traps.

Institutional quality, which encompasses the effectiveness of governance, the rule of law, regulatory quality, and control of corruption, significantly influences regional economic performance. High-quality institutions create an enabling environment for economic activities by ensuring property rights, reducing transaction costs, and fostering a stable and predictable business environment. Conversely, regions with weak institutions often experience higher levels of corruption, bureaucratic inefficiencies, and arbitrary policy changes, which deter investment and hinder economic growth.

In the context of China, variations in institutional quality are pronounced across different regions. Coastal regions, which have benefited from early economic reforms and greater exposure to international markets, typically exhibit higher institutional quality. These regions often have more transparent governance structures, better enforcement of legal frameworks, and more efficient public services. For instance, Guangdong and Shanghai are renowned for their robust regulatory environments and efficient local governments, which have played a crucial role in attracting foreign direct investment and fostering innovation.

On the other hand, many inland and western regions suffer from weaker institutions. These areas often grapple with challenges such as corruption, lack of accountability, and ineffective public administration. For example, provinces like Gansu and Xinjiang face significant institutional barriers that impede their economic development. The prevalence of corruption and bureaucratic red tape in these regions creates an unpredictable business environment, discouraging both domestic and foreign investment.

Empirical evidence supports the significant impact of institutional quality on regional development. Studies have shown that regions with better governance structures tend to attract more investment, experience higher economic growth, and are more resilient to development traps. For instance, Acemoglu and Robinson emphasize the role of inclusive institutions in fostering economic prosperity, highlighting that regions with strong institutions are better equipped to harness the benefits of economic reforms and globalization (Acemoglu & Robinson, 2012).

To illustrate the impact of institutional quality on regional development traps, we can exam-

ine the case of Chongqing. As a municipality directly under the central government, Chongqing has implemented several institutional reforms aimed at improving governance and regulatory quality. These reforms have included measures to enhance government transparency, streamline administrative processes, and combat corruption. As a result, Chongqing has experienced significant economic growth and has been more successful in avoiding development traps compared to other inland regions.

By combining the regions identified at each risk level in both DT1 and DT2 measurements, we provide a comprehensive and nuanced understanding of the economic characteristics of these regions. This combined approach ensures that the regions consistently exhibit the same risk characteristics across both measurement frameworks, providing robust insights into their economic conditions. Our analysis highlights the critical areas where policy interventions are needed to support high-risk regions and leverage the strengths of low-risk regions to promote sustainable and inclusive economic development.

By comparing the characteristics of regions from both DT1 and DT2 measurements, we can identify commonalities and differences that define their risk levels. High-risk regions, as identified by both DT1 and DT2, share several characteristics, including low GDP per capita, limited innovation capacity, and poor educational infrastructure. However, there are also differences in the specific challenges they face. For example, in DT1, high-risk regions may exhibit lower R&D expenditure, while in DT2, they may struggle with long-term economic stagnation despite some R&D investment. Medium-high risk regions show improving economic performance and growing innovation capacity but still face challenges in fully integrating into global markets and enhancing their educational infrastructure. These regions require targeted policy interventions to sustain their growth and avoid falling into development traps.

Medium-low risk regions demonstrate strong economic foundations and robust innovation capabilities, reflecting their resilience against development traps. These regions benefit from high R&D expenditure, strong global market integration, and a well-developed educational infrastructure, which support their economic stability and growth. Low-risk regions consistently exhibit the strongest economic performance, highest innovation capacity, and best-managed population densities. Their focus on education, R&D investment, and global market integration makes them highly resilient against development traps. These regions serve as models for sustainable economic development, providing valuable insights for policymakers aiming to promote balanced regional growth.

In examining the characteristics of regions at different risk levels of falling into development traps, we find that DT2 provides a more reliable and nuanced measure compared to DT1. The enhanced accuracy of DT2 is attributed to its comprehensive inclusion of additional variables that capture the multifaceted nature of regional development and economic performance. Consequently, our analysis focuses on the high-risk and low-risk regions, as defined by DT2. To illustrate the differences between these two risk levels, we have recalculated the mean values for the different dimensions and presented them in the form of bar charts, as shown in figure 9.

The mean value of universities per population is significantly higher in low-risk regions compared to high-risk regions. This indicates that low-risk regions benefit from better educational infrastructure, which can foster human capital development and innovation. Similarly, low-risk regions have a higher mean value of students per population, reflecting a greater emphasis on education and a larger pool of educated individuals. This is critical for sustaining economic growth and technological advancement.

The trade openness is more pronounced in low-risk regions. This suggests that these regions have a higher level of global market integration, which contributes to economic resilience and growth. Innovation capacity, as indicated by the number of patents per population, is significantly higher in low-risk regions. This underscores the importance of a robust innovation ecosystem in mitigating the risk of development traps.

There is a stark contrast in GDP per capita between high-risk and low-risk regions, with the latter exhibiting much higher values. This disparity highlights the economic prosperity and higher living standards in low-risk regions. Urban population density is higher in high-risk regions, which may indicate overpopulation issues and strain on urban infrastructure. In contrast, low-risk regions enjoy lower population density, potentially leading to better living conditions and more effective urban management.

Investment in research and development is crucial for long-term economic growth. Low-risk regions show higher expenditure on R&D relative to their GDP, reflecting their commitment to fostering innovation and technological progress.

By analyzing these dimensions, we can conclude that low-risk regions exhibit stronger institutional frameworks, better educational and innovation infrastructures, higher economic integration, and greater overall economic prosperity. These factors collectively contribute to their resilience against falling into development traps. On the other hand, high-risk regions suffer from weaker institutions, lower levels of educational attainment, limited innovation capacity, and economic underperformance, making them more susceptible to development traps.

In summary, the combined analysis using both DT1 and DT2 measurements provides a holistic view of the economic characteristics of regions at different risk levels. The characteristics of high-risk regions include low GDP per capita, limited innovation capacity, poor educational infrastructure, and poorly managed population densities. These factors make them vulnerable to economic stagnation and development traps. Medium-high risk regions, while showing moderate economic performance and improving innovation capacity, still face challenges in global market integration and educational infrastructure. Medium-low risk regions exhibit strong economic foundations and robust innovation capabilities, benefiting from high R&D expenditure, strong global market integration, and well-developed educational infrastructure. Low-risk regions consistently demonstrate the strongest economic performance, highest innovation capacity, and best-managed population densities, making them resilient against development traps. This comprehensive analysis using both DT1 and DT2 measurements provides

valuable insights for policymakers to design targeted interventions that address the specific challenges of high-risk regions and leverage the strengths of low-risk regions to promote sustainable and inclusive economic growth.

## 5 Conclusion

The conclusion of this study synthesizes the main findings, highlighting the critical factors contributing to regional development traps in China. It also emphasizes the policy implications derived from the analysis and suggests areas for future research to further enhance our understanding and address persistent regional disparities.

### 5.1 Key Findings

This study has identified several critical factors contributing to the persistence of regional development traps in China. The empirical analysis, based on data from various Chinese governmental and international economic databases, highlighted the following key points:

Firstly, there are substantial economic disparities between coastal and inland regions in China. Coastal regions, benefiting from early economic reforms, better infrastructure, and greater access to international markets, have generally experienced more robust economic growth compared to inland provinces. This uneven development has created a pronounced divide that requires targeted policy interventions.

Secondly, regions with higher investment in R&D, better educational infrastructure, and higher patent filings are more resilient to development traps. These factors contribute to greater economic dynamism and the ability to sustain long-term growth. Conversely, regions with lower levels of innovation and educational attainment are more prone to economic stagnation.

Thirdly, the degree of integration into the global market, measured by export and import values relative to GDP, plays a significant role in regional economic performance. Regions that are more globally integrated tend to exhibit stronger economic growth and are less likely to fall into development traps.

Additionally, the employment-to-population ratio and productivity levels are critical indicators of economic health. Regions with higher employment rates and productivity levels are better positioned to avoid development traps. The analysis showed that regions with stagnant or declining employment rates are at higher risk of economic stagnation.

Finally, effective policy interventions and strong governance structures are essential for addressing regional development traps. Regions with proactive and well-implemented policies that promote innovation, education, and infrastructure development have shown better economic performance and resilience against development traps.

This study identified several crucial factors contributing to the regional development traps in China. Among these, the uneven distribution of infrastructure and educational resources stands out as a significant barrier to balanced regional development. Coastal regions, benefiting from early investments and proximity to international markets, have developed robust infrastructure and higher educational standards, which in turn attract more investments and talent. In contrast,

inland regions lag due to historical neglect and geographical constraints, leading to a vicious cycle of underdevelopment.

Moreover, the analysis highlighted the critical role of institutional quality in shaping regional development outcomes. Regions with stronger governance structures and more effective policy implementation have been more successful in leveraging national and global economic opportunities. This finding underscores the need for targeted institutional reforms to enhance governance capacity in underdeveloped regions, thereby enabling them to benefit more fully from national policies and international economic integration.

The study also found that innovation and technological adoption are pivotal in determining regional economic resilience and growth. Coastal regions, with their higher concentration of research institutions and innovative enterprises, have benefited significantly from knowledge spillovers and technological advancements. To mitigate regional disparities, it is essential to promote similar innovation ecosystems in inland regions through strategic investments in R&D and by fostering collaborations between academia, industry, and government.

The findings of this research have significant implications for policymakers aiming to address regional development disparities in China. To mitigate regional development traps, there should be a concerted effort to increase investment in R&D and educational infrastructure in underdeveloped regions. Policies that support innovation and the development of human capital can help create a more balanced economic landscape.

Furthermore, policies that facilitate greater integration of inland regions into the global economy can drive economic growth. This can be achieved through the development of infrastructure that supports trade, such as ports, roads, and communication networks, as well as through trade agreements that open up new markets for these regions. Ensuring that economic growth benefits all regions equitably is crucial. This requires policies that address both urban-rural and coastal-inland disparities. For instance, the redistribution of resources and targeted support for lagging regions can help create a more inclusive growth environment.

Effective governance and strong institutions are vital for the successful implementation of development policies. Efforts should be made to enhance the capacity of local governments to design and execute policies that promote sustainable development. This includes combating corruption, improving regulatory frameworks, and ensuring transparency and accountability in governance.

Investment in infrastructure, particularly in underdeveloped regions, is essential for reducing regional disparities. This includes not only physical infrastructure like roads and bridges but also digital infrastructure to support the modern economy. Improved infrastructure can enhance connectivity, reduce transaction costs, and stimulate economic activities in lagging regions. Fiscal and monetary policies should be designed to support regional development. This could involve providing financial incentives for businesses to invest in underdeveloped regions, as well as implementing monetary policies that promote stable and conducive economic environments



for growth.

While this study has provided valuable insights into regional development traps in China, several areas warrant further investigation to deepen our understanding and improve policy responses. Future research should focus on longitudinal studies that track the long-term effects of policy interventions and economic changes on regional development. Such studies can provide more robust evidence on the sustainability of growth strategies and the effectiveness of different policy approaches.

Comparative studies between China and other emerging economies can yield valuable insights into the unique and shared challenges of regional development. Understanding how different countries address similar issues can inform more effective policy design. Analyzing the impact of development traps within specific economic sectors can provide a more nuanced understanding of the underlying dynamics. For example, examining how agriculture, manufacturing, and service sectors are affected by regional disparities can help tailor sector-specific policies.

Additionally, more research is needed to explore the role of institutional and cultural factors in regional development. Understanding how these factors influence economic performance can help design more culturally sensitive and context-specific policies. The rapid pace of technological change presents both challenges and opportunities for regional development. Future research should investigate how technological advancements can be leveraged to overcome development traps and promote inclusive growth. The impact of climate change on regional development is an emerging area of concern. Research should explore how environmental sustainability can be integrated into regional development strategies to ensure long-term resilience and prosperity.

The insights gained from this study on regional development traps in China highlight the multifaceted nature of economic disparities and the critical need for comprehensive policy frameworks to address these challenges. As China continues to grow and develop, understanding the mechanisms behind regional development traps becomes increasingly important for ensuring balanced and sustainable economic progress. Addressing regional development traps is not only crucial for the economic well-being of underdeveloped regions but also for the overall stability and growth of China. By fostering inclusive growth and ensuring that all regions can contribute to and benefit from economic progress, policymakers can build a more equitable and prosperous future for the country.

In conclusion, this study highlights the need for a multifaceted approach to regional development that takes into account the unique economic, social, and institutional contexts of different regions. By adopting evidence-based policies and continuously monitoring their impact, China can effectively address regional development traps and achieve its goals of balanced and sustainable development. This comprehensive approach will ensure that all regions, regardless of their starting point, have the opportunity to thrive and contribute to the nation's overall prosperity.

## 5.2 Policy Implications

This section provides an in-depth discussion of the proposed policy interventions aimed at addressing the regional development trap in China. It includes detailed case studies and examples from other regions or countries to illustrate effective strategies. Additionally, it discusses potential challenges in implementing these policies and suggests ways to overcome them.

### 5.2.1 Proposed Policy Interventions

To effectively address regional development traps in China, it is essential to propose detailed, region-specific policy interventions. These interventions must consider the unique socio-economic contexts of each region and leverage successful policies from other countries or regions that have faced similar challenges.

The first recommendation is to enhance infrastructure development in underdeveloped regions. Infrastructure plays a critical role in regional economic growth by improving connectivity, reducing transportation costs, and facilitating access to markets. For example, India's implementation of the Pradhan Mantri Gram Sadak Yojana (PMGSY), a nationwide plan to improve rural road connectivity, has significantly boosted economic activities in previously isolated rural areas (Aggarwal, 2018). China could adapt a similar approach by prioritizing infrastructure projects in inland and western regions, ensuring that these areas are better integrated into national and global supply chains. However, the challenge lies in securing the necessary funding and ensuring efficient project execution. Strategies to overcome these challenges include public-private partnerships (PPPs) and leveraging international financing through initiatives like the Asian Infrastructure Investment Bank (AIIB).

Another critical policy intervention is the promotion of innovation and technological adoption in lagging regions. Encouraging local innovation ecosystems can spur economic growth and help regions escape development traps. South Korea's success with its RIS provides a valuable model. By fostering collaboration between universities, research institutions, and industries, South Korea has managed to create vibrant regional innovation hubs (Kim, 1999). China can replicate this model by establishing innovation clusters in its less developed regions, offering tax incentives, grants, and support services to startups and research institutions. The main challenge here is ensuring that local firms and institutions have the capacity to innovate and adopt new technologies. Capacity-building programs, technical training, and facilitating access to global knowledge networks are essential strategies to address this challenge.

Additionally, improving educational outcomes and enhancing human capital in underdeveloped regions is crucial. Quality education is a cornerstone of long-term economic development. Brazil's Bolsa Família program, which provides financial incentives to low-income families conditional on their children attending school, has successfully improved educational outcomes and reduced poverty (Soares et al., 2010). Adapting a similar program in China could incentivize school attendance and improve educational attainment in poorer regions. Challenges

include ensuring the program's proper targeting and avoiding dependency. Implementing robust monitoring and evaluation mechanisms can help mitigate these risks and ensure the program's effectiveness.

Fostering regional economic diversification is another essential policy intervention. Diversification reduces dependency on a single industry and enhances economic resilience. China can promote diversification in its underdeveloped regions by supporting emerging industries, providing targeted subsidies, and creating favorable regulatory environments. The primary challenge is overcoming the existing industrial inertia and resistance to change. Policymakers can address this by ensuring stakeholder engagement, providing clear incentives for diversification, and investing in skill development programs to prepare the workforce for new industries.

To effectively address the regional development trap in China, it is crucial to draw lessons from successful policy interventions implemented in other countries. For instance, the European Union's Cohesion Policy has been instrumental in reducing regional disparities across member states. This policy focuses on investment in infrastructure, innovation, and human capital development, providing a comprehensive approach to regional development<sup>16</sup>.

The European Union's Cohesion Policy aims to reduce disparities between its various regions by allocating significant funding to less developed areas. This policy has facilitated the construction of critical infrastructure, supported innovation and research initiatives, and improved educational and training programs. For example, Poland has been a major beneficiary of the EU Cohesion Policy, receiving substantial funds that have transformed its infrastructure and boosted its economy. This success underscores the importance of targeted investments in underdeveloped regions to stimulate growth and development (Bachtler & Mendez, 2016).

Similarly, India's National Rural Employment Guarantee Act offers valuable insights into addressing rural development traps. NREGA guarantees 100 days of employment to rural households, thereby improving rural incomes and promoting infrastructure development. The success of NREGA highlights the importance of targeted interventions that directly address the needs of underdeveloped regions. By providing guaranteed employment, NREGA has not only alleviated poverty but also improved rural infrastructure, contributing to long-term economic growth.

Brazil's Bolsa Família program provides another example of an effective policy intervention. This conditional cash transfer program has significantly reduced poverty and inequality in Brazil by providing financial assistance to low-income families, conditional on their children attending school and receiving vaccinations. The program has improved education and health outcomes, contributing to long-term economic development (Lindert et al., 2007). The success of Bolsa Família demonstrates the impact of well-designed social welfare programs on reducing regional disparities and promoting inclusive growth.

In the context of China, these international examples suggest that a multifaceted approach is necessary to address regional development traps. Policies should focus on improving infrastruc-

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<sup>16</sup>Available at: [https://ec.europa.eu/regional\\_policy/sources/reports/cohesion7/7cr.pdf](https://ec.europa.eu/regional_policy/sources/reports/cohesion7/7cr.pdf)

ture, enhancing human capital, promoting innovation, and providing targeted financial support to underdeveloped regions.

### **5.2.2 Challenges in Implementing Policies**

Moreover, strengthening local governance and institutional frameworks is vital for effective policy implementation. Effective governance can enhance public service delivery, reduce corruption, and foster a conducive environment for economic activities. Estonia's digital governance reforms, which have streamlined public administration and improved transparency, offer a useful model (Kalvet, 2012). China could implement similar digital governance initiatives to improve efficiency and transparency in its regional administrations. The challenge is ensuring digital infrastructure and literacy in remote areas. Investments in digital infrastructure and comprehensive training programs for public officials can help overcome these barriers.

Finally, leveraging international cooperation and learning from global best practices can significantly enhance regional development strategies. The European Union's cohesion policy, which aims to reduce disparities between its regions through targeted investments and structural reforms, provides a valuable framework (Bachtler & Mendez, 2016). China could collaborate with international organizations, learn from the EU's experience, and tailor these practices to its specific context. The challenge lies in adapting these policies to fit China's unique socio-political environment. Engaging in international dialogue, conducting pilot projects, and gradually scaling successful initiatives can facilitate this adaptation process.

The findings of this study suggest several policy interventions that could help address regional development traps in China. Firstly, increasing infrastructure investment in inland regions is paramount. Developing transportation networks, digital connectivity, and energy infrastructure can significantly enhance the economic prospects of these regions by improving market access and reducing operational costs for businesses.

Secondly, educational reforms are necessary to bridge the human capital gap between coastal and inland regions. This includes increasing funding for schools and universities in underdeveloped areas, as well as implementing vocational training programs tailored to local economic needs. By improving educational outcomes, inland regions can better prepare their workforce for the demands of a modern economy.

Thirdly, promoting regional innovation ecosystems is crucial. Establishing technology parks, innovation hubs, and providing incentives for research activities can stimulate local innovation. Additionally, fostering partnerships between local governments, universities, and private enterprises can facilitate the transfer of knowledge and technology, thereby boosting regional economic growth.

Fourthly, institutional reforms aimed at strengthening local governance structures are essential. Providing training and capacity-building programs for local officials can enhance their ability to implement development policies effectively. Moreover, establishing transparent and

accountable governance practices can attract more investment and foster a more conducive business environment.

Lastly, targeted financial support mechanisms, such as conditional cash transfers and tax incentives, can alleviate immediate economic pressures in underdeveloped regions while promoting long-term growth. These policies should be designed to encourage investments in education, healthcare, and small and medium-sized enterprises, which are critical for sustainable regional development.

In conclusion, addressing regional development traps in China requires a multifaceted approach that combines infrastructure development, innovation promotion, educational improvements, economic diversification, governance strengthening, and international cooperation. By learning from successful policies implemented in other countries and regions, China can develop effective strategies tailored to its unique context. Overcoming the challenges associated with these interventions will require careful planning, stakeholder engagement, and continuous monitoring and evaluation to ensure sustainable and inclusive regional development.

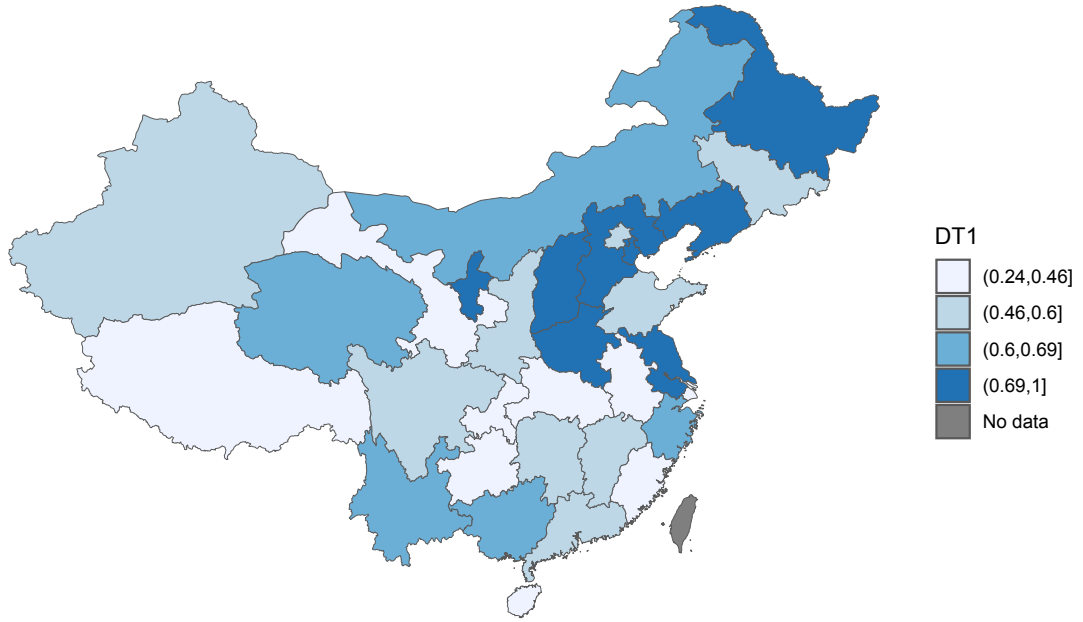
### **5.3 Future Research Directions**

Future research should explore the long-term impacts of the proposed policy interventions on regional development. Longitudinal studies tracking the progress of regions receiving targeted investments in infrastructure, education, and innovation will provide valuable insights into the effectiveness of these policies. Additionally, comparative studies involving other countries with similar regional disparities can offer broader perspectives and validate the applicability of the findings in different contexts.

Qualitative research methods, including case studies and interviews with local stakeholders, can complement the quantitative analysis by capturing the nuanced social, cultural, and political factors influencing regional development. This holistic approach will enhance our understanding of the complex dynamics at play and support the design of more effective, context-specific policy interventions.

Finally, integrating advanced data analytics and geographic information systems in future research can improve the precision and granularity of regional development studies. These technologies can help identify micro-level disparities and monitor the real-time impact of policies, thereby enabling more responsive and adaptive policy-making.

A.



B.

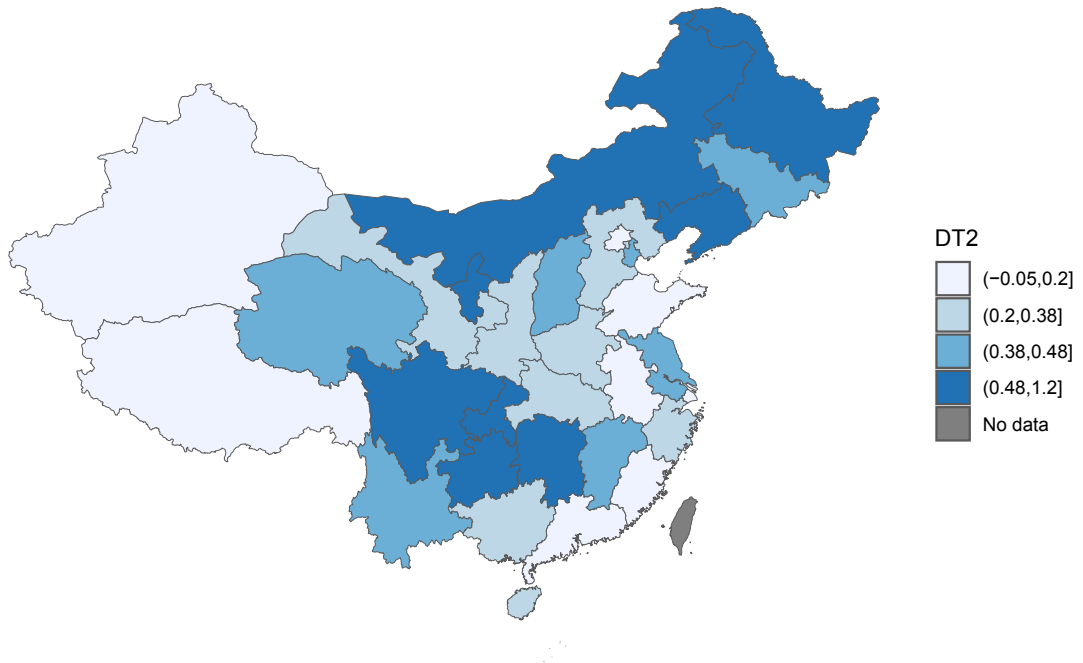


Figure 4: Average risk of being trapped, quartiles of the distribution over 2013-2018



Figure 5: Map of Chinese provinces

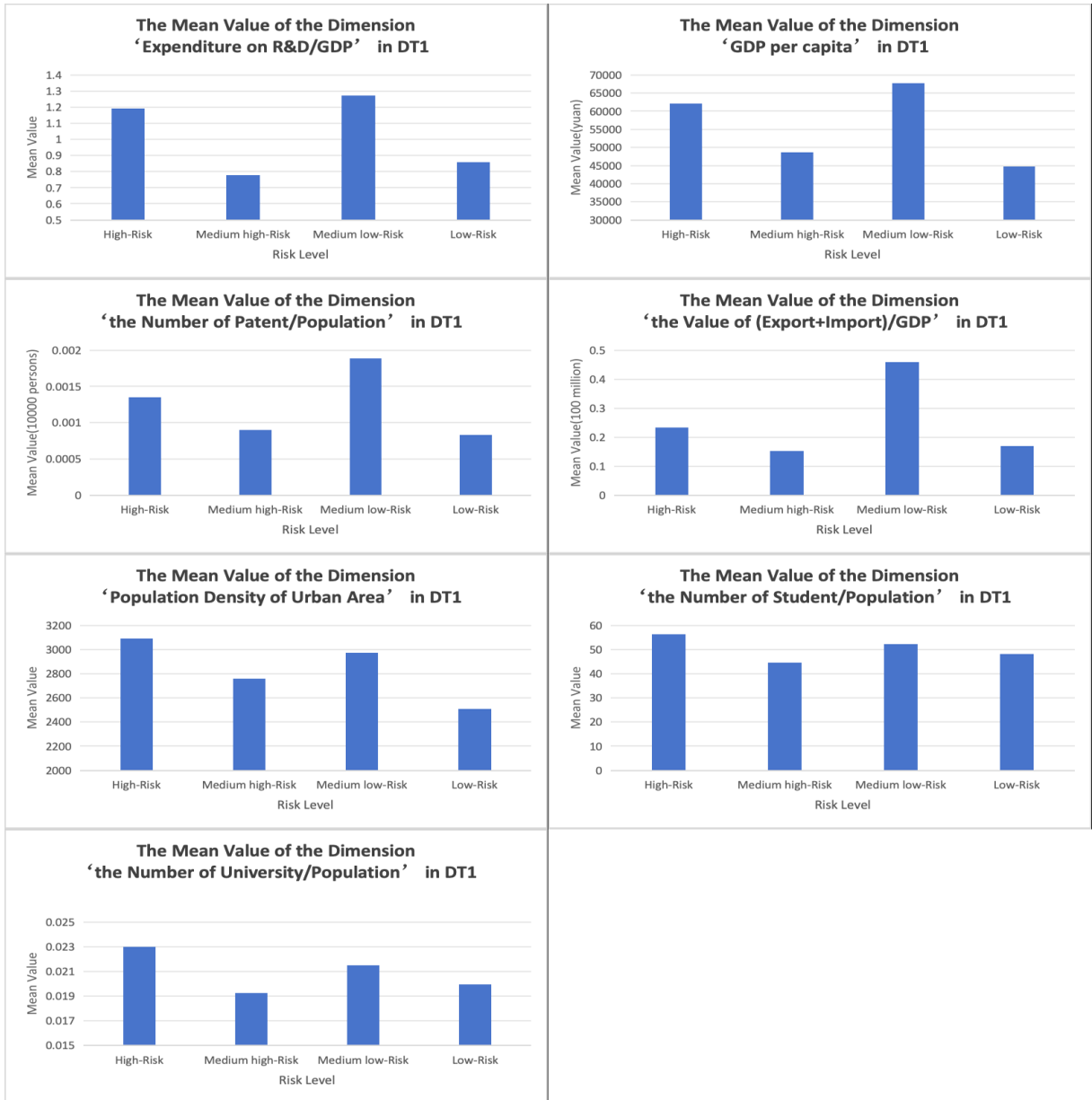


Figure 6: Average characteristics for regions at different risk levels of falling into development trap defined by DT1, average over 2013-2018



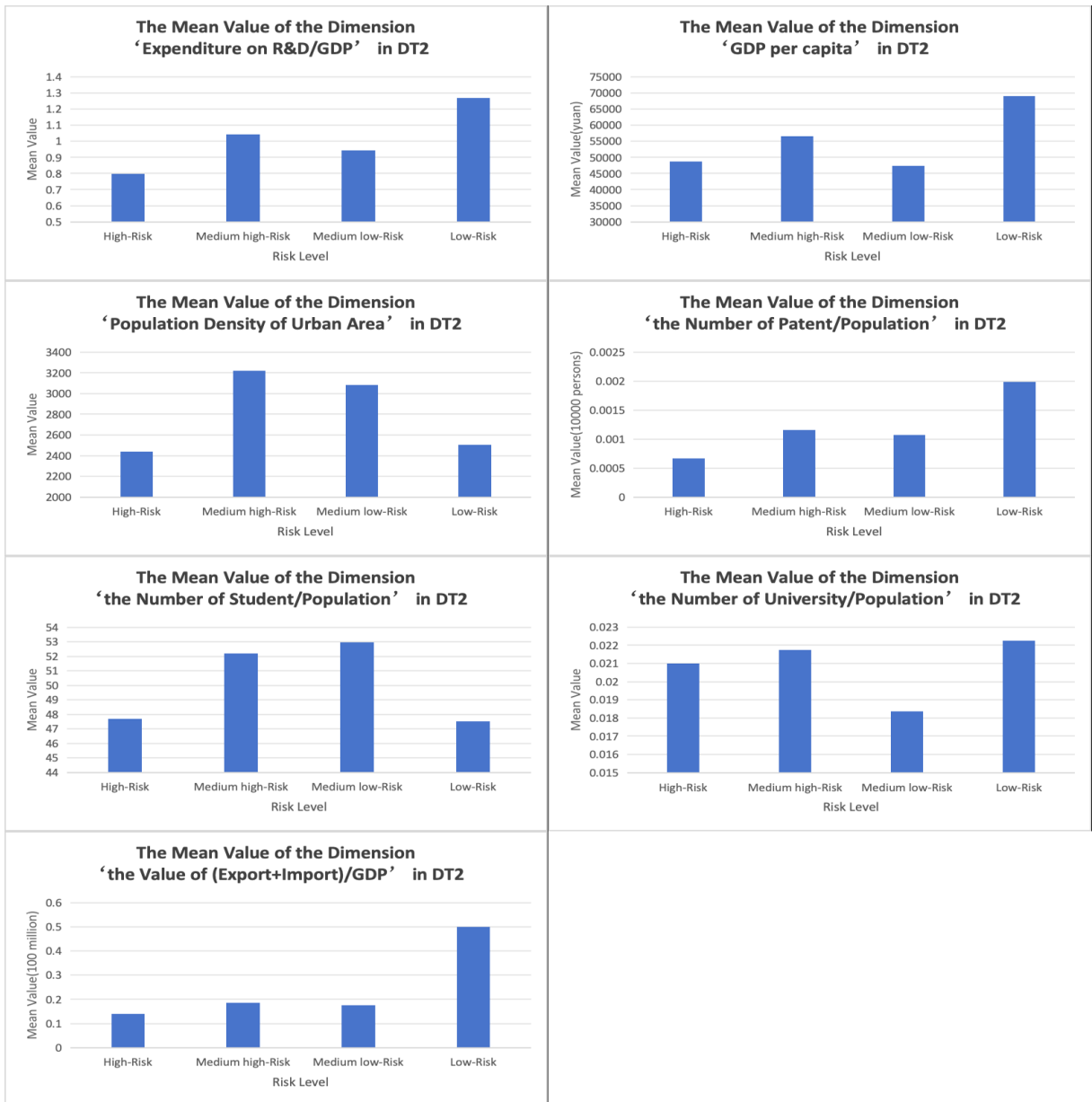


Figure 7: Average characteristics for regions at different risk levels of falling into development trap defined by DT2, average over 2013-2018

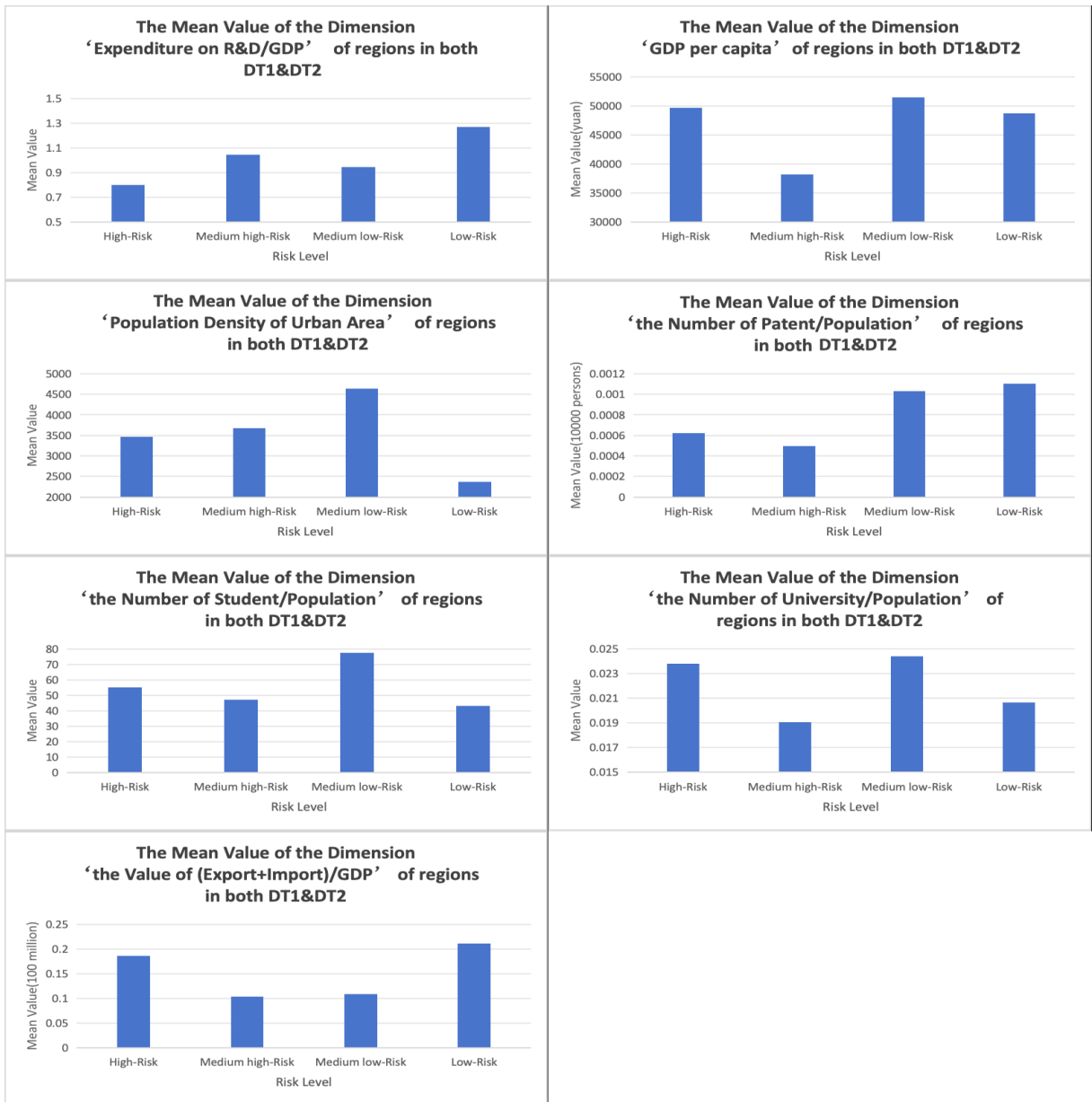


Figure 8: Average characteristics for regions at different risk levels of falling into development trap defined by DT1& DT2, average over 2013-2018

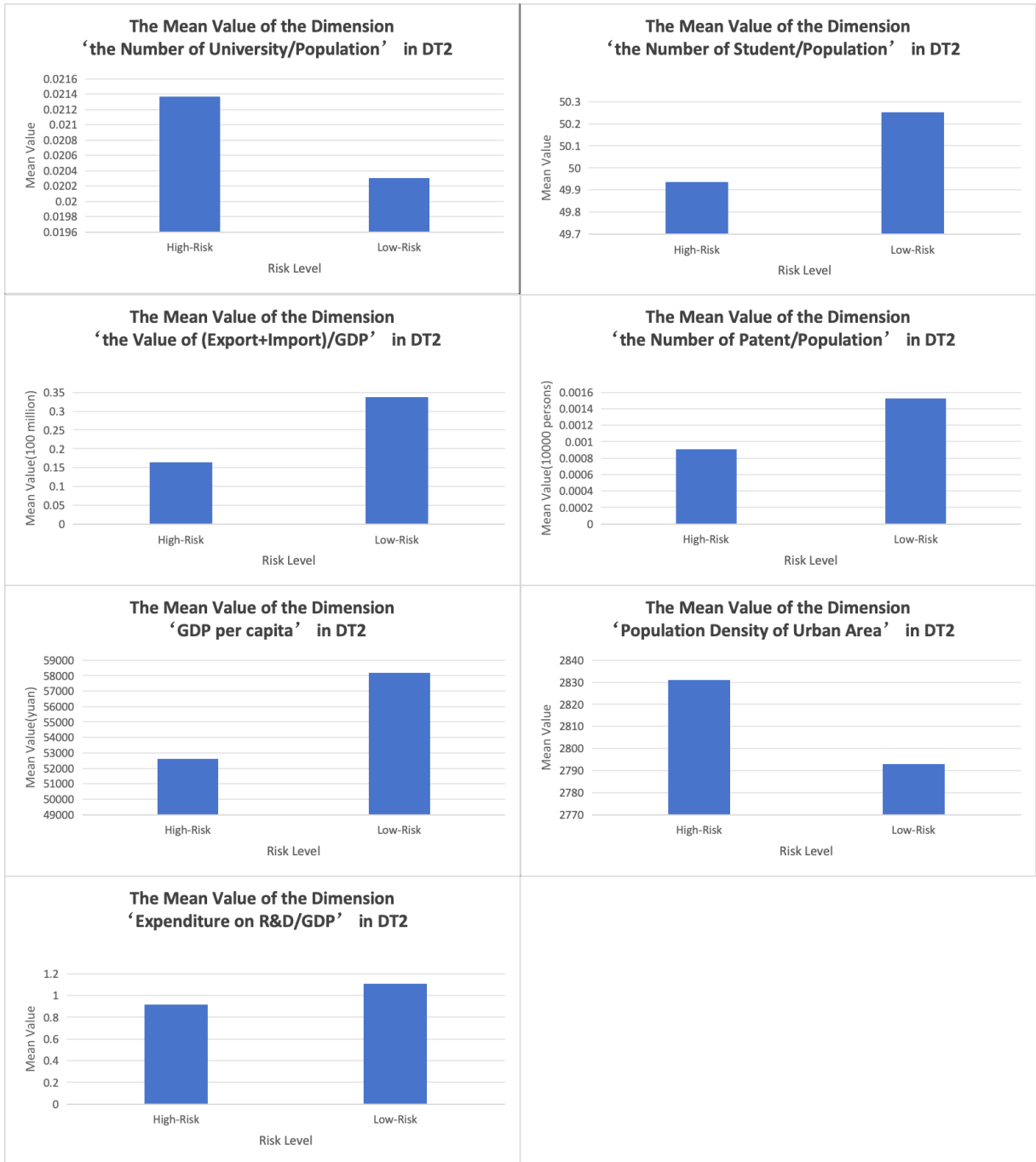


Figure 9: Average characteristics for regions at High risk and Low Risk levels of falling into development trap defined by DT2, average over 2013-2018

## 6 Bibliographical References

- Abramovitz, M. (1986). Catching up, forging ahead, and falling behind. *The Journal of Economic History*, 46(2), 385–406.
- Acemoglu, D., & Robinson, J. A. (2012). Why nations fail: The origins of power, prosperity, and poverty. *Finance and Development-English Edition*, 49(1), 53.
- Aggarwal, S. (2018). Do rural roads create pathways out of poverty? evidence from india. *Journal of Development Economics*, 133, 375–395.
- Ahluwalia, M. S. (2000). Economic performance of states in post-reforms period. *Economic and Political Weekly*, 1637–1648.
- Aiyar, M. S., Duval, M. R. A., Puy, M. D., Wu, M. Y., & Zhang, M. L. (2013). *Growth slowdowns and the middle-income trap*. International Monetary Fund.
- Aiyar, S., & Ebeke, C. (2020). Inequality of opportunity, inequality of income and economic growth. *World Development*, 136, 105115.
- Andreas Diemer, A. R.-P., Simona Iammarino, & Storper, M. (2022). The regional development trap in europe. *Economic Geography*, 98(5), 487–509. <https://doi.org/10.1080/00130095.2022.2080655>
- Ang, Y. Y. (2018). *How china escaped the poverty trap*. Cornell University Press.
- Azariadis, C., & Stachurski, J. (2005). Poverty traps. *Handbook of Economic Growth*, 1, 295–384.
- Azzoni, C. R. (2001). Economic growth and regional income inequality in brazil. *The Annals of Regional Science*, 35, 133–152.
- Bachtler, J., & Mendez, C. (2016). *Eu cohesion policy and european integration: The dynamics of eu budget and regional policy reform*. Routledge.
- Bagchi, K. K. (2011). *Regional disparities in india's socio-economic development*. New Century Publications.
- Bai, C.-E., Hsieh, C.-T., & Qian, Y. (2006). The return to capital in china.
- Barro, R. J., & Sala-i-Martin, X. (1992). Convergence. *Journal of Political Economy*, 100(2), 223–251.
- Barro, R. J., Sala-i-Martin, X., Blanchard, O. J., & Hall, R. E. (1991). Convergence across states and regions. *Brookings Papers on Economic Activity*, 107–182.
- Ben-David, D., & Papell, D. H. (1998). Slowdowns and meltdowns: Postwar growth evidence from 74 countries. *Review of Economics and Statistics*, 80(4), 561–571.
- Breinlich, H., Ottaviano, G. I., & Temple, J. R. (2014). Chapter 4 - regional growth and regional decline. In P. Aghion & S. N. Durlauf (Eds.), *Handbook of economic growth* (pp. 683–779, Vol. 2). Elsevier. <https://doi.org/10.1016/B978-0-444-53540-5.00004-5>
- Budina, M. N., Ebeke, C., Ebeke, M. C. H., Jaumotte, M. F., Medici, A., Panton, A. J., Tavares, M. M., & Yao, B. (2023). *Structural reforms to accelerate growth, ease policy trade-offs, and support the green transition in emerging market and developing economies*. International Monetary Fund.

- Chan, K. W. (2009). The chinese hukou system at 50. *Eurasian Geography and Economics*, 50(2), 197–221.
- Coulibaly, S., Deichmann, U. K., Silva Freire, M. E., Gill, I. S., Goh, C., Kopp, A. D., Lall, S. V., Montenegro, C. E., Packard, T. G., Ross Larson, B. C., Ross-Larson, B. [, & Uchida, H. (2009). *World development report 2009: Reshaping economic geography*. World Bank Group. <http://documents.worldbank.org/curated/en/730971468139804495/World-development-report-2009-reshaping-economic-geography>
- Dennis Wei, Y. (2002). Beyond the sunan model: Trajectory and underlying factors of development in kunshan, china. *Environment and Planning A*, 34(10), 1725–1747.
- Diemer, A., Iammarino, S., Rodríguez-Pose, A., & Storper, M. (2022). The Regional Development Trap in Europe. *Economic Geography*, 98(5), 487–509. <https://doi.org/10.1080/00130095.2022.2080655>
- Eichengreen, B., Park, D., & Shin, K. (2013). *Growth slowdowns redux: New evidence on the middle-income trap* (tech. rep.). National Bureau of Economic Research.
- Eichengreen, B., Park, D., & Shin, K. (2014). Growth slowdowns redux. *Japan and the World Economy*, 32, 65–84.
- Fagerberg, J. (1994). Technology and international differences in growth rates. *Journal of Economic Literature*, 32(3), 1147–1175.
- Fagerberg, J., & Godinho, M. M. (2006). Innovation and catching-up.
- Fan, C. C., & Scott, A. J. (2003). Industrial agglomeration and development: A survey of spatial economic issues in east asia and a statistical analysis of chinese regions. *Economic Geography*, 79(3), 295–319.
- Fan, C. C., & Sun, M. (2008). Regional inequality in china, 1978-2006. *Eurasian geography and Economics*, 49(1), 1–18.
- Fan, S., Kanbur, R., & Zhang, X. (2011). China’s regional disparities: Experience and policy. *Review of Development Finance*, 1(1), 47–56.
- Fan, S., Zhang, L., & Zhang, X. (2002). *Growth, inequality, and poverty in rural china: The role of public investments* (Vol. 125). Intl Food Policy Res Inst.
- Felipe, J., Abdon, A., & Kumar, U. (2012). Tracking the middle-income trap: What is it, who is in it, and why? *Levy Economics Institute, Working Paper*, (715).
- Fiszbein, A., & Schady, N. R. (2009). *Conditional cash transfers: Reducing present and future poverty*. World Bank Publications.
- Frank, A. G. (1967). *Capitalism and underdevelopment in latin america* (Vol. 93). NYU Press.
- Freeman, C. (1995). The ‘national system of innovation’ in historical perspective. *Cambridge Journal of Economics*, 19(1), 5–24.
- Friedmann, J. (1966). Regional development policy: A case study of venezuela. (*No Title*).
- Fu, X., Pietrobelli, C., & Soete, L. (2011). The role of foreign technology and indigenous innovation in the emerging economies: Technological change and catching-up. *World Development*, 39(7), 1204–1212.

- Ganong, P., & Shoag, D. (2017). Why has regional income convergence in the us declined? *Journal of Urban Economics*, 102, 76–90.
- Gill, I. S., & Kharas, H. (2015). The middle-income trap turns ten. *World Bank Policy Research Working Paper*, (7403).
- Gill, I. S., Kharas, H. J., & Bhattasali, D. (2007). *An east asian renaissance: Ideas for economic growth*. World Bank Publications.
- Glewwe, P., & Kremer, M. (2006). Schools, teachers, and education outcomes in developing countries. *Handbook of the Economics of Education*, 2, 945–1017.
- Hanushek, E. A., & Woessmann, L. (2012). Do better schools lead to more growth? cognitive skills, economic outcomes, and causation. *Journal of Economic Growth*, 17, 267–321.
- Hausmann, R., Hwang, J., & Rodrik, D. (2007). What you export matters. *Journal of Economic Growth*, 12, 1–25.
- Hesse, H., et al. (2009). Export diversification and economic growth. *Breaking Into New Markets: Emerging Lessons for Export Diversification, 2009*, 55–80.
- Hirschman, A. O. (1958). The strategy of economic development. (*No Title*).
- Hu, A. G., & Jefferson, G. H. (2004). Returns to research and development in chinese industry: Evidence from state-owned enterprises in beijing. *China Economic Review*, 15(1), 86–107.
- Iammarino, S., Rodriguez-Pose, A., & Storper, M. (2019). Regional inequality in europe: Evidence, theory and policy implications. *Journal of Economic Geography*, 19(2), 273–298.
- Imbs, J., & Wacziarg, R. (2003). Stages of diversification. *American Economic Review*, 93(1), 63–86.
- Kalvet, T. (2012). Innovation: A factor explaining e-government success in estonia. *Electronic Government, an International Journal*, 9(2), 142–157.
- Kanbur, R., & Zhang, X. (2005). Fifty years of regional inequality in china: A journey through central planning, reform, and openness. *Review of Development Economics*, 9(1), 87–106.
- Kanbur, R., & Zhang, X. (2009). Which regional inequality? the evolution of rural–urban and inland–coastal inequality in china from 1983 to 1995. In *Regional inequality in china* (pp. 29–44). Routledge.
- Kim, L. (1999). *Learning and innovation in economic development*. Edward Elgar Publishing.
- Krugman, P. (1991). Increasing returns and economic geography. *Journal of Political Economy*, 99(3), 483–499.
- Lee, K. (2013). *Schumpeterian analysis of economic catch-up: Knowledge, path-creation, and the middle-income trap*. Cambridge University Press.
- Liao, F. H., & Wei, Y. D. (2016, September). Sixty years of regional inequality in china: Trends, scales and mechanisms [Working Paper Series N° 202, Rimisp, Santiago, Chile]. <http://www.rimisp.org/>

- Lin, J. Y. (2011). New structural economics: A framework for rethinking development. *The World Bank Research Observer*, 26(2), 193–221.
- Lindert, K., Linder, A., Hobbs, J., & De la Brière, B. (2007). The nuts and bolts of brazil's bolsa família program: Implementing conditional cash transfers in a decentralized context. *World Bank Social Protection Discussion Paper*, 709.
- Lu, M., & Chen, Z. (2006). Urbanization, urban-biased policies, and urban-rural inequality in china, 1987-2001. *Chinese Economy*, 39(3), 42–63.
- Lucas Jr, R. E. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, 22(1), 3–42.
- Madsen, J. B., Islam, M. R., & Ang, J. B. (2010). Catching up to the technology frontier: The dichotomy between innovation and imitation. *Canadian Journal of Economics/Revue canadienne d'économique*, 43(4), 1389–1411.
- Magrini, S. (2004). Regional (di) convergence. In *Handbook of regional and urban economics* (pp. 2741–2796, Vol. 4). Elsevier.
- Moretti, E. (2012). *The new geography of jobs*. Houghton Mifflin Harcourt.
- Myrdal, G., & Sitohang, P. (1957). Economic theory and under-developed regions.
- Naughton, B. J. (2006). *The chinese economy: Transitions and growth*. MIT press.
- Naughton, B. J. (2018). *The chinese economy: Adaptation and growth*. Mit Press.
- North, D. C. (1990). *Institutions, institutional change and economic performance*. Cambridge university press.
- Obermiller, P. J., & Philliber, W. W. (1994). *Appalachia in an international context: Cross-national comparisons of developing regions*. ERIC.
- Papageorgiou, M. C., & Spatafora, M. N. (2012). *Economic diversification in lics: Stylized facts and macroeconomic implications*. International Monetary Fund.
- Perroux, F. (1955). Note sur la notion de "pôle de croissance". *Economie Appliquée*, 8(1), 307–320.
- Prebisch, R. (1962). The economic development of latin america and its principal problems.
- Pritchett, L. (2000). Understanding patterns of economic growth: Searching for hills among plateaus, mountains, and plains. *The World Bank Economic Review*, 14(2), 221–250.
- Ravallion, M. (2010). Poverty lines across the world. *World Bank Policy Research Working Paper*, (5284).
- Rodríguez-Pose, A., & Crescenzi, R. (2008). Research and development, spillovers, innovation systems, and the genesis of regional growth in europe. *Regional Studies*, 42(1), 51–67.
- Rodrik, D. (2012). *The globalization paradox: Democracy and the future of the world economy*. WW Norton & Company.
- Rodrik, D. (2013). Unconditional convergence in manufacturing. *The Quarterly Journal of Economics*, 128(1), 165–204.
- Rodrik, D., Subramanian, A., & Trebbi, F. (2004). Institutions rule: The primacy of institutions over geography and integration in economic development. *Journal of Economic Growth*, 9, 131–165.

- Romer, P. M. (1986). Increasing returns and long-run growth. *Journal of Political Economy*, 94(5), 1002–1037.
- Soares, F. V., Ribas, R. P., & Osório, R. G. (2010). Evaluating the impact of brazil's bolsa familia: Cash transfer programs in comparative perspective. *Latin American Research Review*, 45(2), 173–190.
- Solow, R. M. (1956). A contribution to the theory of economic growth. *The Quarterly Journal of Economics*, 70(1), 65–94.
- Trigilia, C., et al. (1992). Development without autonomy. perverse effects of policies in the south.
- Wei, Y. D. (2013). *Regional development in china: States, globalization and inequality*. Routledge.
- Xu, C. (2011). The fundamental institutions of china's reforms and development. *Journal of Economic Literature*, 49(4), 1076–1151.
- Yang, D. T. (2002). What has caused regional inequality in china? *China Economic Review*, 13(4), 331–334.
- Zhang, K. H. (2002). What explains china's rising urbanisation in the reform era? *Urban Studies*, 39(12), 2301–2315.
- Zhu, X. (2012). Understanding china's growth: Past, present, and future. *Journal of Economic Perspectives*, 26(4), 103–124.