NBER WORKING PAPER SERIES

CHINA'S MACROECONOMIC DEVELOPMENT: THE ROLE OF GRADUALIST REFORMS

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Working Paper 31395
http://www.nber.org/papers/w31395

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
June 2023

We thank Steven Durlauf, David Lagakos, John Leahy, Eric Leeper, David Romer, and Wei Xiong for helpful discussions and comments, and Yiqing Xiao and Jin Zhang for excellent research assistance. The views expressed herein are those of the authors and do not reflect the views of the Federal Reserve Bank of Atlanta, the Federal Reserve System, or the National Bureau of Economic Research.

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NBER Working Paper No. 31395
June 2023
JEL No. E02,E2,E65,F43

ABSTRACT

This paper reviews recent literature on China's macroeconomic development, emphasizing the critical role of the gradualist approach over the past four decades. Beyond China's structural transformation, we explore various aspects such as high saving rates, the housing boom, an expanding current account surplus, and rising inequality. We propose a unifying framework that encapsulates key development stages, contrasting gradualism with a laissez-faire counterfactual. Our analysis illustrates how China's gradual policy reforms, amidst highly imperfect financial markets, have effectively helped spur GDP growth throughout its macroeconomic evolution. We highlight the tradeoffs between accelerating GDP growth and safeguarding China's long-term financial stability.

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Internet appendices are available at: http://www.nber.org/data-appendix/w31395

I. Introduction

Over the past four decades, China has experienced remarkable economic growth. Since 1978, China's real GDP has grown at an average rate of 10% until its recent slowdown (Figure 1). In contrast to other less developed countries, China has adopted a gradualist approach to reforming its economy, embodied by the Chinese aphorism "crossing the river by touching the stone." Unlike the "shock therapy" approach adopted by the former Soviet Union in the late 1980s, which aimed to eliminate all market frictions simultaneously (Klein, 2008), the Chinese government opted for a more gradual removal of market imperfections over time.[1] Throughout this process, the government maintained a central role in various parts of the economy, actively intervening in resource allocations toward selected sectors or firms through credit and other policies.

Understanding the role of a gradualist approach in China's economic growth and macroeconomy is vital. It begs several important questions: Why has the government maintained certain policy distortions while phasing out others during the reform process? What are the underlying rationales behind active government policies that guide capital and labor allocations to specific sectors? And what potential tradeoffs might such active government interventions entail? Over the past decade, a rich body of literature has emerged to investigate numerous aspects of China's gradualist approach in economic reforms and their effects on trends and cycles, saving and investment, the financial system, and other critical aspects of the Chinese macroeconomy. While traditional analyses have primarily adopted a descriptive approach to comprehend China's remarkable economic growth, recent literature has capitalized on rich micro-level data, enabling the identification of causal effects from specific policy reforms, and employed modern macroeconomic models that take into account various market frictions and policy distortions. These theoretical models incorporate elements unique to China's institutional arrangements and enable counterfactual experiments to quantify the impact of specific economic reforms or policy interventions on China's macroeconomic development. An in-depth review of this literature is thus instrumental in understanding how China's gradualist approach in economic reforms has shaped China's macroeconomic progression.

We commence by reviewing the literature on the role of various economic reforms in China's macroeconomic progression. This review highlights China's gradualist approach to economic reforms across various dimensions, such as sectoral shifts, ownership changes, openness to trade, and direct foreign investment (FDI) and their roles in trend growth or cyclical fluctuations. We also discuss how China's macroeconomic development under these economic reforms is linked to various aspects of China's macroeconomy over the past four

[1]For instance, the government initiated economic reforms by providing market-oriented incentives to publicly-owned firms and postponed large-scale privatizations until 1998.

decades, including the high saving rate, the housing boom, the growing current account surplus, and the distributional consequences of policy reforms. A consensus from the literature is that China's gradualist approach to economic reforms has played a crucial role in fostering sustained economic growth over the past four decades, despite occasionally generating extra distortions and unintended negative consequences.

An essential question is why this gradualist strategy is superior to the laissez-faire (big bang) approach taken by the former Soviet Union. The literature on China's gradualist approach to economic reforms presents a multitude of perspectives on its advantages and disadvantages, attributing China's success to a combination of economic and political factors. In particular, prior literature highlights significant political economy concerns related to institutional changes and their effects on the paths and strategies of reforms. For example, Xu (2011) notes that China's policy reforms were initially implemented in a few regions before being launched nationwide as a strategy to mitigate political resistance and uncertainties. Similarly, Lau, Qian, and Roland (2000) develop a theoretical framework that shows how the dual-track reforms, which are Pareto-improving, minimize political opposition to reform ex-ante as they create no losers, only winners. The dual-track approach is a notable example of a politically feasible strategy for implementing economic reforms, demonstrating the importance of political factors in China's economic success.

This article offers a complementary economic viewpoint, arguing that in the context of highly imperfect financial markets, China's gradualist approach proves more effective in promoting GDP growth than the big bang approach. These imperfect financial markets give rise to an agency problem between banks and firms. Amidst such frictions, we argue that the Chinese government strategically implemented various degrees of distortions to sustain GDP growth throughout different stages of macroeconomic development.

To elucidate on this point, we focus on changes in both ownership structures and credit policy. When China initiated its economic reforms in 1978, it opted against switching to a fully market-driven capitalist system overnight. From 1978 to 1997, Chinese governments, both central and local, did not privatize state-owned firms. To promote growth in light industries such as consumer durables and textiles, the government transferred operational control to individuals without relinquishing ownership. Concurrently, local Chinese governments actively supported the growth of these firms by acting as guarantors, ensuring that bank credit was accessible to them. Since the late 1990s, with the privatization of state-owned enterprises, China has shifted toward a phase of heavy industrialization, extending preferential credit to firms in capital-intensive sectors. The question is why the gradualist approach is more beneficial than the laissez-faire approach in promoting China's GDP growth and what are the tradeoffs that such a policy may entail in terms of the long-term perspectives of China's macroeconomy. To address these questions, in the second part of

this paper, we develop a theoretical framework. This framework is grounded in key facts about China's primary growth drivers and the sectoral distribution of credit and resources over the past four decades.

A careful analysis of China's growth sources reveals distinct phases within its macroeconomy (Table 1). The Chinese economy has undergone several transitions since 1978, each characterized by unique primary growth drivers. From 1978 to 1997, total factor productivity (TFP) growth was the main contributor, accounting for 56.6% of GDP per worker growth. This increase in productivity coincided with an average investment-to-GDP ratio of approximately 30% during this period (see the left chart of Figure 2). From 1998 to 2016, during which China surpassed most developed countries in GDP and became the world's second-largest economy, the primary driver of rapid economic growth transitioned from TFP growth to investment (capital deepening), contributing more than 70% (columns 3 and 4 of Table 1). Although high investment rates (investment-to-GDP ratios) characterize Asian economies during rapid growth phases, China's investment rate surpasses those of all newly-industrialized economies, exceeding 30% during its industrialization (He and Kuijs, 2007). We categorize the first phase of China's economic development from 1978 to 1997 as a light-industry led economy, the second phase from 1998 to 2016 as an investment-driven economy, and the third phase from 2017 to present as a new normal economy.

To capture the different primary growth drivers during the first two phases of the Chinese economy—the light-industry led economy and the investment-driven economy, we construct an integrated theoretical framework that incorporates several key components. First, we recognize sectoral technological differences by dividing the economy into capital-intensive (heavy) and labor-intensive (light) sectors. This division is vital since sectoral resource reallocation has been a fundamental element of China's economic development (Chen and Zha, 2020). Second, we introduce firms with various ownership structures to reflect the government's selective credit support for certain firms, particularly publicly-owned ones. Third, our framework incorporates two types of financial frictions: one relevant to the light-industry led economy, arising from agency friction between labor-intensive firms and banks, and another representing credit rationing in the investment-driven economy. The extent of government control varies across these two development phases. In the light-industry led economy, the government owns and provides credit support to firms in both sectors. By contrast, in the investment-driven economy, the government is merely the residual claimant of capital-intensive firms, offering only credit support to these firms. Figure 3 illustrates that growth rates in fixed asset investment (FAI) and loans used to finance FAI move in tandem across various economies. The correlation between these two growth rates from 1992 to 2017 is 0.78, demonstrating that this high correlation is not period-dependent. Given that China's capital investment is primarily funded by bank loans, our framework considers

it essential to synchronize a regime shift in sector-specific credit policy with changes in ownership structures.

Our framework enables a comparative analysis between the transitional paths derived from the baseline model (representing the gradualist case) and from a counterfactual economy (the laissez-faire case, in which the government opts for laissez-faire policy amidst significant market imperfections.) This quantitative comparison provides a rationale for why the Chinese government chose the gradualist approach to policy reforms, rather than outright eliminating all policy distortions at every stage of macroeconomic development.

In the light-industry led economy, our analysis suggests that the gradualist approach enabled the government to extend credit support to publicly-owned firms in labor-intensive industries. This assistance facilitated the channeling of surplus labor from households to labor-intensive industries, leading to improved labor allocation and an endogenous increase in TFP. By contrast, in the laissez-faire case, privatized labor-intensive firms would have had to self-finance capital accumulation in a highly imperfect financial market. As a result, the gradualist approach facilitated a more rapid accumulation of capital and absorption of surplus labor by the labor-intensive industries compared to the laissez-faire case.

Our model also suggests that in the investment-driven economy, the gradualist approach allowed the government's preferential credit policy to augment profit margins for capital-intensive firms in heavy industries. This state-supported preferential credit spurred a reallocation of resources towards the heavy sector, resulting in a sustained increase in the ratio of aggregate investment to aggregate output during this stage. By contrast, in the laissez-faire case, without governmental support, capital-intensive firms would have lacked the impetus for capital investment. This lack of government support could have led to a decline in the ratio of aggregate investment to output, attributable to the diminishing returns to capital in labor-intensive firms.

In the final part of this paper, we consider the wider literature on two other key policy reforms: the accession to the World Trade Organization (WTO) in 2001 and the economic stimulus in 2009. We also discuss the long-term implications and challenges these policy shifts pose to both China and the global economy. Our extended framework suggests that a permanent reduction in tariffs on Chinese exports has fueled China's economic growth through both capital deepening and aggregate TFP increase via learning-by-doing. Recent studies on the "China Shock" indicate that a steady increase in China's exports has significant impacts on the labor markets and technological innovation in countries exposed to China's import competition, leading to the 2009 trade war between the United States and China.

Both prior literature and our results highlight some unintended consequences of the 2009 economic stimulus on credit allocation across firms and sectors, all of which received varying

degrees of government guarantees. Although it was intended to be short-term, the stimulus inadvertently amplified long-term financial risks through shadow banking, compelling China to employ various macroprudential measures to strike a balance between economic growth and financial stability in the "new normal" economy.

Our literature review, complemented by our integrated framework, does not provide an exhaustive account of China's macroeconomic development because of space limitations. A wealth of existing literature has delved extensively into how China's reforms have reshaped the economic incentives of households, firms, entrepreneurs, and local governments. For instance, significant differences existed between township and village enterprises (TVEs) and state-owned enterprises (SOEs) in managerial autonomy, incentives, and workforce management. These differences played a critical role in shaping economic incentives and governance during the initial transition toward a market-oriented economy. Xu (2011), for example, focuses on how changes in China's institutional organizations, information structure, and economic incentives have influenced decision-making.

In this review article, certain issues that are emphasized as potentially significant in other works receive limited attention. Issues related to the open economy, such as the pro-competitive effects of domestic liberalization through the reduction of import tariffs, non-tariff barriers, and the relaxation of FDI restrictions, are not extensively discussed. The fiscal reforms that took place during the mid-1990s, which placed fiscal constraints on local governments and consequently incentivized them to leverage land values (Ambrose, Deng, and Wu, 2015), are briefly touched upon.[2] Needless to say, our interpretation of the role of government policy in fueling China's economic growth may not align with other researchers studying these issues and should not be considered definitive.

The literature on China's macroeconomic development is influenced by key empirical facts, the construction of data, and robust data documentation.[3] Estimating growth rates and productivity can exhibit significant variation depending on how data series are constructed for variables such as GDP, capital formation, employment, and deflators for GDP and investment. Similarly, the breakdown of the economy by sectors, ownership, and access to credit heavily relies on data construction. Notable studies by Holz (2014), Wu (2014), Higgins and Zha (2015), Chang, Chen, Waggoner, and Zha (2016), and Chen, Chen, Hsieh, and Song (2019) emphasize the challenges faced by researchers when measuring and interpreting data. Given the intricate nature of China's economy, systematically documenting macroeconomic time series is a challenging task, which warrants further research in the future.

[2]A substantial body of literature, primarily empirical in nature, investigates the role of "land financing" and housing policy in China's macroeconomy. For a literature review on the impact of housing policy on China's macroeconomy, see Chen (2020).

[3]Internet Appendix A describes the data used in this paper and its sources.

The rest of the paper is organized as follows. Section II provides a literature review on China's gradualist approach to various economic reforms and its impacts on China's trend growth, cyclical fluctuations, and other crucial aspects of the Chinese macroeconomy. In Section III, we develop an integrated framework, grounded in key facts about the primary growth drivers in different developmental phases. This framework is used to compare the effects of the gradualist approach to changes to ownership structure and credit policy with those of laissez-faire policy. Section IV discusses two additional policy reforms that have long-term macroeconomic consequences as China is transitioning to a new normal economy. Section V presents concluding remarks and highlights future research areas.

II. China's Macroeconomic Development

In this section, we provide an overview of the extensive literature on China's macroeconomic development. We review the gradualist approach adopted by China in its policy reforms, examine the policy distortions that resulted from this approach, and analyze the economic consequences of such gradualist reforms. Sections II.1 to II.3 delve into the literature on the gradualist approach to various policy reforms, exploring its impact on different sectors of the Chinese macroeconomy and its influence on trend growth and cyclical fluctuations. Sections II.4 to II.7 establish the connection between policy reforms, economic growth, and various significant aspects of Chinese macroeconomic development.

II.1. **Structural Transformation.**

China's structural transformation has encompassed both sectoral shifts and changes in the ownership structure. This process began with sectoral shifts in the early 1980s and was followed by significant changes in ownership in the late 1990s, coinciding with the emergence of an investment-driven economy.

Both China and the Asian Miracle economies underwent considerable structural transformations during their respective episodes of rapid growth,[4] with substantial increases in manufacturing employment (Young, 1995). There are, however, key differences between China's experiences and those of the Asian Miracle economies. Supply-side reforms, including the elimination of certain distortions, the improvement of labor and capital mobility across sectors, and the restructuring of firms' ownership, have served as important drivers of China's structural transformation. These reforms have made aggregate TFP growth a primary force behind China's economic growth, particularly during the early stages of the reforms.[5] By contrast, the Asian Miracle economies did not face the same distortions China

[4]In this article, the term "Asian Miracle economies" refers to Japan, Hong Kong, South Korea, Singapore, and Taiwan.

[5]The main driver of economic growth in the Asian Miracle economies has been a subject of debate in the literature. While Young (1995) attributes much of the growth to factor accumulation, Hsieh (2002) challenges this view through dual TFP accounting, finding that technological progress played as significant

needed to overcome, and as small-open economies their structural changes were *primarily* driven by external demand.

II.1.1. *Sectoral Shifts.* The Chinese growth miracle began in the early 1980s with a reform on the rural sector, known as the "rural household responsibility system." This new system replaced the old system of collective farming with all output sold to a national procurement plant at a price set by the government's plan (substantially below the would-be market price). Farmers were now granted land use rights and allowed to sell what they produced in excess of the official quota at a market price. Agricultural production and rural incomes witnessed a dramatic increase in the ensuing years (Lin, 1992); hundreds of millions of farmers were released from their land, providing the nonfarm sector with a seemingly unlimited labor supply. Despite these policy changes, regulatory and discriminatory barriers, such as the Hukou system—the household registration system, hindered the mobility from the agricultural rural population to the industrial urban population. These barriers forced many people to work for TVEs during the 1980s that were located in rural areas.

Sectoral shifts, characterized by the reallocation of labor from agriculture to non-agricultural sectors, occurred during the first phase of China's macroeconomic progression in the 1980s and early 1990s. In particular, the rise of TVEs in rural areas absorbed the surplus labor released from the agriculture sector. Section III develops an integrated framework that underscores the significant role local governments played during this process. By providing credit support to rural industrial enterprises, they bolstered their demand for industrial labor. This governmental intervention contributed to an increase in aggregate TFP during the initial phase of macroeconomic development.

The earliest studies utilize (multi-sector) growth accounting with exogenous wedges to address the role of sectoral shifts in economic growth in the early phase of economic reforms. These studies emphasize two questions. First, how much of the growth in aggregate output per worker can be attributed to the reallocation of labor from agriculture to non-agricultural sectors? Young (2003) finds that for the first two decades of China's economic reforms (1978-1997), sectoral labor reallocation (e.g., the labor force moving out of the agricultural sector) was the key force behind the extraordinary improvements in per capita living standards. When extending the reform period to 1978-2010, Brandt and Zhu (2010) find that labor reallocation from agriculture to non-agricultural sectors contributed to only one-fourth of aggregate TFP growth (1.04% out of 3.95%), with most of the gain from reallocation realized during the first decade of the reforms. This finding suggests that the importance of labor

a role in Singapore's growth as in the other Asian countries. A more recent study by Fernald and Neiman (2011), however, argues that technological growth in Singapore was slightly negative and, despite sizable distortions, was not much different from Young's primal estimates.

reallocation from agriculture to non-agricultural sectors for aggregate productivity was high in the early stage of the reforms but gradually declined, especially after 1997.

Second, what are the main drivers of labor reallocation from agriculture to non-agricultural sectors? A natural candidate is an improvement in agricultural productivity because of the introduction of the household responsibility system. Several studies seek to quantify the importance of agricultural productivity and labor reallocation in aggregate output growth. In theory, an increase in agricultural productivity may improve aggregate productivity both directly and indirectly by releasing labor from the agricultural sector. Empirically, Brandt, Hsieh, and Zhu (2008) find that during 1978-2004, both productivity growth in agriculture and a relaxation of restrictions on labor mobility in rural areas are important in labor reallocation out of the agricultural sector. Consistent with this finding, Dekle and Vandenbroucke (2012) find that between 1978 and 2003, the most important force driving the Chinese structural transformation was growth in agricultural productivity, which accounted for 47% of labor reallocation. At the same time, they find that the effect of reducing frictions on labor mobility from agriculture to non-agricultural sectors is modest. Despite the importance of agricultural productivity for labor reallocation, Brandt, Hsieh, and Zhu (2008) find that productivity growth in agriculture contributed only about 20% to growth of aggregate labor productivity during 1978-2004. Both Brandt and Zhu (2010) and Cheremukhin, Golosov, Guriev, and Tsyvinski (2015) have a similar finding: despite remarkable TFP growth (6.2%) in agriculture during 1978-2010, its contribution to aggregate labor productivity is modest.

More recent studies focus on specific policies that hinder labor mobility and distort labor reallocation from the rural area to the urban area and on these policies across geographic regions. For example, Ngai, Pissarides, and Wang (2019) study two barriers for labor mobility associated with the Hukou system. One is land policy, under which agricultural workers received land to cultivate but were unable to trade it in a frictionless market. The other barrier is social transfers (education, health, etc.) that were conditional on the Hukou system. Ngai, Pissarides, and Wang (2019) show, in a model of migration, that (a) land policy led to over-employment in agriculture and was an important barrier to industrialization, and (b) the main contribution of social transfers, by contrast, was to generate more employment in the non-agricultural sector in rural areas and thus slowed down the process of urbanization. Adamopoulo, Brandt, Leight, and Restuccia (2022) examine the distorting effects of China's "land institutions" on agricultural productivity and aggregate output via allocation or misallocation of resources among farmers of different productivities and via selection of workers between working for agriculture and the non-agriculture sector. They find, in a two-sector model of occupation choices, that land reforms by eliminating the distortions related to agricultural productivity improved the agricultural productivity of labor by three folds but raised real GDP per worker by only 18%.

In addition to land policies, research has found migration policy to be pivotal in China's structural shifts. For instance, Tombe and Zhu (2019) use a two-sector multi-regional model to evaluate the impacts of reduced migration costs for labor across regions. They find a significant rise in migration—15% within provinces and 82% between provincesprimarily from rural to urban areas during 2000-2005, yielding a 4.8% boost in aggregate labor productivity. Extending their study to the period 2000-2015, Hao, Sun, Tombe, and Zhu (2020) find that China's internal migration costs for the shift from agricultural areas to urban ones fell by 45% over these fifteen years. This decline not only contributed significantly to economic growth but also facilitated the major share of labor reallocation from agriculture, resulting in an aggregate productivity gain. They conclude that migration policy has been a central factor in China's structural shifts.

To summarize, literature on China's structural transformation emphasizes the profound role sectoral shifts, especially labor's reallocation from agriculture to non-agricultural sectors, played during the initial economic reforms. It also underscores policy implications promoting labor mobility and eliminating institutional barriers, such as the Hukou system, that impeded the rural population's mobility to urban industrial areas. Thus, policy reforms fostering labor mobility, such as land reforms and Hukou system modifications, are critical in driving China's structural transformation.

II.1.2. *Ownership structure.* The ownership structure has been one of the key reforms in China, along with sectoral shifts, that has driven labor reallocation. The establishment of TVEs in 1978 marked the beginning of a gradual shift toward a more industrialized economy in China. The TVEs reached their peak in gross industrial output share, accounting for around 40% of total output in 1996 during the first phase of macroeconomic development in 1996. During the second phase of development, this share declined steadily to less than 5% in 2004. In 1998, the government allowed privatization of small and medium-sized SOEs, collectively owned enterprises (COEs), and TVEs, while keeping large SOEs in strategic industries such as telecommunication and energy ("Grasp the large and let go of the small"). During this transition, there were massive resource reallocations between state and non-state sectors. Employment in the non-state sector increased steadily from less than 5% in 1997 to more than 60% in 2020, and the entry and exit of firms influenced productivity within each sector.

The literature on ownership changes seeks to answer the following key question: What is the contribution of reallocation of labor and capital from the state sector to the non-state sector to overall economic growth? Similarly to the literature on sectoral shifts, earlier works on misallocation of labor and capital between state and non-state firms use an accounting

approach that seeks to gauge the extent of this misallocation without identifying the underlying source of the misallocation. Dollars and Wei (2007) were among the first authors to use firm-level survey data to show that even in 2002-2004, after a quarter-century of reforms, China's SOEs had lower (marginal and average) returns to capital than domestic non-state firms or foreign firms. In a growth accounting exercise, Brandt, Hsieh, and Zhu (2008) found that reductions in barriers to labor reallocation between state and non-state sectors contributed to about one fourth of aggregate output growth during the period of 1978-2004. Hsieh and Klenow (2009) used firm-level data in a structural model to estimate the extent of resource misallocation. They found that compared to the 1997 U.S. benchmark, Chinese allocative efficiency improved 15% from 1998 to 2005, or 2.0% per year. Of this efficiency improvement, 39% came from the shrinkage of misallocation between SOEs and other plants.

Brandt, Tombe, and Zhu (2013) examine the overall TFP loss due to distortions between sectors within a province and between provinces. While Hsieh and Klenow (2009) argue that the distortions on allocative efficiency declined in the manufacturing sector, Brandt, Tombe, and Zhu (2013) find that misallocation of capital between state and non-state sectors increased sharply since 1997. Their evidence suggests that although resource misallocation might have improved within narrowly defined manufacturing industries, there were still significant barriers to factor mobility across regions and forms of ownership in China's non-agricultural economy, including both manufacturing and services, at a more aggregate level.

In addition to misallocation at the intensive margin, several studies have examined the role of entry and exit of SOEs and non-SOEs in aggregate TFP growth. For example, Brandt, Biesebroeck, and Zhang (2012) find that net entry of firms accounted for roughly half of productivity growth in manufacturing over the period 1998-2007. The creation and selection of new firms in the non-state sector were particularly important. Using an equilibrium model of heterogeneous firms, Hsieh and Song (2015) find that the transformation of the state sector and the creation of new state-controlled firms together accounted for 21% of China's growth from 1998 to 2007. The exit and privatization of SOEs, however, had a negligible effect on aggregate growth. Li, Liu, and Wang (2016) show that the exit of SOEs from the competitive downstream sector and the concentration of SOEs in monopolistic upstream industries are an equilibrium outcome due to the full control and effective ownership of SOEs by the elite group.

Studies have also highlighted financial frictions as a specific source of misallocation between SOEs and private firms and assessed their consequences on growth. For instance, Song, Storesletten, and Zilibotti (2011) develop an equilibrium model to study the role of asymmetric financial frictions for labor and capital reallocation from the state sector to the private sector in sustained economic growth during 1992-2007. Their model suggests that

while SOEs were less productive than privately-owned enterprises (POEs), they did not face financial constraints, creating a wedge of marginal product of capital between the two sectors. As POEs accumulated capital by self-finance, labor and capital were gradually reallocated from SOEs to POEs, leading to sustained growth in TFP due to the improvement in capital allocation.

Several studies explore the effects of financial frictions or policy distortions on aggregate TFP by focusing on resource misallocation at both intensive and extensive margins. These distortions in China typically manifest as considerable benefits for SOEs, POEs favored by state, and firms located in strategically important regions. Such advantages often comprise implicit subsidies or guarantees such as lenient budget constraints, preferred capital costs, and tax incentives. Midrigan and Xu (2014) argue that financial frictions undermine aggregate TFP through misallocation and entry barriers. Their calibrated model suggests that while financial frictions result in negligible TFP losses from misallocation, they significantly affect technological adoptions and entry barriers. Using a heterogeneous-firm model with two types of financial frictions—default risks and fixed costs of issuing loans, Bai, Lu, and Tian (2018) find that these frictions account for 60% of the marginal product of capital dispersion within the manufacturing sector. By contrast, Wu (2018) estimates that financial frictions accounted for only an 8.3% loss of aggregate TFP at the intensive margin, representing 30% of China's capital misallocation from 1998 to 2007. Policy distortions, however, were significant contributors to capital misallocation, resulting in the majority of the aggregate TFP loss.

If policy distortions caused significant efficiency losses, why did the government continue to influence the allocation of capital and labor to certain sectors of the economy through different phases of economic development, and why did the government maintain certain policy distortions, such as subsidizing heavy industries with rigid banking regulations, while removing others? In a model that incorporates input-output linkages, Liu (2019) shows that market distortions in downstream industries pass through to upstream industries, leaving upstream firms with the largest distortions. These distortions create incentives for the government to subsidize the upstream sector, which contains many heavy industries. Since a majority of SOEs are in upstream industries, they receive more production subsidies, such as credit support, than POEs. In a political economy model, Wang (2020) endogenizes the degree of credit constraints faced by private enterprises, showing that the government strikes a balance between keeping the private sector vigorous and extracting taxes from the private sector. The government's credit policy initially generates rapid growth by reallocating resources to the private sector. As the private sector grows to a critical level, however, the government begins to over-invest in the state sector to keep its employment share high.

Several studies examine the tradeoff created by financial policy reforms and their impact on cross-sector misallocation and productivity. Xiong (2018) develops a growth model in which local governments use debt to finance infrastructure investment, generating excessive leverage and a tradeoff between high regional productivity growth and over-investment in the region. Liu, Wang, and Xu (2020) argue that liberalization of lending interest rates may reduce aggregate productivity by exacerbating cross-sector misallocation and advocate for policy reforms to improve private firms' access to credit and to reduce SOEs' distorted incentives. Similarly, Liu, Spiegel, and Zhang (2020) demonstrate that financial repression, which required banks to extend funds to SOEs on favorable terms, created a tradeoff between aggregate productivity and intertemporal allocative efficiency. Reducing the tax on capital outflow would have reduced distortion on intertemporal trade, but it would have raised funding costs and domestic lending rates, causing resources to be reallocated to less productive SOEs and exacerbating cross-sector misallocation.

Overall, the literature on changes in China's ownership structure focuses on sources of capital misallocation and the effects of such misallocation on economic growth. With a significant difference in returns to capital between state and non-state firms, financial frictions and credit policy play a crucial role in generating cross-sector misallocation and productivity losses. When financial markets are highly imperfect, however, an active credit policy, which directs bank loans to favored industries, can be an effective strategy for promoting economic growth, as illustrated in Sections III.2 and III.4.

II.2. **Opening-Up Policy.** In addition to policy reforms influencing sectorial shifts and ownership structures, China's gradualist approach is also reflected in its opening-up policy. The interplay between this policy and economic growth has been a major focus of numerous studies. Commencing in 1978, China adopted an export-led development strategy, progressively liberalizing trade and deregulating FDI. Its accession to WTO in 2001 marked a significant milestone in China's journey of trade liberalization.

II.2.1. *Trade Liberalization.* The literature has conflicting views on the importance of trade reforms in China's productivity and output growth. While some studies emphasize the positive impact of trade liberalization on productivity, others find that gains from domestic reforms are much higher. For instance, Khandelwal, Schott, and Wei (2013) estimate the productivity gain of removing the export quota in 2005 after China joined the WTO. Using firm-level data from Chinese customs, they find that 71% of the overall gain in productivity from removing quotas was attributable to the elimination of the quota misallocation, while 29% was due to removing the quota itself. Another study finds that reductions in input tariffs and input costs, made possible by trade liberalization, enabled entrants to produce with higher productivity, leading to growth of within-firm productivity (Brandt, Biesebroeck,

Wang, and Zhang, 2017). Moreover, China's WTO membership granted it permanent Normal Trade Relations status and stimulated sectoral reallocation, leading to productivity improvements (Erten and Leigh, 2021). In Section IV.1, we extend our investment-driven economy model to incorporate an explicit trade channel and evaluate the impact of China's WTO accession on its macroeconomy. Our extended model suggests that China's accession to the WTO has significantly bolstered its GDP growth, attributable to both enhanced TFP growth and capital deepening.

Other researchers argue that gains from trade liberalization are much lower than those from domestic reforms. For instance, Tombe and Zhu (2019) find that during 2000-2005, 36% of growth of aggregate labor productivity was due to reductions of internal trade costs and migration costs, while only 8% was attributable to reductions of international trade costs. During 1998-2005, a majority of GDP growth and TFP growth resulted from technological improvements, capital accumulation, and mitigation of distortions (Bai, Jin, and Lu, 2019). With the share of capital-intensive goods in China's exports rising and labor costs increasing, future research is needed to explore how these changes may affect China's trade balance and GDP growth.

II.2.2. *Role of Foreign Direct Investment.* The literature on the role of FDI in China's growth focuses on two main channels. The first is the role of FDI in promoting export-led growth. The consensus is that inward FDI played a significant role in China's development strategy of capital deepening, which began before its WTO accession. For example, early studies, such as Zhang and Song (2000) and Yao (2006), have argued for the positive impact of FDI on China's economic growth, specifically through the manufacturing sector, prior to China's accession to the WTO.

More recent literature focuses on the tradeoff of FDI, as it may harm domestic rivals through competition while encouraging technology transfer (Aitken and Harrison, 1999). Lu, Tao, and Zhu (2017) confront this tradeoff and conclude that inward FDI had positive implications for industries not in direct competition with FDI firms, but negative implications for those that were. The paper also addresses endogeneity problems apparent in earlier studies.

Joint ventures were found to be a significant form of FDI in promoting technology transfer, as shown by Jiang, Keller, Qiu, and Ridley (2019), although other forms of FDI also played a positive role. These studies demonstrate the importance of FDI for China's economic development, especially in the first two phases of its macroeconomic growth. As China transitions into the new normal economy (the third phase), however, it has increasingly emphasized the development of domestic innovation capabilities and reduced its reliance on

foreign technology. It remains to be seen how this shift in policy will impact the role of FDI in China's future growth, which is an interesting topic for further research.

II.3. **Cyclical Fluctuations.** Recent studies have found that China's gradualist approach to economic reforms not only influences its trend growth but also its cyclical fluctuations. The body of literature exploring the intersection of structural transformation and economic fluctuations primarily focuses on the comovements among consumption, investment, employment, and output. During the first two phases of China's macroeconomic development, credit policy played a pivotal role in cyclical fluctuations. In earlier studies, Brandt and Zhu (2000) and Brandt and Zhu (2001) find a unique characteristic of China's growth from 1979 to 1995—a pronounced positive correlation between growth and inflation over the business cycle. They attribute this correlation to fiscal decentralization in 1985, which curtailed the central government's ability to generate fiscal revenue. As a result, the government had to primarily rely on credit allocation and money creation to finance transfers to the state sector.

Chen and Zha (2020) establish stylized facts on a regime shift in the cyclical movements of the Chinese macroeconomy around 1998. During the light-industry led economy phase, there is a significant positive correlation between consumption and investment and between long-term and short-term loans. In the investment-driven economy phase, however, there is no positive correlation between investment and consumption, no positive correlation between investment and the labor share, and a significantly negative correlation between long-term and short-term loans. This finding is confirmed by Fernald (2016), who calculates the correlations of real investment, real consumption, and incomes for 40 countries in 1995-2010 and finds that China is an outlier with very low or negative correlations. For most economies, positive comovements are the defining feature of the business cycle.

Another unique cyclical fact found in the literature is a near-zero correlation between aggregate employment and GDP and a low volatility of aggregate employment fluctuations. Both Yao and Zhu (2020) and Storesletten, Zhao, and Zilibotti (2019) emphasize the key role played by the countercyclical agricultural employment share in acyclical fluctuations of aggregate employment. Yao and Zhu (2020) argue that the key to understanding the aggregate employment fluctuation in China is the income effect of a change in agriculture productivity. With this mechanism, a positive shock to agricultural productivity reduces relative demand for agricultural goods as incomes rise. Thus, the correlation between the share of agricultural employment and aggregate output becomes negative, and there is almost zero correlation between aggregate employment and aggregate output. Storesletten, Zhao, and Zilibotti (2019), however, argue that the countercyclicality of the share of agricultural employment was mainly driven by shocks to non-agricultural TFP. Under the assumption that an elasticity of substitution between agricultural and non-agricultural products is larger than

one, a positive shock to non-agricultural TFP would cause workers to move from agriculture to the non-agricultural sector and thus reduce the share of agricultural employment.

Various studies have emphasized different factors causing cyclical fluctuations in the Chinese economy, but there is a common factor driving both secular trends and cyclical fluctuations. For instance, credit policy has been identified as a key factor by Brandt and Zhu (2000) and Chang, Chen, Waggoner, and Zha (2016) to understand both the secular growth and the cyclical fluctuation, while Yao and Zhu (2020) argue that improvements in agricultural productivity are the key to understanding both the secular decline in the share of agricultural employment and the almost zero correlation between aggregate employment and GDP. Similarly, Storesletten, Zhao, and Zilibotti (2019) attribute the aforementioned phenomenon primarily to improvements in non-agricultural TFP.

These studies underscore that standard DSGE models are ill-suited to deciphering the cyclical fluctuations in the Chinese economy because they operate on the assumption that the economy fluctuates around a steady state. In these standard models, long-term growth factors such as research and development (R&D) and institutional developments are distinctly different from those influencing short-term fluctuations. These models treat long-run growth as exogenously given and focus on fluctuations around the trend or the detrended steady state. For emerging market economies like China, however, it is likely that the same factors or policies impact both output growth along a transitional path and cyclical fluctuations of output. It is therefore necessary to integrate both secular growth and cyclical fluctuations into one framework that accommodates the transitional path.

II.4. **High Saving Rate.** In addition to shaping secular trends and cyclical fluctuations, China's gradualist approach to economic reforms has also left an indelible mark on other aspects of the Chinese macroeconomy. A notable phenomenon is the country's high saving rates. China's aggregate saving rate has consistently been above 35% of GDP since the 1980s, and it witnessed a steady climb between 2000 and 2010, peaking at over 50% around 2010 (Yang, 2012). In addition, the household saving rate in China has surged significantly alongside the rapid growth in income. From constituting only 6% to 7% of GDP in the late 1970s, household savings have grown persistently since 1978, reaching above 25% in 2009 (Curtus, Lugauer, and Mark, 2015). This striking phenomenon of high saving rates amidst rapid income growth contradicts the canonical permanent income hypothesis and is known as the "high saving rate" puzzle. A robust body of literature explores the factors contributing to China's high saving rate, examining it through lenses such as structural changes or the one-child policy.

II.4.1. *Structural Changes.* One strand of literature argues that the increasing saving rate is an outcome of China's structural transformation. Researchers have studied the contributions

of precautionary savings against various types of risks associated with these reforms. Using data from China's Urban Household Survey, Chamon and Prasad (2010) found that even after controlling for demographic shifts, there remains a substantial time trend in the household saving rate, indicating that economy-wide changes affecting all households are the primary driver of high savings. They argue that the declining public provision of education, health, and housing services (due to the breaking of the "iron rice bowl") is a key factor. This forces young households to save for their children's education, while older generations have to save for their own health expenses. Additionally, the large-scale privatization of residential housing has forced households to save for down payments.

Other studies focus on the impact of income risks on household savings. Wen (2010) argues that borrowing constraints and sufficiently large uninsured uncertainty may be the key to understanding the "high saving, high growth, and low interest rate" phenomenon for fast-growing countries like China. Precautionary saving can completely alter the relationship between permanent income and consumption, making the marginal propensity to save a positive function of permanent labor income, regardless of interest rates. Chamon, Liu, and Prasad (2013) emphasize that household saving rates increase with idiosyncratic income risks. They argue that during 1989-2009, the rising uncertainty of transitory idiosyncratic incomes resulting from the SOE restructuring process, together with the 1997 pension reforms, led to significant increases in the saving rates of both young and old households. Similarly, Santaeullia-Llopis and Zheng (2018) find that during the period of rapid economic growth from 1989 to 2009, Chinese households faced an increasing level of income risks, especially those in the permanent component of income. As the economy grew, consumption insurance deteriorated while shocks to permanent income that were transmitted to consumption at least tripled from 1989 to 2009.

He, Huang, Liu, and Zhu (2018) argue that China's large-scale reforms in the late 1990s caused massive layoffs in the state sector, thereby significantly reducing perceived job security for the remaining SOE workers. Their research suggests that precautionary savings against unemployment risks accounted for 40% of wealth accumulation by households employed by SOEs. On the other hand, Wei and Zhang (2011) suggest that the continuous and rapid increase in the household saving rate since 2003 is difficult to reconcile with the precautionary saving motive theory, given the improvements in pension systems and public health care provision during the same period. These improvements should discourage households' precautionary saving against mortality risks or health-related risks.

II.4.2. *One-Child Policy.* Another important factor that may affect the household saving rate is the one-child policy initiated in 1979. Researchers have identified various channels through which the one-child policy affected the saving rates of households of different ages. In

contrast to the precautionary saving motive, Wei and Zhang (2011) propose a competitive saving motive: the one-child policy led to an unbalanced sex ratio of male population to female population at birth, chiefly through the combination of a strong preference for sons and the arrival of prenatal sex determination technology in the early 1980s (Chu, 2001; Yang and Chen, 2004; Gupta, 2005). As the sex ratio became more unbalanced, Chinese parents with a son competed with one another to raise savings as a way to improve their son's relative financial position for marriage. The pressures on parents to raise savings spilled over to other households, which contributed to about half of the rise in the Chinese saving rate after 2000.

Their argument is supported by cross-region and across-household evidence. Du and Wei (2013) develop a theory of competitive saving motive motivated by the evidence established in Wei and Zhang (2011) and explicate the conditions under which the competitive saving motive at an individual level can translate into major changes in economy-wide aggregate savings. They show that the saving rate of the male, which is in excess supply, will tend to rise as higher savings are considered a clear signal and a competitive instrument in the dating and marriage market. As a result, the economy-wide saving rate rises unambiguously in response to a higher sex ratio. Their model also suggests that a rise in the aggregate saving rate triggered by a rise in the sex ratio is socially inefficient, as the excess savings generated by the competitive saving motive can be used alternatively by households for consumption with no corresponding change in the marriage outcome.

Curtus, Lugauer, and Mark (2015), on the other hand, emphasize that the one-child policy led to fewer children and a declining family size. A household with fewer children devotes a smaller share of household income to support dependents and therefore has more to savethe so-called expenditure effect. Had the number of children per household been held at the level in the 1970s, as calibrated in their model, the household saving rate in 2009 would have been 7% lower than when the family size is allowed to decline.

Another channel through which households with fewer children save more than other households is the effect of intergenerational transfers. Choukhmane, Coeurdacier, and Jin (2017) argue that Chinese children are a financial source for supporting parents of old age. Under the one-child policy, as shown in their model with intergenerational transfers, a reduction in the number of children supporting parents of old age lowers the expected income received from children and raises the need for saving. Taking one step further, Imrohoroglu and Zhao (2018) argue that since the one-child policy reduced the extent that children could provide insurance, households increased precautionary savings against risks of long-term care (LTC). As shown in their calibrated OLG model with bilateral altruism, the LTC risks faced by the elderly and the deterioration of the family insurance as a result of the one-child policy accounted for approximately half of the increase in the saving rate between 1980 and 2010. Demographic changes due to lower fertility rates and the increased life expectancy

contributed to an increase in the household saving rate by 9 percentage points between 1978 and 2015 (Dotsey, Li, and Yang, 2019).

The one-child policy in China has resulted in a rapidly aging population and a rising ratio of old-age parents to young dependents, which has led to discussions on reforming the pension system. Song, Storesletten, Wang, and Zilibotti (2015) incorporate demographic changes, fast wage growth, and financial market imperfections into their model to analyze the effects of these factors on China's economic growth. They find that the current pension system is not financially sustainable due to unfavorable demographic changes, which will increase the dependency ratio of the old population in the future. Although future generations will receive low pensions, they will have high wages and be able to save for their own retirements. The social planner is content with a system of intergenerational transfers that takes resources away from future generations to support the initial generations of poor workers. Therefore, pension reforms will be delayed.

In January 2016, China replaced its one-child policy with a universal two-child policy, which has implications for household decisions, such as savings and the supply of female labor. The existing research on the effects of the one-child policy suggests that relaxing this policy may potentially reduce savings and the female labor supply. For example, Li, Zhang, and Zhu (2005) find that the one-child policy had a large negative effect on fertility, and He and Zhu (2016) find a negative, albeit small, effect of fertility on female labor supply in urban China. More recently, Cao (2019) uses the one-child policy as an exogenous shock to fertility and estimates that a second child in rural areas reduced maternal labor force participation by 4.6 percentage points, labor supply intensity (hours worked per worker) by 1.4 hours per week, and monthly incomes by 54.5 Chinese Yuan (18.7%). Further research is needed to evaluate the effects of the new two-child policy on savings, labor participation, and growth, with the understanding that these effects may be stronger for mothers whose husbands are rural-to-urban migrants.

II.5. **The Housing Boom.** China's housing investment boom, which is closely linked with its high saving rate, has coincided with the economy's structural transformation and rapid economic growth. Housing stock constitutes a significant portion of Chinese households' wealth, accounting for 75.5% of urban households' wealth in 2013. This figure stands in striking contrast to the U.S., where residential property makes up approximately 40% of household wealth.

China underwent an unparalleled housing boom from 2003 to 2016. During this period, real house prices grew at an average annual rate of 13.1% in the four first-tier cities and 10.5% in the second-tier cities, surpassing the aggregate income growth rate of 10% over the same time frame (Fang, Gu, Xiong, and Zhou, 2016). While house prices experienced a

temporary slowdown between late 2013 and 2014, they sharply rebounded during 2015-2016 before stabilizing in 2017 (Liu and Xiong, 2020).

One view suggests that the housing boom in China occurred during the economic transition period when there was massive labor reallocation from the state sector to the non-state sector (Chen and Wen, 2017). This shift in the labor market was driven by expectations of an eventual depletion of the labor surplus and lower future returns to capital. As a result, the current generation of entrepreneurs turned to housing as an alternative store of value for their rapidly growing wealth. According to Chen and Wen (2017), the high annual rate of growth in house prices during the transition to a market-based economy is justified by the high returns to capital enjoyed by entrepreneurs in the private sector, who are marginal investors participating in the housing market. Housing booms, would eventually crowd out productive physical capital, which could slow down economic growth. These findings are supported by Jiang, Miao, and Zhang (2021), who attribute the rapid growth in house prices to stochastic bubbles with high returns on housing investment.

Another factor contributing to the housing boom is the increasing demand for housing consumption. Rapid growth of disposable household income is one prominent factor that rationalizes the strong housing demand, with low-income homebuyers often carrying a heavy financial burden and purchasing homes worth eight to ten times their annual incomes (Fang, Gu, Xiong, and Zhou, 2016). This reflects expectations of persistently high income growth in the future. The effect of expected income growth on house prices is quantified by Han, Han, and Zhu (2018) with a life cycle model, which shows that the high price-to-income ratio observed in Beijing can be justified by the high expected income growth in the beginning of their sample (i.e., the period prior to 2010).

The structural transformation of China's economy, driven by rural-to-urban migrations, has also played an important role in the housing boom. Migration flows to cities can generate an average 6.4% annual rate of growth in national house prices between 1998 and 2012 (Garriga, Hedlund, Wang, and Tang, 2017). Homeownership as a social status has also played a role in the housing boom, with ownership serving as a status good in the marriage market. Cities with a more unbalanced sex ratio experienced higher house prices between 2003 and 2009, implying that an increase in the male-to-female sex ratio accounted for between 30% and 48% of the increase in real house prices in 35 major cities during this period (Wei, Zhang, and Liu, 2017).

A policy experiment that relaxed the loan-to-value (LTV) ratio limit for secondary houses was conducted and its impact on the housing market is analyzed by Chen, Wang, Xu, and Zha (2020) using administrative data on more than 3 million mortgage originations. The results show that the policy change fueled a housing boom by not only encouraging direct investments in secondary houses but also increasing demand for primary homes through

the spillover channel. The study highlights the large quantitative impact of loosening the LTV policy for secondary houses on house prices and mortgage loans, with spillover effects on primary homes. It also reveals that the relaxation of LTV policy on secondary houses disproportionately impacts the housing demand of middle-aged, highly educated households, while reducing the welfare of young households.

II.6. **Growing Current Account Surplus.** High saving rates and substantial capital investment are shared traits among China and the Asian Miracle economies during their high-growth phases. However, China's surging current account surplus during its transition marks a significant departure (Chang, Chen, Waggoner, and Zha, 2016). Before 2001, China's current account balance remained around 2% of GDP, but it experienced a dramatic rise after 2000, peaking over 9% of GDP in 2008 (Figure 4). In contrast, Asian Miracle economies such as Singapore and Korea had current account deficits during their investment booms, while Japan maintained near-zero current account balances, as illustrated in Figure 5.

Several studies attribute the growing current account surplus to financial frictions that limit firms' ability to raise investment during the second phase of growth acceleration, leading to net capital outflows. For instance, Song, Storesletten, and Zilibotti (2011) find that reallocation of labor from the state sector to the non-state sector caused a decline in the aggregate investment rate, decreasing the demand for credit and resulting in capital outflows. In addition, financial frictions prevented accumulated household savings from being invested in domestic firms, contributing to large current account surpluses until 2008 (Imrohoroglu and Zhao, 2020).

In recent research, rising saving rates in both the household and corporate sectors have been identified as key factors behind China's growing current account surplus (Du and Wei, 2016). The competitive saving motive, combined with a sustained increase in the sex ratio, has led to persistently growing surpluses. As the economy-wide saving rate increases, the real exchange rate falls, reducing demand for non-tradable goods, and leading to a decline in the value of the real exchange rate (Du and Wei, 2016). Capital reallocation from the labor-intensive sector to the capital-intensive sector in the corporate sector also contributed to rising national savings and current account surpluses during the period 1998-2015 (Chang, Chen, Waggoner, and Zha, 2016). During this transition, the labor income share declined, and a large share of output was used for investment and foreign asset purchases, rather than consumption.

China's growing current account surplus has also been studied in the context of global current account imbalances. In a two-country model with heterogeneous degrees of credit constraints faced by an emerging market economy and a developed economy, Coeurdacier, Guibaud, and Jin (2015) show that rapid growth in emerging market economies, with tight

credit constraints, exerts downward pressures on the world interest rate. A low world interest rate leads to less savings by young households and more savings by middle-aged households, and since emerging market economies are more credit constrained, the rise of the saving rate for middle-aged households is larger. Accordingly, the aggregate saving rate increases in emerging market economies relative to developed economies, leading to capital outflows from emerging market economies. While income growth and falling interest rates have a positive wealth effect on consumption of middle-aged households, the population aging due to the one-child policy has dampened this effect and contributed to an additional increase in the saving rate in China.

Wang, Wen, and Xu (2017) interpret the growing current account surplus as a two-way capital flow puzzle, where China receives FDI from abroad, but its capital in the form of financial investment moves to foreign countries. They attribute this puzzle to China's underdeveloped financial system, where severe credit constraints on households and firms result in insufficient investment from firms but a savings glut from households. As a result, a high marginal product of capital and a low interest rate exist simultaneously, and while FDI flows into China, households save for other countries.

All these papers view a country's current account balance as the difference between national saving and national investment (net capital outflow). After China's accession to the WTO at the end of 2001, the country's tariffs, especially non-tariff import barriers, were reduced considerably, leading to an increase in exports (Ju, Shi, and Wei, 2021). The increase in exports lowered the price of capital-intensive goods and the cost of domestic capital, encouraging labor-intensive firms to expand their production for exports by increasing the capital stock. As exports exceeded imports, the current account balance became a surplus. In China, therefore, capital outflows, rising investment rates, and current account surpluses can coexist.

II.7. **Inequalities.** The extraordinary growth of the Chinese economy over the last four decades prompts the question of how this expansion has impacted inequality across different households and regions. The equitable distribution of benefits from China's macroeconomic development is a critical issue for both China and the world.

II.7.1. *Household-Level Inequality.* Over the past four decades, China experienced significant growth in wealth and income inequalities, with the top 10% income share increasing from 27% to 41% between 1978 and 2015. Moreover, wealth concentration rose sharply, with the top 10% wealth share reaching 67% in 2015, approaching the level of the United States (Piketty, Yang, and Zucman, 2019).

During the period between 1992 and 2007, there was a significant increase in wage inequality, accompanied by a rapid rise in the average real wage. Ge and Yang (2014) use

a national sample of Urban Household Surveys to find that capital accumulation, a change in the skill-biased technological sector, and migrations from rural areas to urban areas were the primary driving forces behind wage growth and wage level inequalities. Piketty, Yang, and Zucman (2019) report that despite the widening urban-rural income gap, the increase in inequality was primarily due to rising income dispersion within both rural and urban areas. The China Family Panel Survey shows that "intergenerational income elasticity" is higher for younger cohorts than older cohorts, with an increase from 0.390 for the 1970-1980 birth cohort to 0.442 for the 1981-1988 birth cohort, with this increase more evident for urban and coastal residents than for rural and inland residents (Fan, Yi, and Zhang, 2021).

Rapid increases in house prices have contributed to the widening wealth inequality as well. Using the 2011-2017 China Household Finance Survey (CHFS), Chen, Wang, Xu, and Zha (2020) find that middle-aged households with high education experienced the most significant increase in their house value during the 2015-2016 housing boom. As they show, capital gains from the house price increase enabled middle-aged, high-income homeowners to trade up to larger homes. Between 2002 and 2013, the contribution of the house price increase to the widening wealth inequality was estimated to be 45.3% (Knight, Li, and Wan, 2020). This is in contrast to the U.S., where reductions in tax progressivity have played the most crucial role in the widening wealth inequality (Hubmer, Krusell, and Smith, 2020).

Since 2009, however, income and wealth inequalities across households have gradually declined, along with the secular slowdown of economic growth. Between 2008 and 2014, the Gini coefficient for incomes declined by 2.3 percentage points (Li, 2016). The top shares in earnings, incomes, and wealth have also declined in recent years, according to Zeng and Zhu (2022) who use the CHFS data. The declining inequality in earnings was attributed to credit policy preferential to unskilled labor-intensive firms during the post-2008 stimulus period (Bai, Liu, and Yao, 2020).

II.7.2. *Regional Inequality.* In 2000, the eastern coastal provinces had considerably higher levels of real GDP per worker than the central and western regions. In addition, real GDP per worker in the non-agricultural sector was much higher than that in the agricultural sector in every province. Tombe and Zhu (2019) suggest that the Hukou system, which imposes strict restrictions on worker mobility within China, is a significant reason for these disparities. Between 2000 and 2015, however, provincial income inequality declined by a third as China's overall income quadrupled (Hao, Sun, Tombe, and Zhu, 2020).

International trade has worsened the inequality between regions with similar skill levels and between skilled and unskilled workers within regions, with between-region inequality accounting for 75% of the overall inequality increase in China (Fan, 2019). Since China's

accession to the WTO, coastal regions have benefited from comparative advantages in manufacturing production due to their proximity to foreign suppliers, while interior regions have shifted toward the agricultural sector, resulting in significant increases in skill premia in the coastal regions but not the interior regions (Erten and Leigh, 2021).

While trade liberalization has increased income disparities across provinces, migration policy has played a crucial role in reducing regional inequality. The relaxation of Hukou restrictions on migration between 2000 and 2005 led to significant increases in intra-provincial and inter-provincial migrations (Tombe and Zhu, 2019). Furthermore, reductions in migration costs contributed significantly to the decline in cross-province income inequality during 2000-2015 (Hao, Sun, Tombe, and Zhu, 2020).

In summary, since adopting market-oriented reforms in 1978, China's economy has undergone a significant transformation. The nation transitioned from a nonmarket economy emphasizing equality to a market economy in which efficiency is prioritized and resources are allocated predominantly via market mechanisms. This transition has played a crucial role in shaping how inequality has evolved in China. Different policy reforms, however, have had different effects on inequality. The literature shows that trade liberalization and relaxation of the Hukou policy have had opposing impacts on regional inequality. Trade liberalization has tended to increase regional inequality by affecting different regions differently, while relaxation of the Hukou policy has facilitated intra-provincial and inter-provincial migration, allowing all residents to benefit from the country's opening policy.

III. Understanding China's Gradualist Approach: An Integrated Framework

While existing literature offers insightful analyses of China's gradualist approach, one less explored issue is the benefit of this approach to China's economic growth, relative to a laissez-faire approach. What, for instance, would have occurred if China had opted for a big bang approach instead? In this section, we aim to address this question by developing an theoretical framework, focusing on a mix of gradual changes in ownership structure and credit policy. Using a theoretical model helps assess the macroeconomic impacts of this approach in several aspects. First, it enables us to perform counterfactual laissez-faire policy experiments and juxtapose the outcomes of the gradualist approach with those of the laissez-faire policy. Second, a model offers a clear and structured framework for isolating and scrutinizing the key mechanisms and factors driving the gradualist approach, which helps identify the channels through which it influences the economy. Third, a model can be used to assess the welfare effects of the gradualist approach.

Our framework amalgamates the two initial phases of China's macroeconomy: the light-industry led economy and the investment-driven economy. This integration is disciplined by

key facts concerning the distinct primary drivers of GDP growth as tabulated in Table 1, as well as credit and resource allocations across sectors as detailed by Chen and Zha (2020).[6] First, in the light-industry led economy from 1978 to 1997, fluctuations in the consumption-to-output and investment-to-output ratios remained stationary, as shown in the left chart of Figure 2. However, in the investment-driven economy from 1998 to 2016, the investment-to-output ratio consistently increased, maintaining its high level even in the new normal economy (right chart in Figure 2). Second, the labor income share during the light-industry led economy lingered around 52%, experiencing a sustained decline before returning to 52% in the investment-driven economy (Figure 6). Third, both gross output and fixed assets in heavy industries mirrored the growth rate of those in light industries during the light-industry led economy, but at an accelerated pace in the investment-driven economy (Figure 7).[7] Fourth, medium and long-term (MLT) bank lending, primarily used for investment, maintained a stable ratio compared to short-term (ST) bank lending in the light-industry led economy. The ratio of MLT to ST bank loans, however, exhibited an upward trend in the investment-driven economy and continues this trend in the new normal economy (Figure 8).

III.1. **The Light-Industry Led Economy.** Our model of China's light-industry led economy is constructed to capture changes in the industrial policy during 1978-1997 when the government prioritized light-industry production. We focus on the labor-intensive sector, which was the main target of government support through credit policy and other forms of institutional support. By modeling the incentives and behaviors of labor-intensive firms, along with other economic agents in this sector, we can quantify the impact of China's gradualist approach to economic reform on the growth and development of the economy during this period. In the subsequent section, we extend our model, within the same framework, to encompass the investment-driven phase that succeeded the light-industry led economy. This extension provides another scenario for evaluating the effectiveness of China's gradualist approach to economic growth.

The light-industry led economy model is composed of workers and managers who live for two periods with overlapping generations. All agents work while young and spend their savings when older. Each young worker possesses $\overline{L}$ units of labor, while each young manager is endowed with managerial abilities.

III.1.1. *Technology.* The economy consists of two production sectors with different levels of capital intensity and demand for bank loans. The first sector, which corresponds to heavy

[6]This paper extends the macroeconomic time series to encompass the most recent periods for which data is accessible. See Internet Appendix A.

[7]Disaggregate time series for output and capital in the capital-intensive sector versus the labor-intensive sector are fragmentary. The series displayed in Figure 7 were discontinued in 2012 for gross output and in 2017 for gross fixed assets.

industry, is composed of capital-intensive firms (K-firms) that are owned and operated by the government. The second sector, corresponding to light industry, is made up of labor-intensive firms (L-firms) that are owned by the government but operated by young managers. From 1978 to 1997, domestic private firms played a minor role in the Chinese economy (Naughton, 2018). The labor-intensive sector was a mix of small SOEs, COEs in urban areas, and TVEs in the surrounding countryside.[8] For theoretical tractability, we assume that all L-firms are owned by the government, which serves as the residual claimant on their profits.

The technologies for the two types of firms have constant returns to scale:

$$Y_t^k = K_t^k,\ Y_t^l = \left(K_t^l\right)^{\alpha} \left(\chi L_t\right)^{1-\alpha},$$

where Y^j, K^j, and L^j denote the output, capital stock, and labor for the type-j firm, $j \in \{K, L\}$.[9] To focus on endogenous growth, we assume zero exogenous technological growth in both sectors, and normalize the level of technology to one.

The final goods are produced by combining the two intermediate goods using a constant elasticity of substitution (CES) function:[10]

$$Y_t = \left[\varphi \left(Y_t^k\right)^{\frac{\sigma-1}{\sigma}} + \left(Y_t^l\right)^{\frac{\sigma-1}{\sigma}}\right]^{\frac{\sigma}{\sigma-1}}.$$

III.1.2. *K-Firms.* We assume that the representative K-firm has a lifespan of only one period, although this assumption can be relaxed without affecting our results. At the beginning of each period, the new K-firm receives net worth N_t from the government. To finance the gap between its capital investment and the government's net worth (capital injection), the K-firm borrows from the representative financial intermediary at a (gross) interest rate R_t^L. Since both the K-firm and the bank are controlled by the government, there is no agency friction between them. The K-firm's problem can be summarized as follows:

$$\Pi_t^k \equiv \max_{K_t^k} (1-\tau) P_t^k K_t^k - R_t^L \left(K_t^k - N_t\right) + (1-\delta) K_t^k,$$

where P_t^k is the price of the K-firm's output, Π_t^k is the sum of the K-firm's profit and the capital stock after depreciation, and δ is the depreciation rate. Without loss of generality,

[8]TVEs are collectively owned enterprises located in townships or villages. The township government is considered the representative of the community, and is thus the de facto executive owner of the TVEs within the community (Xu and Zhang, 2009). COEs and TVEs were effectively controlled by local governments.

[9]We classify the sectors into capital-intensive versus labor-intensive based on the labor income share of each sector using the input-output table for the period of 1995-2010 (Chang, Chen, Waggoner, and Zha, 2016). The labor income share for the labor-intensive sector is 0.64, while that for the capital-intensive sector is 0.32.

[10]Our model is simplified and does not account for industrial linkages. In reality, light industries are mostly downstream industries and heavy industries are mostly upstream industries (Li, Liu, and Wang, 2016). A static model with production network that incorporates the role of industrial policies is presented by Liu (2019).

we assume that capital fully depreciates in one period ($\delta = 1$), and that one unit of capital goods can be costlessly converted into one unit of consumption goods. Accordingly, we normalize the price of K_t^k to one. The symbol τ represents the fraction of the K-firm's revenue expropriated by the government. This is consistent with the institutional fact that during this episode, despite rapid growth in the rural industry and TVEs, the government still relied heavily on the state sector for tax revenue (Naughton, 2018). After production, the K-firm ceases to exist and the government claims the remaining assets Π_t^k. The optimality condition implies

$$P_t^k = \frac{R_t^L}{1-\tau}. \tag{1}$$

Equation (S7) represents the supply curve for capital-intensive goods, demonstrating perfect elasticity.[11]

III.1.3. *L-Firms.* The production of the representative L-firm in our model requires working capital before production takes place. The working capital pays for wages ($w_t L_t$) and gross capital rent ($R_t^K K_t^l$). To finance working capital, the L-firm borrows from the bank at the beginning of each period, and repay at the end of the period after production takes place and good markets opens. The bank charges a gross interest rate of R_t^l for the intra-period working capital loan.

In this sector, firms are managed by hired managers. We assume that a fixed proportion, ψ, of the L-firm's output is allocated as a management fee.[12] As the L-firms are operated by managers, agency frictions between L-firms and the bank exist due to the limited enforcement of debt contracts, as in Jermann and Quadrini (2012). Specifically, L-firms can choose to default on their loan repayment to the bank, a decision made after revenue realization and manager payment, but prior to repaying intra-period loans. In the case of default, the bank can seize a fraction, $1 > \theta \geq 0$, of its revenue net of the managerial compensation.

We characterize the credit support provided to L-firms in the labor-intensive sector by local governments as loan repayment guarantees equal to the government's net worth, N_t, multiplied by R_t^l. As Naughton (2018) pointed out, during the 1980s and early 1990s, local government officials in China acted as intermediaries and guarantors for TVEs, providing reassurance to local banking agents that their loans would ultimately be repaid. This guarantee effectively enlarges the borrowing capacity of L-firms, as captured by the following incentive-compatibility condition:

$$\theta(1-\psi)P_t^l \left(K_t^l\right)^{\alpha} \left(\chi L_t\right)^{1-\alpha} + R_t^l N_t \geq R_t^l \left(w_t L_t + R_t^K K_t^l\right). \tag{2}$$

[11]The introduction of τ creates a distortion in the supply of capital-intensive intermediate goods. All our results hold even in the absence of τ.

[12]Typically, the control rights of TVEs are partially delegated to managers through what is officially referred to as the management responsibility contract.

Specifically, the left-hand side of (2) is the total amount an L-firm can pledge to the bank for working capital loan. The right-hand side of (2) is the total debt repayment of working capital loan. The incentive compatibility (IC) constraint in equation (2) limits the amount of intra-period working capital loans that the L-firm can obtain. The limit is determined by the government's net worth and the fraction θ of the firm's revenue that serves as collateral. By contrast, K-firms, which are operated by the government itself, do not face such a borrowing constraint.[13]

Our model's credit support by the government for the representative L-firm is based on institutional facts in China. During 1978-1997, the Chinese government prioritized stimulating the production of light industries, such as consumer durables, within the labor-intensive sector to generate demand for goods produced by the capital-intensive sector. To support this objective, in September 1979, the central government established the "Six Priorities" for developing light industries: (1) ensuring the supply of raw materials, fuel materials, and electricity; (2) renovating facilities; (3) improving infrastructure; (4) providing bank credit; (5) increasing foreign reserves and introducing technology from abroad; and (6) improving transportation. Two years later, in the 5th National People's Congress of China, the central government emphasized the importance of the consumption-goods industry by declaring it a key sector of the economy. The Chinese slogan during that period was "Let light (labor-intensive) industries lead the heavy (capital-intensive) industries." Local governments had incentives to provide a favorable institutional environment for credit support to boost production of L-firms, a new form of close government corporations with TVEs that Oi (1992) referred to as "local government corporatism."

The optimization problem faced by the L-firm can be written as:

$$\Pi_t^l \equiv \max_{K_t^l, L_t} (1-\psi) P_t^l \left(K_t^l\right)^{\alpha} \left(\chi L_t\right)^{1-\alpha} - R_t^l \left(w_t L_t + R_t^K K_t^l\right) + (1-\delta) K_t^l \tag{3}$$

subject to the IC constraint given by equation (2). In the remainder of this paper, we focus on the scenario in which the IC constraint (2) consistently binds, as detailed in Proposition S1 in Internet Appendix F.1.

III.1.4. *Managers' Problem.* Managers have only one saving choice: bank deposits with a deposit rate of R_t^D. We assume a constant relative risk aversion (CRRA) utility function for the manager's consumption, given by

$$u\left(c_t^m\right) = \frac{\left(c_t^m\right)^{1-\frac{1}{\gamma}}}{1-\frac{1}{\gamma}}, \tag{4}$$

[13] This captures the prevalence of soft budget constraints of SOEs in the light-industry led economy.

where $c_t^m = c_{1t}^m$ or c_{2t+1}^m, and γ is the intertemporal elasticity of substitution. The manager's consumption-saving problem is expressed as

$$\max_{s_t^m} \frac{\left(m_t - s_{t+1}^m\right)^{1-\frac{1}{\gamma}}}{1-\frac{1}{\gamma}} + \beta \frac{\left(R_{t+1}^D s_{t+1}^m\right)^{1-\frac{1}{\gamma}}}{1-\frac{1}{\gamma}}, \tag{5}$$

where $m_t = \psi P_t^l \left(K_t^l\right)^{\alpha} \left(L_t\right)^{1-\alpha}$ is the management fee, and s_{t+1}^m represents the manager's savings.

III.1.5. *Workers' Problem.* We assume that each individual worker can choose to work at home or in the L-firm. Working at home generates $\underline{w}$ units of consumption goods for each unit of labor, but home production does not count toward GDP. Reallocating labor from home production to L-firm production would raise aggregate TFP. Workers cannot lend directly to the firms but can deposit their savings in the representative bank and earn a deposit interest rate R_t^D. The representative worker's consumption-saving problem is:

$$\max_{c_{1t}^w, c_{2t+1}^w, L_t} \frac{\left(c_{1t}^w - \underline{w}\left(L_t - \overline{L}\right)\right)^{1-\frac{1}{\gamma}}}{1-\frac{1}{\gamma}} + \beta \frac{\left(c_{2t+1}^w\right)^{1-\frac{1}{\gamma}}}{1-\frac{1}{\gamma}}$$

subject to

$$\begin{aligned} c_{1t}^w + s_{t+1}^w &= w_t L_t, \\ c_{2t+1}^w &= s_{t+1}^w R_{t+1}^D, \\ L_t &\leq \overline{L}, \end{aligned}$$

where $\underline{w}(\overline{L} - L_t)$ represents consumption from home production, $\underline{w}$ is the reservation wage rate, w_t is the market wage rate, and c_{1t}^w, c_{2t+1}^w, and s_t^w denote the worker's consumption when young, the worker's consumption when old, and the worker's savings.

Our framework simplifies the supply side of industrial labor to highlight the role of the government's macroeconomic policy in bolstering demand for industrial labor. Specifically, the model abstracts from the agricultural sector and assumes the total hours available for industrial production ($\overline{L}$) as a constant. Integrating factors that influence the supply of industrial labor, as highlighted in existing literature, can potentially strengthen the impact of government policy on growth of industrial labor in equilibrium.

From 1978 to 1997, an abundance of industrial labor was transferred from the agricultural sector. We represent this labor abundance in our model with $L_t < \overline{L}$. Real wages in 1978-1997 grew at a rate that was only half of the wage growth rate in 1998-2016. Our model focuses on endogenous TFP growth engineered within the labor-intensive sector and its impact on the aggregate economy. The solution to workers' problem implies that the labor supply is perfectly elastic at $w = \underline{w}$ until it is binding at $\overline{L}$. This supply curve captures the essence of the labor supply framework introduced by Lewis (1954) for many nations with

surplus labor. Within this context, the labor price represents a wage at subsistence level and the labor supply is deemed "unlimited" as long as the supply of labor at this price exceeds its demand.

III.1.6. *The Bank's Problem.* In each period, the bank receives deposits from young workers and young managers, amounting to a total of D_t at the begining of the period. For simplicity, we assume that the bank possesses the technology to convert household deposits into physical capital on a one-to-one basis, which can be rented to both K-firms and L-firms. The deposits can be allocated in three ways: first, a portion of B_t^k is lent to K-firms as capital; second, an amount of K_t^l is rented to L-firms as capital, with respective interest rates of R_t^L and R_t^K; third, the residual deposit, given by $D_t - B_t^k - K_t^l$, is invested in foreign bonds, earning an interest rate of R. To finance L-firms' working capital, we assume that within each period, the bank borrows an amount B_t^l from the international money market, which is then loaned to L-firms as intratemporal loans to working capital.[14] The bank's objective can be described as maximizing profits:

$$\Pi_t^b \equiv \max_{B_t^l, B_t^k, K_t^l, D_t} [R_t^L B_t^k + R_t^K K_t^l + R(D_t - B_t^k - K_t^l) - R_t^D D_t] + (R_t^l - 1)B_t^l,$$

where the term B_t^k represents an intertemporal loan, while B_t^l denotes an intratemporal loan for working capital in the L-firm, which is fully repaid at the end of the period. The expression enclosed in square brackets corresponds to the profit garnered from intertemporal loans, bond investments, and capital rentals, whereas the final term represents the profit from intratemporal loans to L-firms.[15]

III.1.7. *The Government's Problem.* The government is an infinitely-lived entity. At the onset of each period, the government injects capital into K-firms and provides loan guarantees to L-firms with its own net worth (N_t). By the end of each period, it accumulates profits from both types of firms and the bank, as well as returns from the previous period's foreign bond investments (B_t^G).[16] The government then determines its net worth for the next period and invests the remaining assets in foreign bonds at the international interest rate (R).[17] To

[14] We assume that the bank's borrowing cost is zero within the period.

[15] Our assumption that loans to K-firms are intertemporal while those to L-firms are intratemporal are motivated by the empirical findings of Chang, Chen, Waggoner, and Zha (2016). Based on the 2010Q1-2014Q4 quarterly series of loan classifications reported by the People's Bank of China, they find that 89% of MLT loans is allocated, on average, to heavy industries and this number has been stable over the years.

[16] Our assumption that the profits of both L-firms and K-firms feed into the government's budget constraint is motivated by the "fiscal contracting system" implemented in 1980s. This system effectively rendered local governments the "residual claimants" of firms under governments' control.

[17] If the government's foreign assets are negative, it issues bonds.

simplify, we posit that the government's net worth for the next period (N_{t+1}) is a fraction (ξ) of the current period's capital stock of K-firms, i.e., $N_{t+1} = \xi K_t^k$, where $0 \leq \xi \leq 1$.

III.1.8. *Timeline.* We provide a brief summary of the sequence of economic events that occur in each period (t) as follows.

(1) At the beginning, the intertemporal loan market, the foreign bond market, and the rental capital market open. With total deposits, D_t, from cohorts born at $t-1$, the bank makes portfolio decisions among capital to be rented to L-firms $\left(K_t^l\right)$, loans to K-firms $\left(B_t^k\right)$, and foreign bonds (B_t^P).
(2) K-firms receive capital stock N_t from the government.
(3) The bank borrows B_t^l from the international money market and lends to L-firms as intra-period working capital loans.
(4) The production of K-firms and L-firms takes place.
(5) The intermediate and final goods markets open.
(6) L-firms repay the bank the intra-period loans with interest, $R_t^l B_t^l$, and the bank repays B_t^l to lenders in the international money markets.
(7) The bank receives loan payments from K-firms, $R_t^L B_t^k$, and returns from the foreign bond market, RB_t^P.
(8) The bank repays cohorts born at $t-1$ their deposits plus interest payments, $R_t^D D_t$.
(9) Workers and entrepreneurs born at t deposit s_{t+1}^w and s_{t+1}^m, respectively, into the bank.

III.2. **Gradualist vs. Laissez-Faire Policies in the Light-Industry Led Economy.** In this section, we demonstrate the advantages of the gradualist policy over the laissez-faire policy by highlighting the importance of government support in the light-industry led economy. We begin by simulating a transitional path to the steady state in the economy described in Section III.1, with the government's initial net worth below the steady state value. Table 2 provides the parameter configuration used for these simulations, which lead to a steady state where the collateral constraint for L-firms binds.

Figure 9 illustrates the transitional paths of labor demand, wage rate, aggregate TFP, and GDP for both the gradualist case and the laissez-faire case in the light-industry led economy.[18] In the gradualist case, labor demand by L-firms continues to increase throughout the transitional period until all available labor is employed by L-firms (panel A). During the initial stage of the transition, the wage rate remains constant at the reservation wage rate due to the availability of surplus labor, leading to the AK feature in the labor-intensive sector. However, as the surplus labor is depleted, the wage rate increases rapidly (panel

[18]For comparison purposes, we calibrate the initial capital stock for the labor-intensive sector (K_t^l) in the laissez-faire case such that both economies have the same initial labor demand in the labor-intensive sector.

D). With an increase in the government's net worth, the demand for L-firms also rises, leading to the reallocation of more labor hours per worker from home production to market production. This reallocation increases the aggregate output per worker (labor productivity) and thus the aggregate TFP (panel B). Consequently, GDP rises during the transition due to the expansion of capital stock in L-firms and the endogenous TFP improvement (panel C). Throughout the transition, the aggregate investment rate, the ratio of revenue in the capital-intensive sector to revenue in the labor-intensive sector, the ratio of capital in the capital-intensive sector to capital in the labor-intensive sector, and the ratio of medium and long-term loans to short-term loans remain constant. These observations are consistent with the stylized facts discussed at the beginning of Section III.

Brandt and Zhu (2007) provide evidence that the non-state sector in China, with TVEs as a significant constituent, exhibited considerably higher TFP compared to the state sector. In fact, the level of investment in the non-state sector was central to this sector's growth, contributing notably to the overall advancement of the Chinese economy. They further find a strong correlation between the growth rate of investment in the non-state sector and the growth rate of GDP. The growth rates of investment in the non-state sector and credit directed towards this sector's investment closely tracked each other. These empirical findings are consistent with our model's prediction that, along the transition path, bank loans allocated to the labor-intensive sector, investment in this sector, and aggregate output grow at the same rate (see Proposition S2 in Internet Appendix B.9 for more details).

To underscore the resource allocation across sectors, our model abstracts from small SOEs within the labor-intensive sector. If we were to extend the model by incorporating these less productive SOEs, we would expect a resource reallocation towards non-state firms within the labor-intensive sector, making credit support to this sector even more significant.

Now consider the big bang scenario of laissez-faire policy, where the light-industry led economy is left without any government support. At the outset of the economy, the L-firms are privatized and not provided with credit support for capital investment. Consequently, the agency problem between firms and banks forces L-firm managers to self-finance their capital investment. This agency problem is deeply ingrained in an economy with highly imperfect financial markets. Our laissez-faire case not only sheds light on the role of credit policy in China's macroeconomic development but also carries policy implications for other emerging market economies and countries facing significant financial frictions.[19]

[19]A large body of literature has employed similar growth models to investigate the impact of financial market frictions on economic development (Buera, Kaboski, and Shin, 2011; Song, Storesletten, and Zilibotti, 2011; Buera and Shin, 2013; Moll, 2014). In these models, a fraction of forward-looking managers face financial frictions associated with capital accumulation and attempt to mitigate these credit frictions through their own savings. Note that Itskhoki and Moll (2019) investigate the optimal (Ramsey) policy

The transitional path in the laissez-faire case shares some similarities but also displays significant quantitative differences compared to the path in the gradualist case. Specifically, labor demand in the laissez-faire case increases much more slowly than in the gradualist case, resulting in a substantially longer transition period. The slower growth rate of labor demand in the laissez-faire case arises because the growth rate of capital stock in L-firms is dependent on young managers' savings, which are constrained by their income and need for intertemporal consumption smoothing. In the gradualist case, however, capital investment in the labor-intensive sector is primarily governed by the government's credit support and its net worth growth rate. The government's loan repayment guarantee, represented by N_t, relaxes the L-firms' credit constraint and enables them to access sufficient credit, leading to a higher growth rate of K_t^l in the gradualist case than in the laissez-faire case. Consequently, the growth rates of aggregate TFP and GDP are much lower in the laissez-faire case than in the gradualist case during the transition period. Once the transition is complete, the level of GDP is much higher in the gradualist case than in the laissez-faire case.[20]

Our model helps us understand the transition in the actual economy. In the light-industry led economy during the 1978-1997 period, there were a labor surplus and low labor costs. Rather than privatizing labor-intensive firms in the initial stage of economic reforms, which would have required them to self-finance capital investment, the local Chinese government played an active role in their growth by acting as their guarantors, ensuring that bank credit was available to them. While there always exists an agency problem between a firm and a bank in China, local governments in China played crucial roles in a firm's investment and credit decisions because the firm's own property was insufficient collateral for a loan and banks required a guarantor to secure the loan. For instance, the township economic commission often acted as the guarantor for township enterprises (Oi, 1992). These government interventions allowed labor-intensive firms to accumulate capital at a faster pace than self-financing, leading to faster growth in aggregate TFP and GDP by reallocating surplus labor to the labor-intensive sector.

Our analysis shows that government interventions allow labor-intensive firms to accumulate capital more quickly than they could through self-financing. This policy support leads to faster growth in aggregate TFP and GDP by reallocating surplus labor to the labor-intensive sector. In the actual economy, small SOEs, COEs, and TVEs played a key role in solving the labor surplus problem that arose from economic reforms by reallocating labor from low

for development in these economies, which also experience endogenous TFP improvements due to resource reallocation.

[20]We also compute the welfare effects of the gradualist approach reform on different transitional cohorts, measured by consumption equivalent variations. We find that entrepreneurs along the transition path enjoy welfare gains relative to the laissez-faire case. By contrast, workers' welfare changes little before the surplus labor in the labor-intensive sector is depleted, as their wage rate is kept at the reservation wage.

productivity farm activities to relatively high productivity manufacturing activities (Wei, Xie, and Zhang, 2017). According to Pei (2002), TVEs absorbed about 110 million surplus labor from farms to the rural industrial sector between 1978 and 1996.

Our model sheds light on the transition of the Chinese economy from the light-industry led phase to the investment-driven phase in the late 1990s. Figure 9 shows that as the surplus labor from households is depleted, labor costs for labor-intensive firms increase, causing a decrease in their profitability. TFP growth ceases to be the primary force behind aggregate output growth. In 1998, the first phase of China's macroeconomic development ceased to be an effective model for the Chinese government to promote further GDP growth. The government began to shift its support toward an investment-driven economy by relying heavily on capital deepening for economic growth. While prior literature highlights reforms around 1998 that aimed at reallocating resources from less productive SOEs to more productive POEs, our analysis offers a complementary perspective. The growth decomposition discussed in the introduction reveals that capital deepening was the primary driver of aggregate output growth from 1998 to 2016.

III.3. **The Investment-Driven Economy.** We now provide an analysis of the investment-driven economy, representing the second phase of China's macroeconomic evolution. During the initial light-industry led phase, the government prioritized labor-intensive industries. As the economy transitioned into the investment-driven phase, the government altered its policy to favor heavy industries. This shift is characterized by the following key elements reflecting China's policy changes:

- E1 All L-firms undergo privatization, with managers transitioning to the role of entrepreneurs. This change allows experienced entrepreneurs to assume ownership of L-firms, consequently becoming the sole beneficiaries of their profits.[21]
- E2 The government discontinues its credit support for L-firms. As a result, due to the inherent agency problem, L-firms must rely on self-financing to accumulate physical capital.
- E3 K-firms become subject to collateral constraints.
- E4 After the depletion of all surplus labor from the household sector, the policy changes are modeled as unexpected to agents in the light-industry led economy."[22]

The transition to an investment-driven economy in our model represents a regime shift resulting from several policy reforms in the late 1990s. A significant aspect of this shift was

[21]An alternative assumption allows a fixed (administrative) cost for an entrepreneur to establish an L-firm. In the light-industry led economy, this cost is prohibitively high, discouraging entrepreneurs from establishing an L-firm. Privatization effectively reduces this cost to zero.

[22]In the actual economy, once firms in the labor-intensive sector lost the advantage of cheap labor, the government had an incentive to privatize SOEs, COEs, and TVEs, thereby boosting their productivity level.

the change in ownership, encapsulated by the policy "Grasp the Large and Let Go of the Small." As profitability dwindled in small labor-intensive firms, the Chinese government chose to privatize them, uphold large SOEs in capital-intensive industries, and authorize the entry of sizable private enterprises into certain capital-intensive sectors. In addition, the banking system opened up to non-state banks, in addition to the five state banks. This regime shift is encapsulated by elements (E1)-(E2) above, during which incumbent managers secured a dominant share of privatized firms (Dong, Bowles, and Ho, 2002).

The central government's new industrialization strategy was the second dimension of this regime shift. The government allowed large private and non-state firms to enter the capital-intensive sector, making large firms in the capital-intensive sector, whether they were SOEs or non-SOEs, favored by local governments. The third dimension of this regime shift occurred in financial reforms that not only decentralized the banking system but also allowed the central bank to target M2 growth explicitly to support credit policy preferential to firms in the capital-intensive sector. Capital-intensive firms, often favored by governments, received bank loans with favorable terms, giving them preferential credit access relative to labor-intensive firms (elements (E3) and (E4)). This difference in credit accessibility reflects the government's shifting support of credit from labor-intensive industries during the 1978-1997 period to capital-intensive industries during the 1998-2016 period. The following model is designed to capture all these changes from the light-industry led economy to the investment-driven economy.

III.3.1. *K-Firms.* During 1998-2016, the Chinese government allowed large private and non-state enterprises to enter capital-intensive industries with low entry costs, while rationing credit in favor of certain K-firms. While we do not model credit rationing explicitly, we use collateral constraints as a tractable proxy for the credit rationing outcome. At the beginning of each period, newborn K-firms receive government support in the form of net worth N_t. Although K-firms can borrow from the representative bank at an interest rate (R_t^L) to finance capital investment, they may default on loan payments and receive a fraction of output, $(1-\theta)P_t^k Y_t^k$. The IC constraint for the representative K-firm is given by:

$$P_t^k K_t^k - R_t^L \left(K_t^k - N_t\right) \geq (1-\theta)\, P_t^k K_t^k. \tag{6}$$

The credit constraint (6) is a reduced-form way to capture credit rationing in the investment-driven economy to selective capital-intensive firms. The government's credit policy in support of capital-intensive firms is consistent with China's "helping hand" special deal policy to enhance growth, as argued by Bai, Hsieh, and Song (2020). They find that local governments provide a "helping hand" to favored private firms, which are always the largest employers in the locality. Special deals are available to some firms only; they provide these firms with

land and bank credit at below-market prices, and block entry of other firms that would compete with the favored firms. As argued by Bai, Hsieh, and Song (2016), this combination of "diffuse entrepreneurial spirits" and strong local government support is a unique product of China that serves as an imperfect substitute for an economically well-functioned institution.

The problem faced by the K-firm is:

$$\Pi_t^k \equiv \max_{K_t^k} P_t^k K_t^k - R_t^L \left(K_t^k - N_t\right) + (1-\delta) K_t^k$$

subject to (6). Denote the investment loan to the K-firm as $B_t^k = K_t^k - N_t$. At the end of the period, the K-firm turns in its gross profit, including $(1-\delta)K_t^k$, to the government and ceases to exist.

It is straightforward to show that for the IC constraint to bind, the following inequality must hold:

$$\theta P_t^k < R_t^L < P_t^k.$$

The first inequality is necessary to ensure that the IC constraint for the K-firm binds in equilibrium. The second inequality holds because K-firms always find it profitable to expand production until the collateral constraint binds.

III.3.2. *L-Firms.* Following the privatization of labor-intensive firms in 1997, small and medium-sized businesses faced a severe agency problem without government support. For our model's tractability, we assume that L-firms cannot access intertemporal bank loans to fund their fixed investment due to the agency problem. Therefore, they must self-finance their investments through their own savings.[23] Before production, L-firms must borrow working capital loans from the bank at the short-term loan rate R_t^l.

The representative L-firm is owned by the old entrepreneur, who pays the young entrepreneur a management fee of $\psi P_t^l \left(K_t^l\right)^\alpha (\chi L_t)^{1-\alpha}$. Therefore, the L-firm's problem, previously described by equation (3), is changed to the old entrepreneur's problem as

$$\Pi_t^l \equiv \max_{L_t} P_t^l (1-\psi) \left(K_t^l\right)^\alpha (\chi L_t)^{1-\alpha} - R_t^l w_t L_t + (1-\delta) K_t^l, \tag{7}$$

where K_t^l is determined when the old entrepreneur is young. The gross return to the L-firm's capital is given by $\rho_t^l \equiv \Pi_t^l / K_t^l$.

[23] In Internet Appendix E.1, we incorporate the mechanism suggested by Song, Storesletten, and Zilibotti (2011) into our model of the investment-driven economy. We include both SOEs and POEs within the labor-intensive sector, with the assumption that while SOEs are less productive than POEs, they have the capability to secure loans from banks.

III.3.3. *Entrepreneurs' Problem.* In the labor-intensive sector, the young entrepreneur's problem is to decide on consumption and portfolio allocation between bank deposits and physical capital investment. This problem is changed from the manager's problem described in Section III.1.4. As the rate of return to capital investment, ρ_t^l, is always greater than the deposit interest rate R_t^D in the steady state, the young entrepreneur always prefers investing in capital to depositing in the bank. Thus, the young entrepreneur's consumption-saving problem can be formulated as follows:

$$\max_{s_t^m} \frac{\left(m_t - s_{t+1}^m\right)^{1-\frac{1}{\gamma}}}{1-\frac{1}{\gamma}} + \beta \frac{\left(\rho_{t+1}^l s_{t+1}^m\right)^{1-\frac{1}{\gamma}}}{1-\frac{1}{\gamma}}.$$

III.3.4. *Workers' Problem.* The worker's consumption-saving problem remains unchanged from the light-industry led economy, as described in Section III.1.5. However, there is no longer a surplus of cheap labor $(\bar{L} - L_t)$ in the current model. The problem is simplified as follows:

$$\max_{c_{1t}^w, c_{2t+1}^w} \frac{\left(c_{1t}^w\right)^{1-\frac{1}{\gamma}}}{1-\frac{1}{\gamma}} + \beta \frac{\left(c_{2t+1}^w\right)^{1-\frac{1}{\gamma}}}{1-\frac{1}{\gamma}}$$

subject to

$$c_{1t}^w + s_{t+1}^w = w_t,\ c_{2t+1}^w = s_{t+1}^w R_{t+1}^D.$$

III.3.5. *The Bank's Problem.* The competitive bank's problem in the investment-driven phase of the Chinese economy is similar to that for the light-industry economy as described in Section III.1.6 (see Internet Appendix C.4 for technical details.).

III.3.6. *The Government's Problem.* The government's problem remains unchanged from the light-industry economy, as described in Section III.1.7. In the investment-driven economy, however, L-firms are privately owned by entrepreneurs, rather than by the government. Therefore, the profit generated by L-firms, denoted as Π_t^l, does not enter the government budget constraint. The government's budget constraint is given by

$$B_{t+1}^G + N_{t+1} = \Pi_t^k + \Pi_t^b + RB_t^G. \tag{8}$$

III.4. **Gradualist vs. Laissez-Faire Policies in the Investment-Driven Economy.** The shift in the Chinese macroeconomy in 1998 marked a turning point for the country's economic development. Unlike the pre-1998 period, the investment rate, which is the ratio of investment to GDP, steadily increased throughout the 1998-2016 period (Figure 2). This shift raises important questions about the role of credit policy in facilitating economic growth and structural transformation.

To explore this issue, we simulate a path of transition to the steady state in the investment-driven economy by assuming that both the initial net worth of the government and the initial capital stock endowed to the L-firm are below their steady state values. This approach allows

us to evaluate the effectiveness of gradualist versus laissez-faire policies in the investment-driven phase of the Chinese economy. Specifically, we study the impact of credit policy on aggregate investment and GDP growth. These economic indicators were the primary targets of the government's support through credit policy and other government aids.

All parameter values used for simulations are the same as those from the light-industry led economy, with one exception. In the investment-driven phase, we set χ to 3 to account for the higher labor productivity of the private L-firm, compared to that of the publicly owned L-firm in the light-industry led economy. This adjustment allows us to encapsulate the tradeoff presented by the preferential credit policy towards the heavy sector. While such a policy promotes aggregate investment, it also induces a TFP loss due to the exacerbation of capital misallocation between sectors.[24]

Figure 10 showcases the transitional paths of key macroeconomic variables in both the gradualist and the laissez-faire cases. For the gradualist case, the figure shows that along the transitional paths, both L-firms' capital stock and aggregate output increase (panels A and B). With the government's net worth rising, capital-intensive firms' borrowing capacity increases, and their capital demand grows. The growing demand for capital-intensive goods increases, in turn, the demand for labor-intensive goods and capital investment by young entrepreneurs. The root of aggregate output growth lies in capital deepening, as the ratio of aggregate investment to output consistently rises after an initial dip (panel C).[25] Simultaneously, aggregate TFP experiences a decline after an initial rise (panel D). The value of the capital-intensive sector grows relative to that of the labor-intensive sector (panel E), signifying a reallocation of resources from the labor-intensive to the capital-intensive sector.[26]

Because of the asymmetry in credit access, the capital demand by the capital-intensive sector outpaces that in the labor-intensive sector, resulting in capital reallocation. This reallocation accounts for the inverse movements of the investment-to-output ratio and the aggregate TFP, as well as the reduction in the labor income share along the transitional path (panel F). The rising revenue share of the capital-intensive sector relies on an elasticity

[24]Capital misallocation happens when the marginal revenue product of capital differs between sectors, leading to TFP loss. In our model, capital misallocation occurs when the marginal revenue product of capital of the K-firm is smaller than that of the L-firm. Empirically, Chen and Song (2013) measure capital misallocation by the gap in capital productivity across firms, where capital productivity is gauged by the ratio of operating income before depreciation (OIBDP) to one-year-lag net plant, property and equipment (PPENT).

[25]For more details on the initial dip of the investment rate and the corresponding rise of TFP, see Chang, Chen, Waggoner, and Zha (2016).

[26]This theoretical prediction is in line with empirical evidence from Fernald (2016), which demonstrates that the gross output of favored industries, primarily composed of heavy industries, witnessed much faster growth in both real and nominal terms compared to other industries in China since the late 1990s.

of substitution between the L-firm and K-firm output exceeding one, where the substitution effects of a decline in P_t^k surpass the income effects.

The laissez-faire case for the investment-driven economy differs from the gradualist case in one key aspect: K-firms compete for bank loans (with an exogenously given interest rate) instead of being subject to credit rationing. The transitional path in this laissez-faire case differs sharply from the gradualist case in several dimensions.[27] The growth rates of both K_t^l and aggregate output in the laissez-faire case are initially high, but then decline rapidly to reach their steady-state levels, similar to the neoclassical growth economy. Consequently, in the long run, aggregate output is significantly higher in the gradualist case than in the laissez-faire case. Since capital-intensive firms have a zero profit margin, growth of aggregate output is driven by growth of capital investment in L-firms. The decreasing marginal returns to capital in the labor-intensive sector result in a secular decline in the ratio of aggregate investment to output (panel C). In contrast to the gradualist case, the ratio of revenue in the capital-intensive sector to that in the labor-intensive sector is constant (panel E), explaining the constant labor income share (panel F). The aggregate TFP, however, increases during the transition, indicating an improvement in capital allocation (panel D).[28]

These theoretical findings indicate that the Chinese government's macroeconomic policy of rationing bank credit to selective firms in the capital-intensive sector during the second phase of development boosts output growth through investment in the capital-intensive sector. Credit rationing leads to a reduction in aggregate credit demand and lowers the costs of funds for capital-intensive goods, as represented by R_t^L/P_t^k which is less than one. This outcome creates profit margins for existing capital-intensive producers and provides them with a strong incentive to invest in capital. The effect of a rise in investment on aggregate output dominates the efficiency loss from capital misallocation and TFP slowdown. As a result, aggregate output has experienced sustained growth. On the other hand, with a laissez-faire policy toward capital-intensive firms, profit margins of capital-intensive firms dissipate under perfect competition for bank credit. Aggregate investment is driven by labor-intensive firms' investment decisions, which are subject to decreasing (marginal) returns to capital. Consequently, the growth of aggregate output in the laissez-faire case is not as sustained as in the investment-driven economy (panel B).[29]

[27]For comparison, we set the initial capital stock for the labor-intensive sector, K_t^l, in the laissez-faire case to be identical to that in the gradualist case.

[28]See Internet Appendix D for a formal proof.

[29]Our results also reveal that, compared to the laissez-faire case, the gradualist approach generates welfare gains for workers and entrepreneurs born later along the transition path. This improvement arises because increased capital demand from the capital-intensive sector boosts returns on capital and wage rates in the labor-intensive sector through an increase in P_t^l.

To summarize, our analytical framework suggests that the success of China's gradualist approach to economic reform is largely due to economic considerations revolving around second-best outcomes, which emphasize the problems with laissez-faire policies when financial markets are highly imperfect. We show that the gradualist approach is more efficient than the big-bang approach when the capital market is highly imperfect, complementing prior literature's political-economic explanations. In addition, our structural model sheds light on the underlying forces behind the transformation from the light-industry led economy to the investment-driven economy. The gradualist and laissez-faire results provided by our framework help understand salient facts of China's economic transition, the role of government policies in the light-industry led economy and in the investment-driven economy, and the rationale for China to implement these policy interventions.

IV. Other Policy Reforms and Challenges in the New Normal Economy

The previous section evaluates the benefits of the gradualist approach to changes in ownership structure and credit policy for fostering economic growth. In this section, we examine two other crucial policy reforms that have had long-term impacts on China's macroeconomy. We then discuss the challenges these reforms pose to the Chinese economy and the global economic landscape as China enters into the "new normal" phase of its macroeconomic development.

IV.1. **China's WTO Accession.** China's 2001 accession to the WTO triggered a host of significant domestic reforms, encompassing trade liberalization for domestic firms and increased openness to foreign direct investment (FDI). In this section, however, we focus on the macroeconomic impacts of a specific channel—the attainment of the Permanent Most Favored Nation (MFN) status for exports. As highlighted by Handley and Limo (2017), this status was a key catalyst for China's export boom to the U.S. market. From 2002 until the recent U.S.-China trade war, China's permanent MFN status eliminated the threat of sudden tariff hikes. Prior to 2002, Chinese exporters risked facing a tariff spike, as China's MFN status required annual renewal.[30]

To assess the macroeconomic impacts of China's WTO accession through this channel, we broaden our investment-driven economy model by allowing L-firms to export a portion of their labor-intensive goods abroad, subject to an iceberg tariff. Our model assumes that the primary source of exports is the labor-intensive sector, and imports consist of capital-intensive goods, in line with existing empirical findings (Koopman, Wang, and Wei, 2008;

[30]In 2000, for instance, the average U.S. MFN tariff was 4%; if China had lost its MFN status, it would have faced an average tariff of 35%, with about one fifth of product tariff lines escalating to at least 50% (Handley and Limo, 2017).

Huang, Ju, and Yue, 2015, for example). We assume capital-intensive intermediate goods to be a CES aggregator of domestically produced and imported foreign capital inputs.

The production technology for exported goods is represented as

$$X_t^l = \left(K_t^l\right)^{\alpha} \left(\chi_t L_{xt}\right)^{1-\alpha},$$

where X_t^l denotes exports, L_{xt} represents the labor used in the production of exports, and

$$\chi_t = \chi_0 \left(L_{xt}\right)^{\chi_1} \tag{9}$$

with $\chi_0 > 0$ and $0 < \chi_1 < 1$. Equation (9) reflects the learning-by-exporting technology that aligns with the empirical findings of Lin (2015). Equation (9) implies that employment in the export sector affects the level, not the growth rate, of labor productivity. This is a reduced-form representation that captures how net entry into the export sector following China's entry into WTO impacts the productivity level. As Khandelwal, Schott, and Wei (2013) find, the strong export growth that resulted from China's export quota removal was driven by net entry, rather than incumbents, and that entrants were more productive than firms that exported under quotas. This finding is a crucial factor in the increase of aggregate TFP following a permanent reduction in tariffs on exports.[31]

We use our extended model to show the response of investment, exports, imports, and the current account balance to a permanent unanticipated cut in tariffs during the economic transition. As the learning-by-exporting production brings positive externalities to labor productivity, the share of exports in GDP increases along the transition path (panel A of Figure 11) even without tariff reductions. A reduction in export tariffs leads to a decrease in the tariff rate, an increase in the marginal revenue product of labor for exported goods, and the reallocation of labor from the production of domestic intermediate inputs to the production of exported goods, thereby increasing the share of exported goods in the labor-intensive sector and in GDP.

In our extended model, a permanent reduction of tariffs on exports results in an increase in GDP (panel A of Figure 12) due to two factors: (a) capital deepening (panel B) through the reallocation of capital from the labor-intensive sector to the capital-intensive sector, and (b) an increase in aggregate TFP (panel C) due to the increase in TFP in the labor-intensive sector (panel D) where learning-by-exporting plays a crucial role. This prediction is consistent with China's increasing investment in the heavy sector after it joined the WTO (Erten and Leigh, 2021).

A permanent reduction of tariffs on exports increases the value of imports as a percentage of GDP (panel B). The value of imported goods, denoted as $P_t^F Z_t^F$, as a share of GDP can

[31] For more information on the extended model, see Internet Appendix E.2.

be expressed as

$$\frac{P_t^F Z_t^F}{GDP_t} = \frac{P_t^F Z_t^F}{P_t^k Y_t^k} \times \frac{P_t^k Y_t^k}{GDP_t}. \tag{10}$$

The reduction of export tariffs increases the demand for capital-intensive intermediate goods, which raises the price of domestically produced capital-intensive goods, P_t^k. This increase in the share of domestic capital-intensive goods in GDP (the second term on the right side of equation (10) and panel C of Figure 11) raises the ratio of import values to domestically produced capital goods (the first term on the right side of equation (10)) since the elasticity of substitution between domestically produced capital goods and capital-intensive imports is greater than one. The combination of these effects results in an increase in imports as a share of GDP (panel B). As the increase in exports is greater than the increase in imports, the current account balance as a share of GDP also increases (panel D).

The drastic increasing in China's export following its WTO accession not only affects China's own economy, but also generates profound impacts on the rest of the world, which Autor, Dorn, and Hanson (2016) called "China shock". Studies have already been conducted on the impacts of competition from Chinese imports on local labor markets. Using China's WTO accession as a quasi-experiment, Autor, Dorn, and Hanson (2013) find that rising imports by the U.S. from China after China's WTO accession cause higher unemployment, lower labor force participation, and reduced wages in local labor markets that house import competing manufacturing industries. And, import competition explains one-quarter of the contemporaneous aggregate decline in US manufacturing employment. By contrast, Wang, Wei, Yu, and Zhu (2018) argue that via the supply chain channel through which the U.S. imports intermediate goods from China, the total impact of trading with China is a positive boost to the U.S. local employment and real wages, with employment stimulation outside the manufacturing sector the most important factor. Another impact of China Shock studied by the literature is on innovation and technology of the imported countries. Bloom, Draca, and Reenen (2016) find that for twelve European countries, following China's WTO accession, the absolute volume of innovation increases within the firms most affected by Chinese imports in their output markets. On the labor market, Chinese import competition reallocated employment between firms toward more technologically advanced firms and led to falls in employment and the share of unskilled workers. These within and between effects were about equal in magnitude, and account for 14% of European technology upgrading over 20007.

An inevitable consequence of China Shock is the tension between China and its trade partners, such as the U.S., which triggered the 2018 trade war between these two countries. The three rounds of tariffs that were enacted increased tariff rates by 25% on USD 50 billion worth of commodities and by 10% on USD 200 billion worth of commodities imported from China. As a retaliation, Chinese government responds with an increase in tariff on U.S.

exports from 8.0% in January 2018, to 18.3% in September 2018, and to about 22% in September 2019.

An emerging literature has begun to study the impacts of trade war on China and the U.S. Jiao, Liu, Tian, and Wang (Forthcoming) find that the surges in U.S. tariffs significantly reduced China's exports to the U.S., and caused Chinese firms to switch their exports toward non-U.S. countries as a whole. Waugh (2019), on the other hand, focuses on the impacts of China's retaliatory tariff on U.S. consumption and provides evidence that U.S. counties in the upper quartile of the retaliatory-tariff distribution experienced a 3.8 percentage point decline in consumption growth via a decline in both tradeable and retail employment. In recent years, the tension has been escalated from tariff increase to the more frequent use of non-tariff export and import barriers and FDI restrictions in key sectors. Undoubtly, such frictions in international trade and investment would have profound long-run impacts on China's macroeconomy and the rest of the world, and it will be a fruitable area for future research.

IV.2. **The 2009 Economic Stimulus.** China's gradualist approach to market-oriented reforms incorporates active policy interventions. These interventions have consistently supported China's economic growth during normal periods, while helping avert potential recessions during times of substantial external or domestic shocks, such as the 2008 global financial crisis. During the financial crisis, China, like many other countries, experienced a severe economic downturn, with real GDP tumbling from 13.6% in 2007Q2 to 6.4% in 2009Q1. In response to the precipitous decline in aggregate output, the People's Bank of China implemented an extraordinarily expansionary monetary policy. This policy involved increasing the M2 supply by 4.2 trillion RMB in 2009Q1 alone and by a total of 11.5 trillion RMB between 2009Q1 and 2009Q3. Concurrently, in November 2008, the State Council announced an expansionary fiscal plan known as the "four-trillion RMB investment package." This plan primarily targeted capital-intensive industries, notably infrastructure.

In recent years, an emerging body of literature has been exploring the short-term and long-term effects of the 2009 economic stimulus. Bai, Hsieh, and Song (2016) study both aggregate and firm-level data of LGFVs and find that financial deregulation in 2009 led to a notable increase in LGFVs' borrowing. While this surge in borrowing boosted investment in the short run, it led to resource misallocation in the long run by crowding out bank credit from firms not favored by governments. Huang, Pagano, and Panizza (2020) further examine the crowding out effects of local government debt using firm-level data from the Annual Tax Survey. They find that local government debt between 2006 and 2013 constrained funding for private firms, resulting in a decrease in their investment, while investment by SOEs remained unaffected.

The allocation of bank credit is also influenced by economic stimulus. Based on loan-level data from the 17 largest banks in China, Cong, Gao, Ponticelli, and Yang (2019) find that a stimulus-driven credit expansion reversed the process of credit reallocation toward private firms during the pre-stimulus period. Prior to 2008, credit was supplied more to firms with higher average productivity of capital than to other firms. During the planned stimulus years (2009-2010), there was a reversal in the trend of capital allocation, with an increase in bank credit to firms with lower average productivity of capital. Cun, Quadrini, Sun, and Xia (2020) argue that an expansionary credit policy may be less effective precisely when it is most needed, especially in an economic downturn. Using a model of trade credit supply, they find that the credit boom induced by the expansion of monetary policy in 2009-2010 increased the availability of funds to upstream industries but was not "re-channeled" to other industries within the manufacturing sector due to the under-supply of trade credit.

In a further analysis, Chen, Gao, Higgins, Waggoner, and Zha (2023) explore how a fiscal expansion, brought about by infrastructure investment, affects the dynamic impacts of a monetary stimulus on credit allocation. To decompose the overall effect on credit allocation of monetary stimulus into two components, they develop a two-stage framework consisting of a dynamic macroeconomic model and a dynamic panel model. In the first stage, they use the dynamic macroeconomic model to identify a portion of infrastructure investment driven only by monetary policy and then extract a series of infrastructure investment absent these monetary shocks. In the second stage, they use a dynamic panel model to estimate the impacts of monetary stimulus and its interaction with fiscal policy on bank lending. The results show that fiscal policy through infrastructure investment significantly weakened monetary policy's transmission to credit allocated to private firms in sectors other than infrastructure while reinforcing the monetary effects on loans to SOEs.

The study finds that a fiscal expansion through infrastructure investment provided government guarantees to infrastructure projects, which increased their collateral values and debt capacity. The credit advanced to infrastructure firms raised the cost of funds for firms in other sectors, especially non-SOEs. These findings demonstrate that the fiscal-monetary interaction channel was crucial for understanding the economy-wide impacts of the 2009 monetary stimulus on the allocation of both credit and capital from non-SOEs to SOEs.

What are the tradeoffs associated with such active government interventions? To answer this question, we use our structural model (Section III.3) to simulate the impact of an economic stimulus during the transition period by temporarily increasing θ to capture the 2009 credit stimulus. Figure 13 compares the transition path between our baseline scenario (no credit stimulus) and the stimulus scenario. In the latter, θ increases by 30% and then gradually returns to its initial value.

In the stimulus scenario, both aggregate output and the investment-to-output ratio increase significantly (panels A and B), consistent with Figure 2 and the empirical results in Chen, Higgins, Waggoner, and Zha (2017). Aggregate TFP, however, declines further (panel C) as capital and bank credit are increasingly reallocated to the capital-intensive sector (panels D and E). The decrease in aggregate TFP aligns with the finding of Wei, Xie, and Zhang (2017): since 2009, TFP's contribution to GDP growth has persistently turned negative, while the ratio of long-term loans to GDP has risen. In our simulations, the economic stimulus also triggers a significant rise in the ratio of long-term debt to GDP (panel F), implying increased financial risks.

In summary, both existing literature on China's economic stimulus and our analysis suggest that while this policy was effective in boosting short-term GDP growth, it led to unintended negative consequences. The policy prompted a reversal of credit allocation from more productive POEs to less productive SOEs and upstream firms, and from labor-intensive industries to capital-intensive industries. Despite its short-term impacts, the 2009 economic stimulus has cast a long shadow over both China's macroeconomy and its financial system, which we discuss in the following section.

IV.3. **Financial Risks, New Normal Economy, and Macroprudential Policy.** The 2009 economic stimulus had a profound, long-term impact on China's financial markets and system. In the early 2000s, the ratio of China's total bank loans to GDP oscillated around 100%. But in the post-2008 era, this ratio has risen consistently, surpassing 160% by 2020. Meanwhile, total social financing experienced an even steeper increase, exceeding 280% in 2020 (see Figure 14). The growing gap between total bank loans and total social financing underscores a rapid surge in shadow banking activity over the past decade. Such a swift expansion of loans, originating from both traditional and shadow banking systems, has made China become one of the most heavily indebted emerging market economies, subsequently escalating financial risks. Given the central role of the banking sector in the financial system, the escalating debt-to-GDP ratio threatens the sustainability of economic growth and underscores the need for sound macroprudential policy.

The banking sector in our framework, as well as in much of the existing literature on China's growth (Song, Storesletten, and Zilibotti, 2011; Hsieh and Song, 2015, for example), is oversimplified in several dimensions. First, banks do not accumulate net worth and have no portfolio choices over various sources of liabilities and assets. Second, banks face no regulation on their traditional or shadow banking activities. Third, the credit risk, the liquidity risk, and the systemic risk are not explicitly modeled. In recent years, however, there is a growing body of literature on China's financial risks. This literature exploits the

granular data on the banking sector and develops more realistic models that incorporate banking activities and risks.

In China, shadow banking activities have increased significantly since 2008, especially after the 2009 economic stimulus (Chen, Ren, and Zha, 2018). According to Chen, Ren, and Zha (2018), this rise in shadow banking was an unintended consequence of government policies. They estimate an endogenously switching monetary policy rule that is consistent with China's practices and find that risky loans originated by non-state banks increased in response to a tightening of monetary policy in the post-2008 stimulus period. The increasing shadow loans offset the expected decline of traditional bank loans and hampered the effectiveness of monetary policy on total bank credit. In their model, the banking sector incorporates the loan-to-deposit ratio (LDR) constraint imposed by the Chinese government. Contractionary monetary policy encourages non-state banks to shift their portfolio from traditional bank loans to risky shadow banking activities to circumvent the LDR regulation on traditional loans. Regulatory policy on shadow banking, when not coordinated with monetary policy, would reduce the effectiveness of monetary policy on the banking system as well as the real economy.

While Chen, Ren, and Zha (2018) analyze the asset side of banks' balance sheet, Hachem and Song (2021) investigate banks' liabilities and argue that the tightened liquidity rules implemented in 2008 initially spurred smaller banks to issue more wealth management products (WMPs) to take advantage of regulatory arbitrage, which subsequently pushed larger banks to tighten the interbank market and increase credit through traditional lending. In addition, Chen, He, and Liu (2020) propose that the rise in shadow banking was partly fueled by the demands of Chinese local governments. These governments initially secured financing for the 2009 economic stimulus through traditional bank loans, and then pivoted to nonbank debt financing methods, such as trust loans and WMPs, around 2012 when existing bank debt needed to be rolled over during a period of monetary tightening.

Around 2016, China began its transition from the investment-driven economy to the new normal economy. Our framework presented in Section III.3 unveils two primary driving forces behind this transition. First, while capital deepening facilitates economic growth, it simultaneously reduces the growth of aggregate TFP due to capital misallocation (Figure 10). This finding is consistent with recent empirical studies by Chen and Wen (2017) and Chen, Liu, Xiong, and Zhou (2017), who discovered that China's real estate boom from 2003 to 2013 crowded out productive capital investment in the manufacturing sector. Another study by Chen, Gao, Higgins, Waggoner, and Zha (2023) find that the 2009 credit stimulus intensified capital misallocation between infrastructure firms and those in other sectors of the economy. Second, the rise of long-term loans as a percentage of GDP threatens the financial stability of the Chinese economy as the investment-driven phase ends (Figure 15).

These two outcomes–the intensification of capital misallocation and the growing ratio of long-term loans to GDP—have prompted the Chinese government to steer the investment-driven economy towards the new normal economy, aiming to strike a balance between the quantity and quality of economic growth, and between growth and financial stability. Accordingly, recent macro-finance literature has explored the regulatory policy tradeoff between GDP growth and financial stability.

One aspect of financial stability that concerns the government is corporate default. In a two-sector model, Chang, Liu, Spiegel, and Zhang (2019) evaluate corporate default risks and find that an increase in China's reserve requirement reallocates resources to private firms and raises aggregate productivity. At the same time, however, it increases the bankruptcy rate of SOEs and the social cost of bailing them out. Thus, the optimum reserve requirement policy faces a tradeoff between allocative efficiency and bailout costs for macroeconomic stability. Similarly, quantity-based monetary policy faces a tradeoff between price stability in the domestic economy and costly sterilization in the foreign exchange market when the capital account is restricted (Chang, Liu, and Spiegel, 2015).

In response to the financial risks faced by China, the government has established a preliminary macroprudential framework for the banking sector. The tension between robust GDP growth and financial stability has prompted the government to strengthen its regulations on the banking system and improve coordination between monetary and regulatory policies under the Macro Prudential Assessment program. Macroprudential policy, however, has faced various tradeoffs. For instance, according to Li, Liu, Peng, and Xu (2020), the adoption of Basel III capital regulation in 2013 forced commercial banks to shift their lending toward SOEs in response to expansionary monetary policy, thus reducing banks' risk-taking activity. As such, regulations on banks' capital adequacy face a tradeoff between corporate default risks and aggregate productivity. Moreover, as shown by Chen, Xiao, and Zha (2022), interbank lending via negotiable certificates of deposit facilitates the transmission of monetary policy via interest rates to non-state bank loans, but it also increases financial fragility as an unintended consequence. Hence, regulations on interbank lending face a tradeoff between the effectiveness of monetary policy transmission and the economy's exposure to systemic risks.

When facing various tradeoffs, the Chinese government's interventions in the development of the country's financial markets have sometimes been heavy-handed. For example, China's interventions in the issuance of new equities resulted in a number of suspensions of IPO activities, which negatively impacted firms' innovation activities and fixed investment (Cong and Howell, 2019). As argued by Brunnermeier, Sockin, and Xiong (2017), excessive policy interventions inject noise into financial markets and undermine financial regulations by

reducing information efficiency in asset prices. Another example of a heavy hand is the development of "China Connect" programs, such as the Shanghai-Hong Kong "Stock Connect" program in 2014 and the Shenzhen-Hong Kong "Stock Connect" program in 2016. These programs reduce credit misallocation between private and state-owned enterprises but make connected firms more sensitive to external shocks such as U.S. monetary policy shocks than unconnected firms (Ma, Zhou, and Roger, 2021).

As China transitions into the new normal economy and places a greater emphasis on financial stability, the influence of policy interventions on the evolution of financial markets will be an area of significant future research. In particular, with China becoming more deeply integrated into global financial markets, it is critical to evaluate how China's financial risks—such as the recent default risk from its major real estate developer—contribute to global financial instability, and how financial shocks from other regions of the world can permeate the Chinese economy.

V. Concluding Remarks

We conclude by revisiting the question posed in the introduction: how have China's economic reforms at various stages contributed to its sustained growth over the past several decades? In the light-industry led economy, structural reforms coupled with government policies accelerated the transition of surplus labor from agriculture to light industries, thereby raising both the supply of and the demand for industrial labor. These reforms, which included the household responsibility system that bolstered agricultural productivity, the establishment of TVEs, and the implementation of policies that enabled local governments to actively secure bank credit for TVEs, spurred the growth of aggregate TFP, which was the principal catalyst for GDP growth during this initial phase.

In the investment-driven economy, various reforms such as SOE privatization, trade liberalization, and relaxation of the Hukou registration system lessened frictions in labor mobility. The increase in labor mobility enabled a more efficient reallocation of labor and capital within the labor-intensive sector and continued to augment aggregate TFP and its contribution to GDP growth. During this phase, the government's heavy industrialization strategy led to capital deepening, significantly boosting GDP growth—a strategy that became even more critical in the aftermath of the 2008 global financial crisis. The one-child policy, as well as the rise in idiosyncratic risks due to structural transformation, led to an increase in both household and national saving rates, despite a decrease in labor income share. These factors together resulted in an expanding current account surplus amidst an investment boom.

The Chinese government strategically intervened in specific sectors during the reform process while alleviating distortions in others. This gradualist approach can be attributed to severe financial market frictions that are difficult to eradicate for both political and economic

reasons. These policy interventions, favoring certain industries and firms in the presence of such frictions, have played an instrumental role in bolstering aggregate TFP and deepening capital investment. In the light-industry led economy, governmental support for TVEs fueled the growth of aggregate TFP. In the investment-driven economy, government credit policy favoring industries, such as real estate, infrastructure, and large firms within the capital-intensive sector, encouraged firms to invest in physical capital, such as roads, buildings, and telecommunications equipment.

The tradeoffs between active government interventions and the long-term perspectives of China's macroeconomic development are complex. On the one hand, policies such as the 2009 economic stimulus have successfully achieved the GDP growth target in the short run by correcting market failures. On the other hand, such policies can exacerbate resource misallocation, causing the corporate sector to become overleveraged, and leading to the creation of shadow banking activities and housing bubbles that threaten the financial system's stability. The effectiveness of monetary policy in the real economy and regulatory policy in the banking sector has been undermined by the rapid growth of shadow banking. It is therefore essential to recognize that without addressing existing market frictions and coordinating monetary, fiscal, and regulatory policies, even well-intentioned policy interventions may have unintended consequences on economic growth and financial stability.

There are several promising directions for fruitful future research on the Chinese macroeconomy:

- *China's macroeconomic performance in recent years.* This area has been understudied. China's growth has slowed down since the global financial crisis, and this slowdown has accelerated since 2018. The pace of domestic economic reforms has also slowed, while resource reallocation to SOEs has resurged ("State Marches, Private Retreats"). More ambitious industrial policies have been carried out by the government to direct investment decisions (Lardy, 2019). At the same time, more regulations have been imposed on private firms in various industries (e.g., fintech, real estate, and e-commerce). In recent years, China's trade and technology war with the U.S. and its Covid policy have cast a long shadow over its macroeconomy. With the help of micro and macro data for the last ten years, more research is needed to understand the recent development of China's macroeconomy.
- *Coordination among monetary, regulatory, and fiscal policies.* In the presence of highly imperfect financial frictions, the Chinese government has incentives to design financial policies that encourage an allocation of bank credit in favor of certain sectors to sustain investment and GDP growth. At the same time, however, this has made households, firms, and local governments highly leveraged due to an increasingly sophisticated financial system. As the effectiveness of monetary policy has been

eclipsed by shadow banking in recent years, it is important to study how to coordinate monetary, regulatory, and fiscal policies to sustain economic growth with financial stability.

- *Using rich micro data to help identify the effects of macroeconomic policies.* The increasing availability of administrative and survey data at the levels of households, firms, and transacted loans has made it possible to identify the causal impacts of various government policies. Cross-sectional moments from such micro data help discipline structural models with rich heterogeneity to quantify the relative importance of various channels through which government policies influence China's macroeconomy.[32]

[32] A growing body of literature has made progress over the past decade (see, for example, Midrigan and Xu (2014), Tombe and Zhu (2019), Chen, Wang, Xu, and Zha (2020), and Adamopoulo, Brandt, Leight, and Restuccia (2022)).

TABLE 1. Growth accounting (%) according to Long and Herrera (2016)

Growth	1978-1997	1998-2015	2016	2017
GDP per worker	6.67	8.36	6.26	6.55
Due to capital intensity	2.89	5.71	4.55	4.11
Due to TFP	3.78	2.65	1.71	2.45
Contribution by investment	43.4	68.3	72.7	62.7

Note: This table is taken directly from Chen and Zha (2020), who demonstrate that this method of accounting is robust to other approaches than the one used in Long and Herrera (2016). The growth decompositions are obtained from the production function $Y_t = \text{TFP}_t K_t^{\alpha} N_t^{(1-\alpha)}$, where Y denotes output, TFP stands for total factor productivity, K represents capital, N refers to labor (employed workers), and α denotes the share of capital income in total income. The decomposition of growth per worker is given by $\Delta \log \frac{Y_t}{N_t} = \Delta \log \text{TFP}_t + \alpha \Delta \log \frac{K_t}{N_t}$, where the second term on the right-hand side of the equation reflects the contribution from capital intensity (capital per worker) or investment.

TABLE 2. Parameter values for the gradualist case in the integrated framework

Parameter	Definition	Value
α	Capital income share in the labor-intensive sector	0.40
η	Aggregate capital income share (derived)	0.6615
β	Subjective discount factor	0.96^{30}
ξ	Government's net worth accumulation	0.56
θ	Leverage ratio for the capital-intensive sector	0.40
δ	Capital depreciation rate	1.0
χ	Relative labor-augmented TFP level in the labor-intensive sector	2.0
σ	Elasticity of substitution between the heavy and labor-intensive sectors	2.0
R	Interest rate for investment loans to the capital-intensive sector	1.04
φ	Share of heavy-sector output in total (final) output	0.7
ψ	Share of labor-intensive sector output as management fee	0.30
$\underline{w}$	Reservation wage	0.25
τ	Revenue tax rate on the capital-intenive firms	0.25
γ	Intertemporal elasticity of substitution	1.0

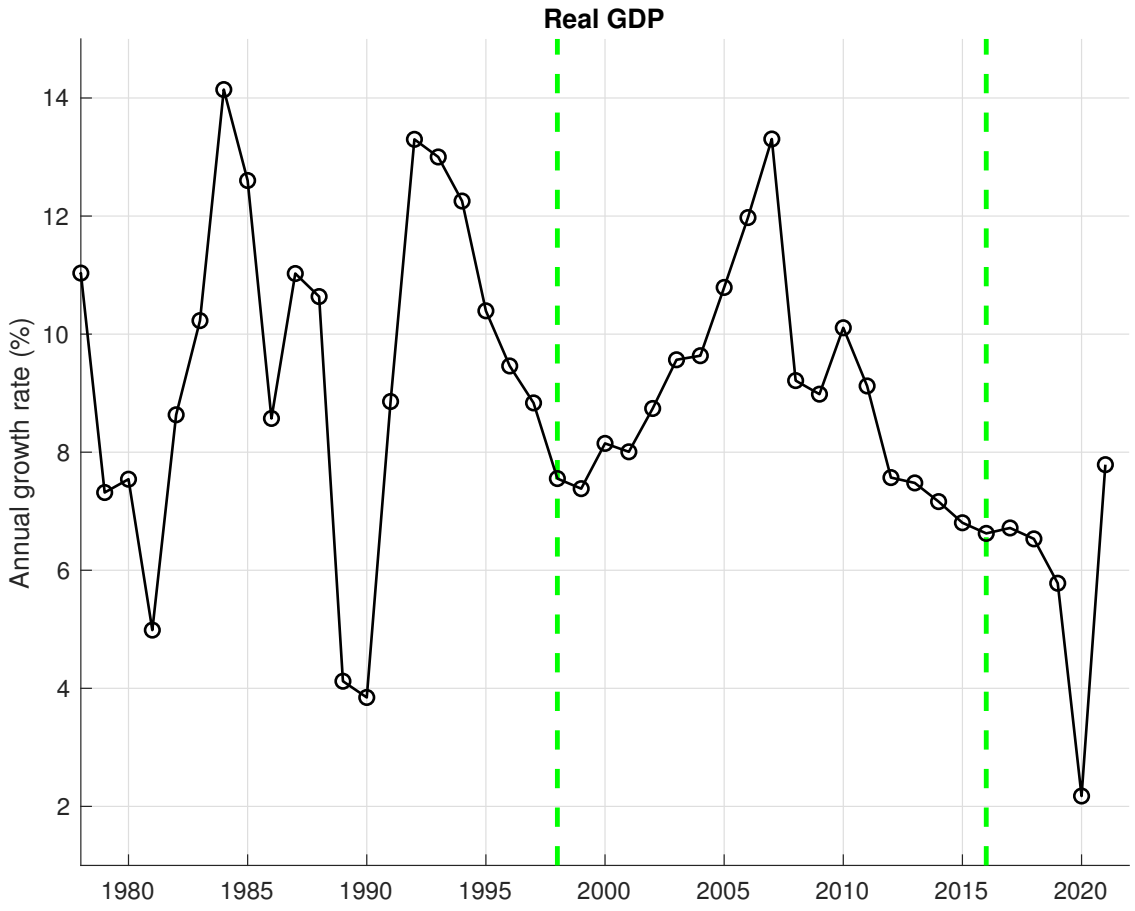

FIGURE 1. GDP growth (annual data). The first vertical green line marks the beginning of the investment driven economy and the second marks the beginning of the new normal economy. Data source: Internet Appendix A.

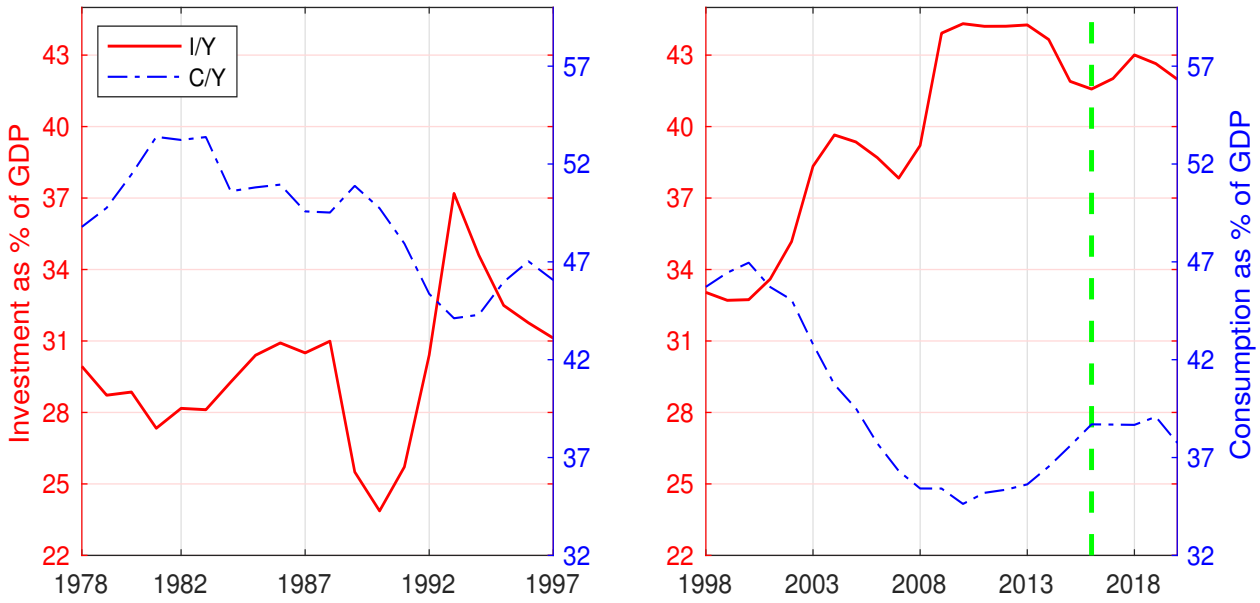

FIGURE 2. Ratios of investment and consumption to GDP. The top panel reports the ratios in the light-industry led economy; the bottom panel reports the ratios in the investment-driven and new normal economies. Investment is measured by gross fixed capital formation (fixed investment) and consumption by households' consumption. The vertical green line marks the beginning of the new normal economy. Data source: Internet Appendix A.

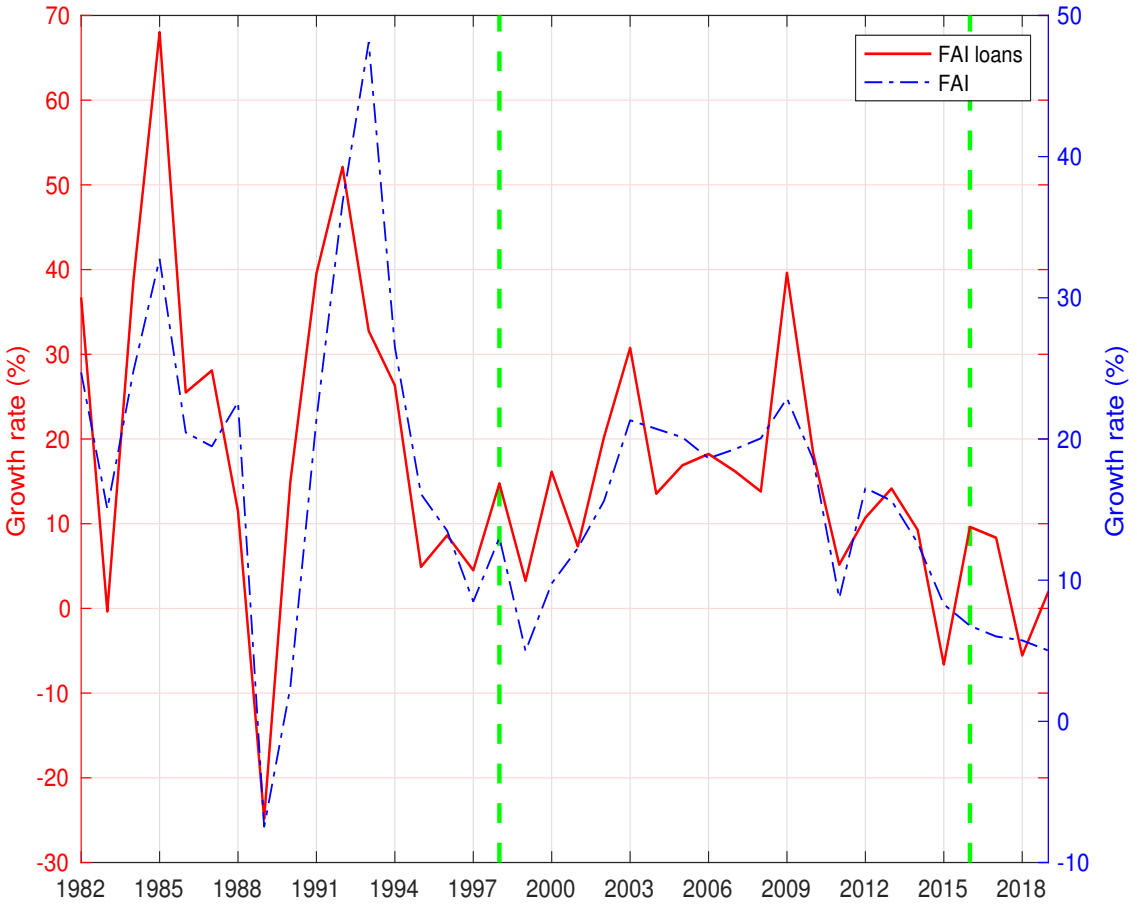

FIGURE 3. Annual growth rates of FAI and loans used to finance FAI. The first vertical green line marks the beginning of the investment driven economy and the second marks the beginning of the new normal economy. The correlation between FAI and its loans is 0.78 with the p-value of 0.00% from 1982 to 2017 and 0.73 with the p-value of 0.02% from 1998 to 2017. Data source: Internet Appendix A.

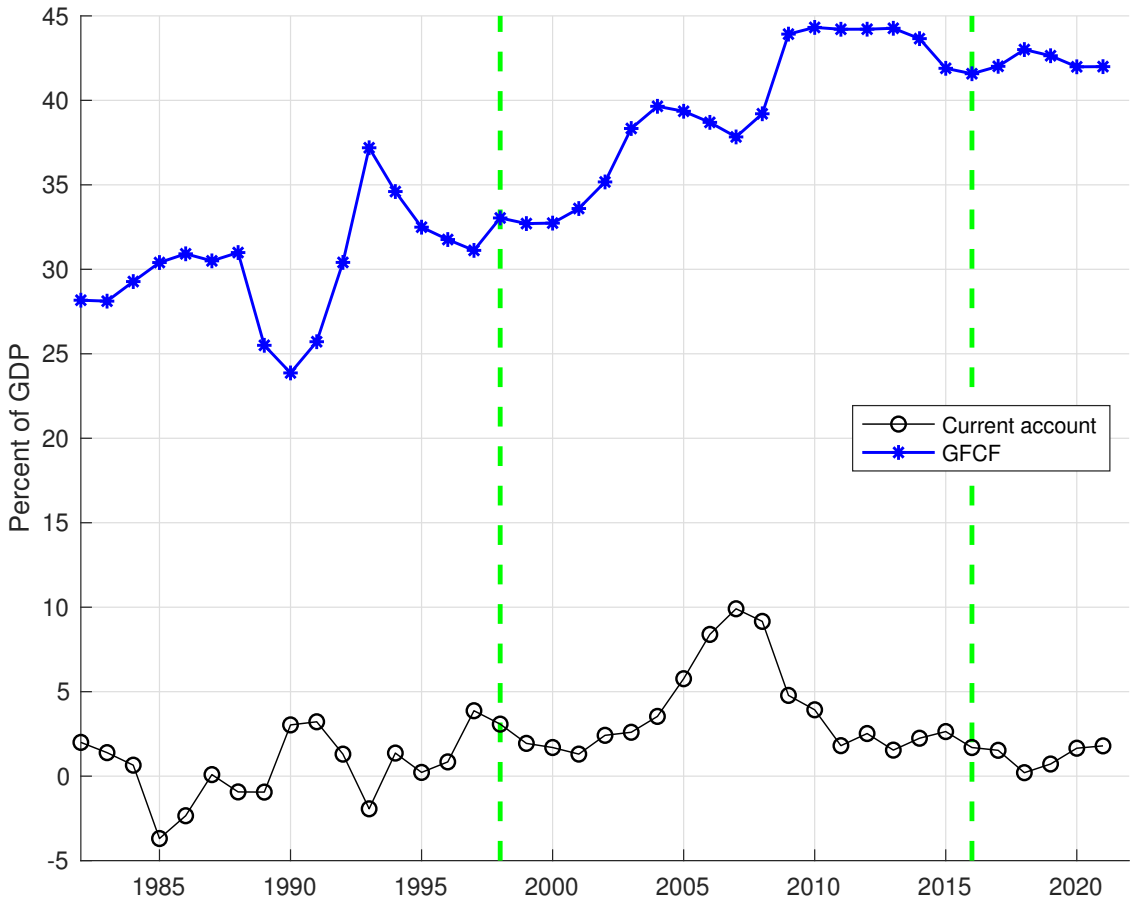

FIGURE 4. Current account balance and investment as percent of GDP in China. The acronym "GFCF" stands for gross fixed capital formation. The legend "Current account" stands for current account balance. The first vertical green line marks the beginning of the investment driven economy and the second marks the beginning of the new normal economy. Data source: Internet Appendix A.

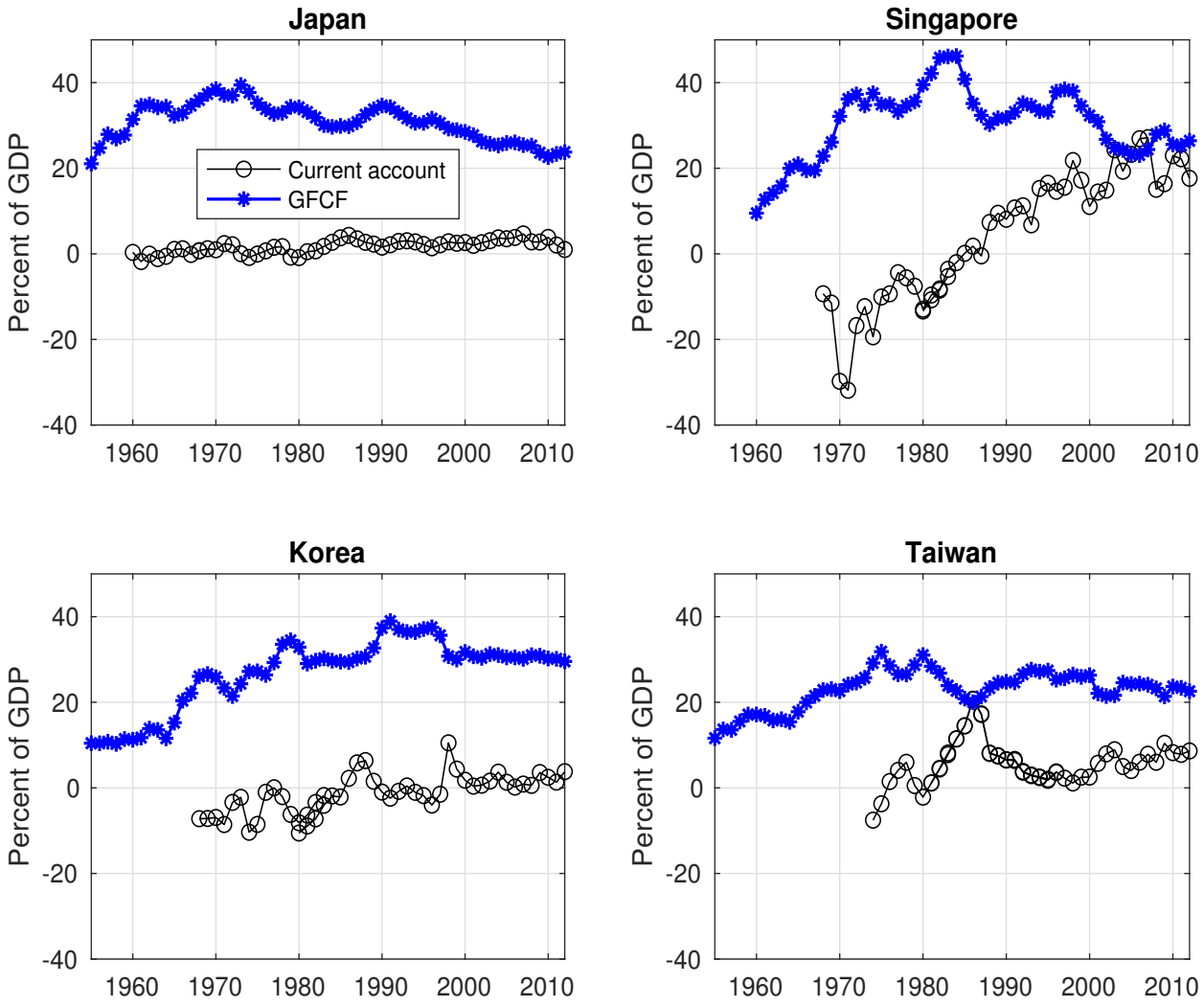

FIGURE 5. Current account balance and investment as percent of GDP in Japan, Singapore, Korea, and Taiwan. The acronym "GFCF" stands for gross fixed capital formation. The legend "Current account" stands for current account balance. Data source: Internet Appendix A.

FIGURE 6. Labor income share as percent of GDP. Data source: Internet Appendix A.

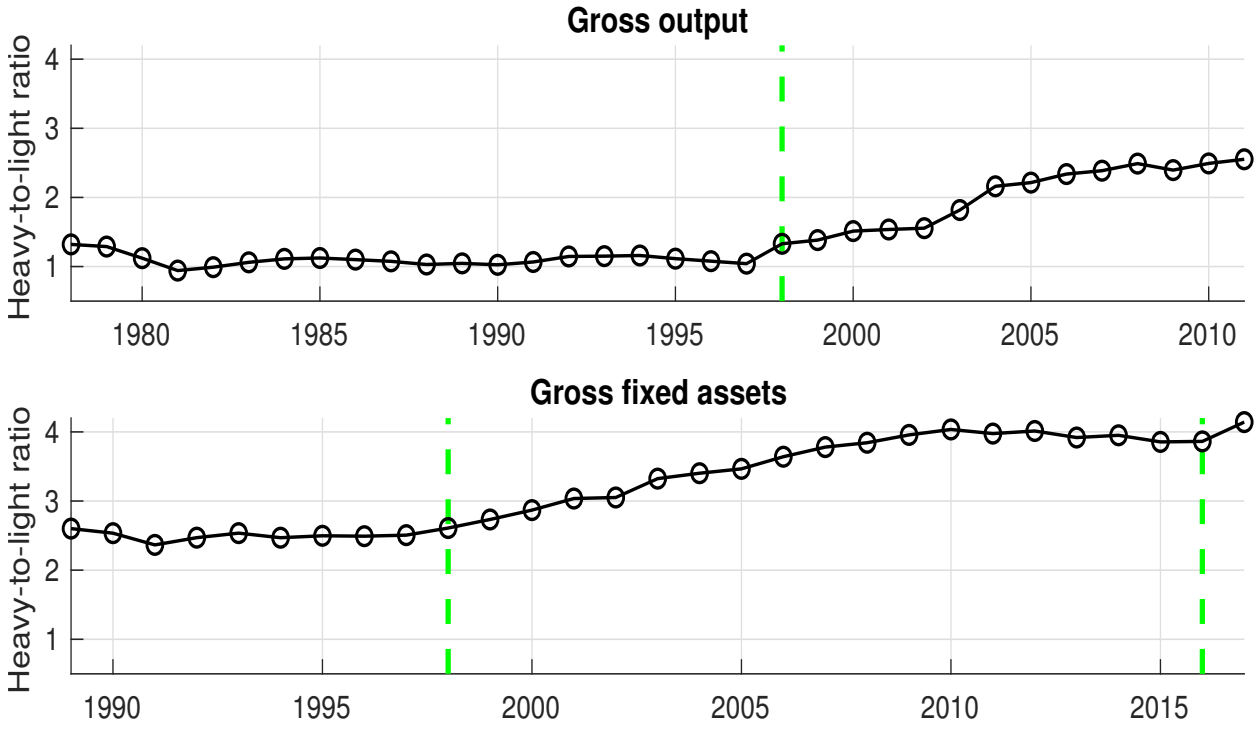

FIGURE 7. Top panel: the ratio of gross output in heavy (capital-intensive) industries to that in light (labor-intensive) industries. The vertical green line marks the beginning of the investment driven economy. Bottom panel: the ratio of gross fixed assets in heavy industries to those in light industries. The first vertical green line marks the beginning of the investment driven economy and the second marks the beginning of the new normal economy. Data source: Internet Appendix A.

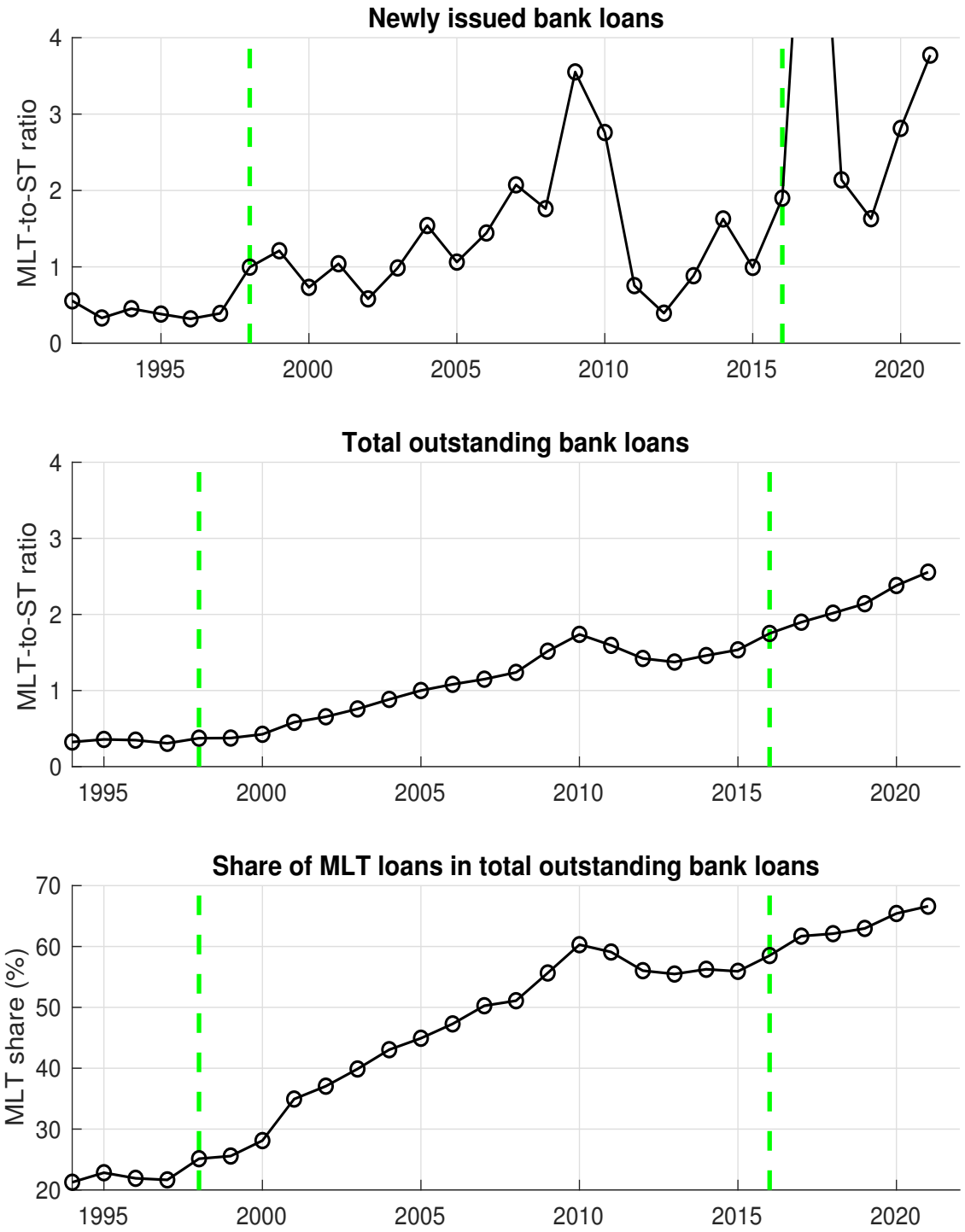

FIGURE 8. Top panel: the ratio of newly originated medium and long term (MLT) bank loans to short term (ST) bank loans to non-financial enterprises. The ratio in 2017, not displayed in the graph, is an outlier with the value over 8. The large outlier is recorded in the China Statistical Yearbook (http://www.stats.gov.cn/tjsj/ndsj/2019/html/E0315.jpg) and also reported by CEIC. Middle panel: the ratio of total outstanding MLT bank loans to ST bank loans. Bottom panel: the share of MLT loans outstanding in total outstanding bank loans. The first vertical green line marks the beginning of the investment driven economy and the second marks the beginning of the new normal economy. Data source: Internet Appendix A.

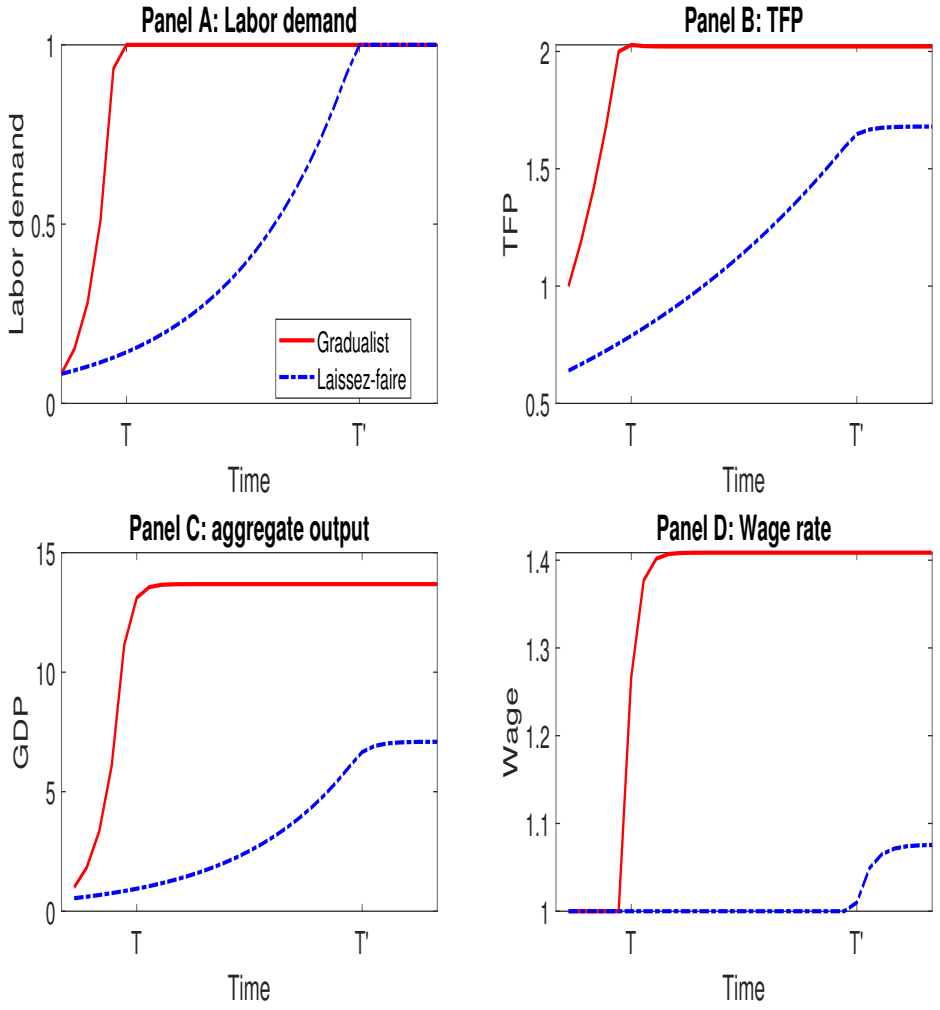

FIGURE 9. The macroeconomic dynamics in the light-industry led economy. Time T for the gradualist case, and T' for the laissez-faire case, denote the end of transition where all labor is employed by L-firms. The scale on the vertical axes for TFP, GDP, and wage in the gradualist case is normalized to unity at the beginning of the time period to allow for comparison over time. In the laissez-faire case, we adjust the TFP by subtracting the initial TFP of the gradualist case. Similarly, GDP and wage are scaled by dividing them by their respective values in the gradualist case at the beginning of the time period.

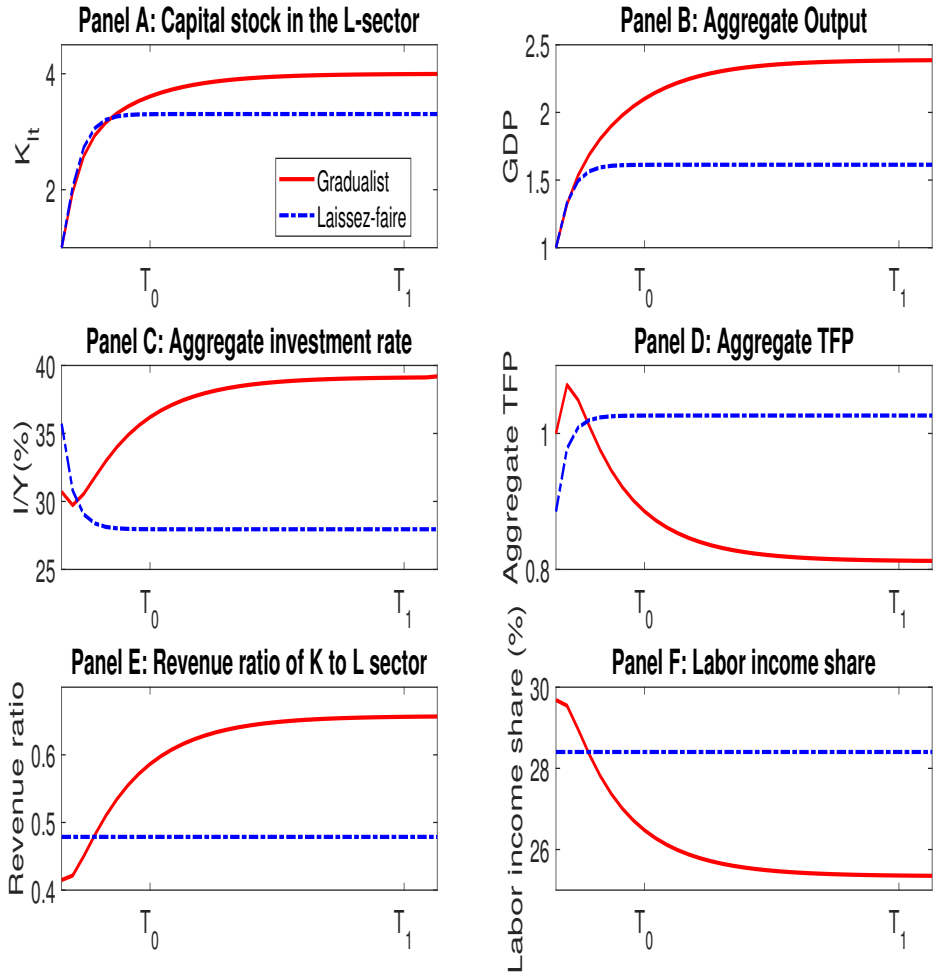

FIGURE 10. The macroeconomic dynamics in the investment-driven economy. Time T_0 denotes the end of transitional stage for the laissez-faire case, and T_1 for the gradualist case, after which the economy enters into the steady state. The scale on the vertical axes for aggregate TFP, GDP, and K_t^l in the gradualist case is normalized to unity at the beginning of the time period to allow for comparison over time. In the laissez-faire case, we adjust the TFP by subtracting the initial TFP of the gradualist case. Similarly, GDP and K_t^l are scaled by dividing them by their respective values in the gradualist case at the beginning of the time period.

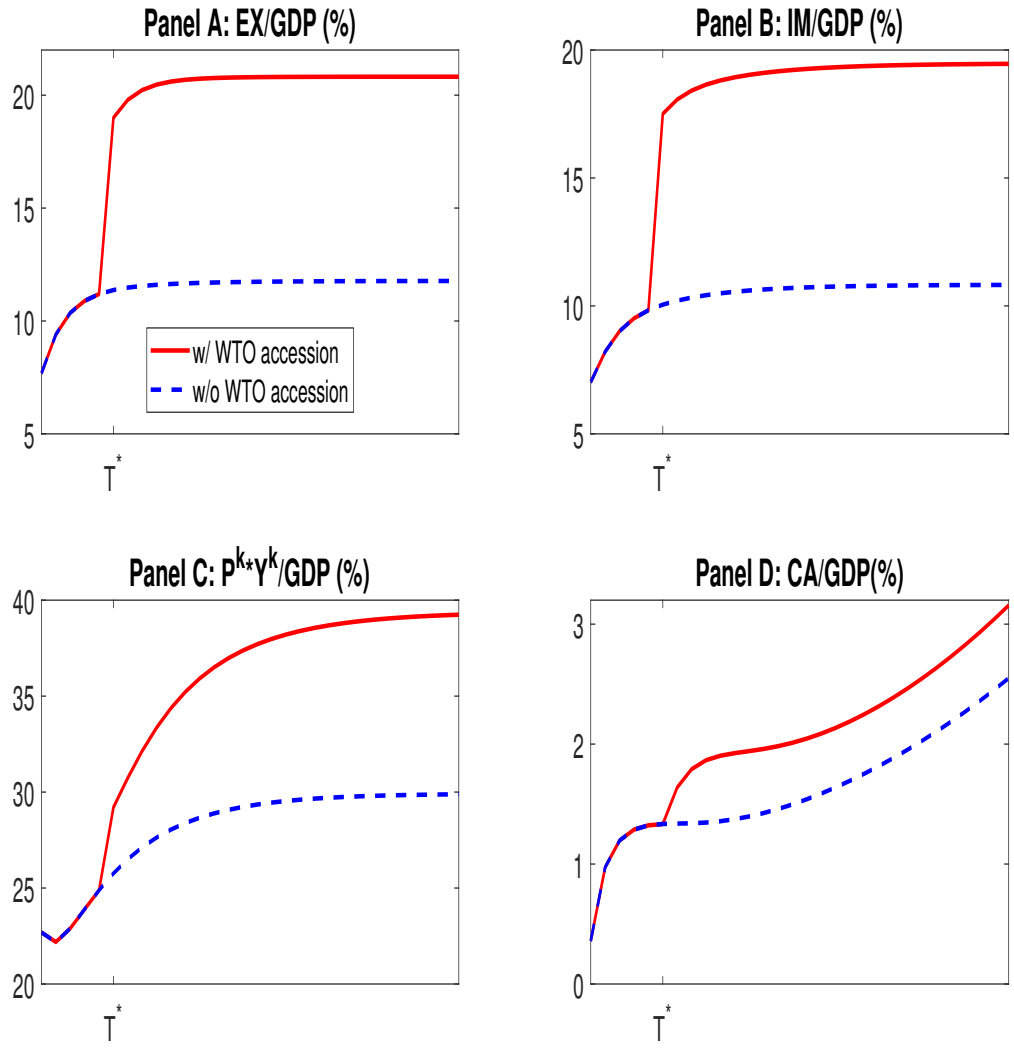

FIGURE 11. Impact of a permanent cut of tariffs on export goods in the investment-driven economy. The time at which an unexpected permanent cut in tariffs occurs is denoted by T^*.

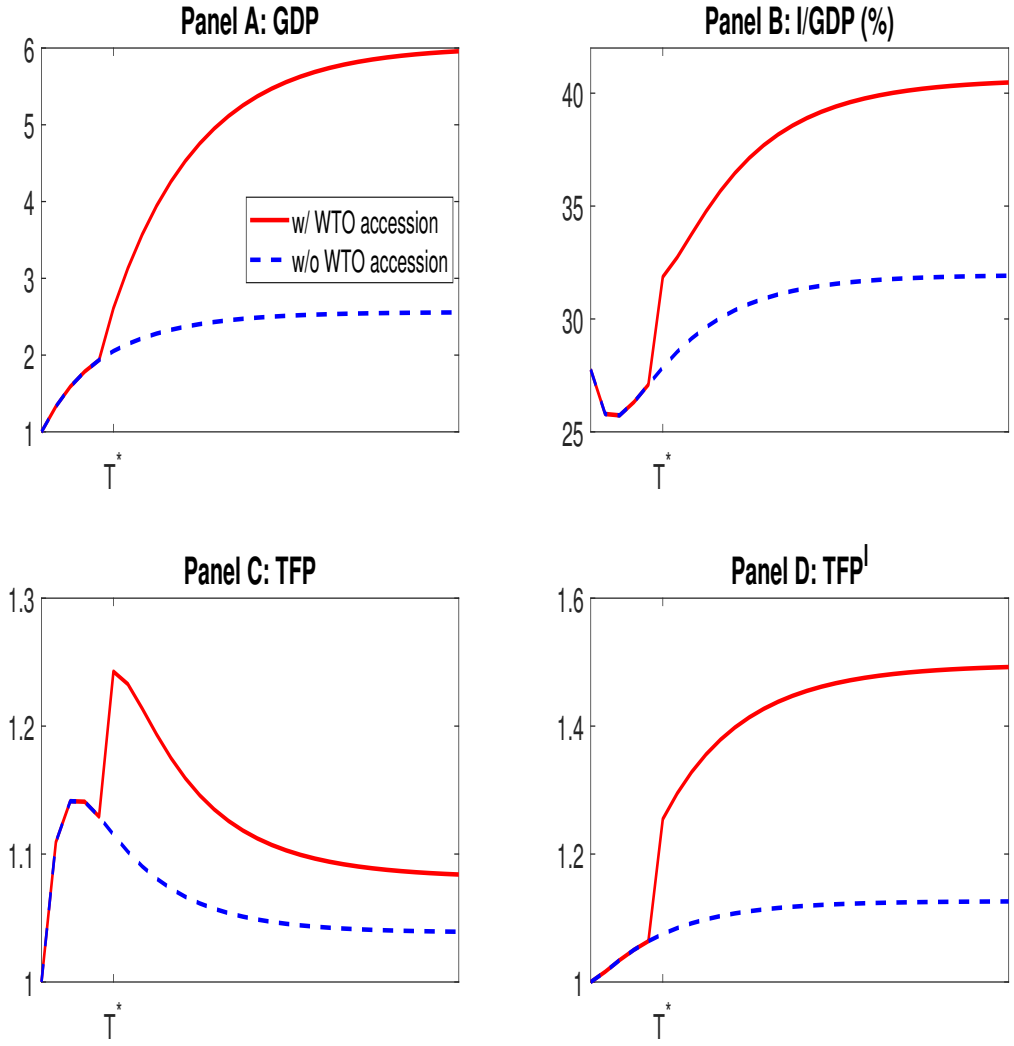

FIGURE 12. Impact of a permanent cut of tariff on export goods in the investment-driven economy.The time at which an unexpected permanent cut in tariffs occurs is denoted by T^*. The scale on the vertical axes for GDP, TFP, and TFP^l is normalized to unity at the onset of the time period for comparison.

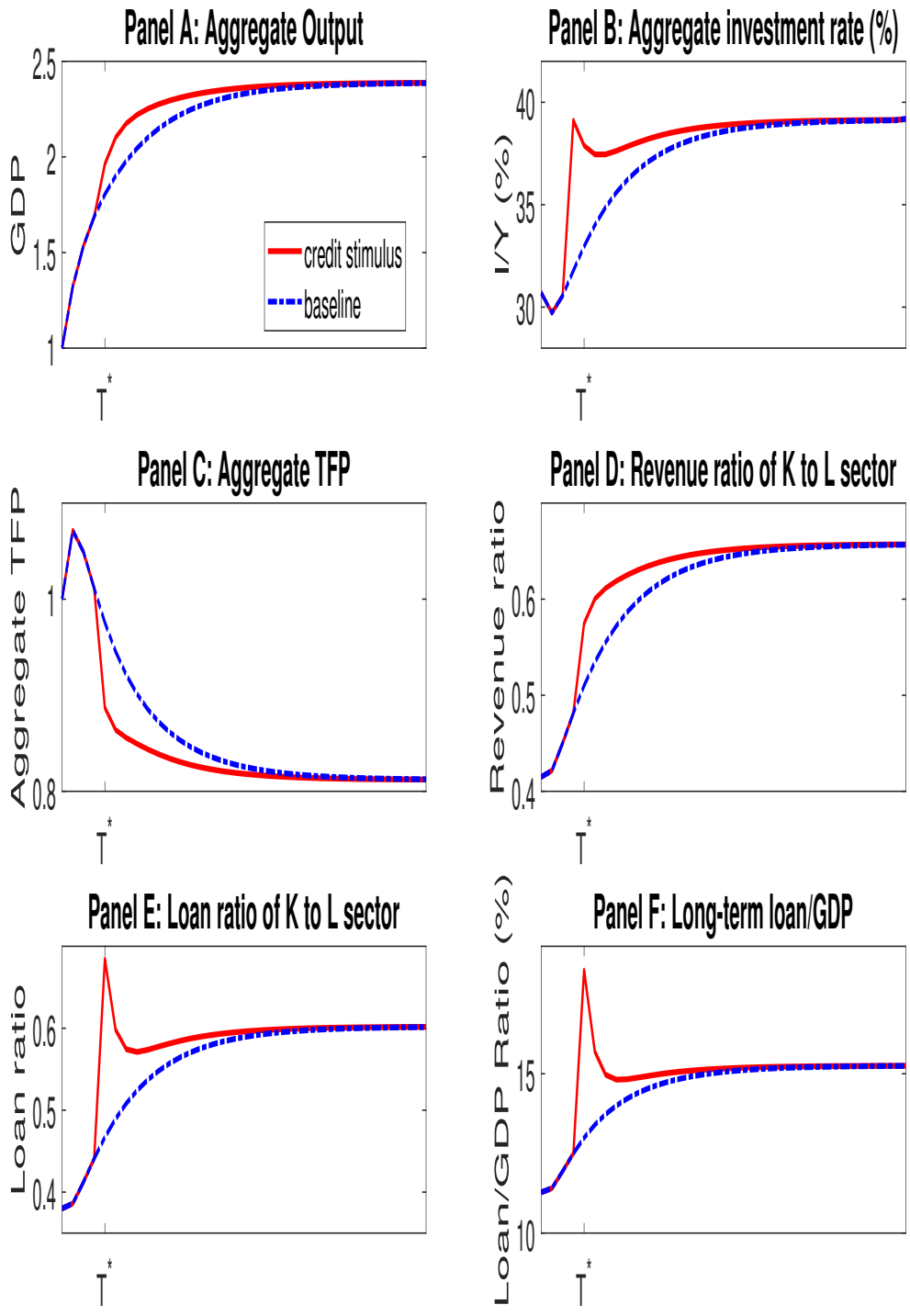

FIGURE 13. Impact of an expansionary shock to the credit stimulus on the investment-driven economy. The time at which a transitory shock to the credit stimulus occurs is denoted by T^*. The scale on the vertical axes for GDP and aggregate TFP is normalized to unity at the onset of the time period for comparison.

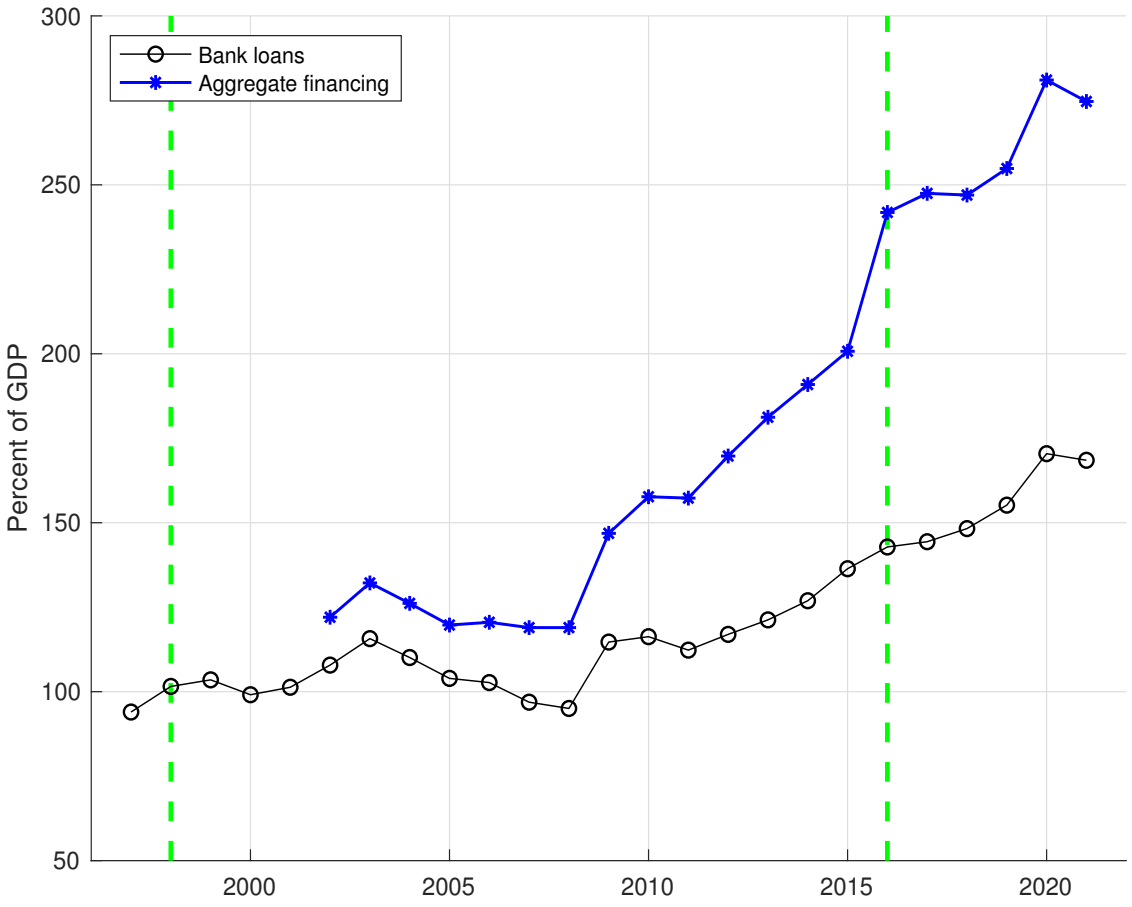

FIGURE 14. Ratios of total social financing and total bank lending to GDP. The first vertical green line marks the beginning of the investment driven economy and the second marks the beginning of the new normal economy. Data source: Internet Appendix A.

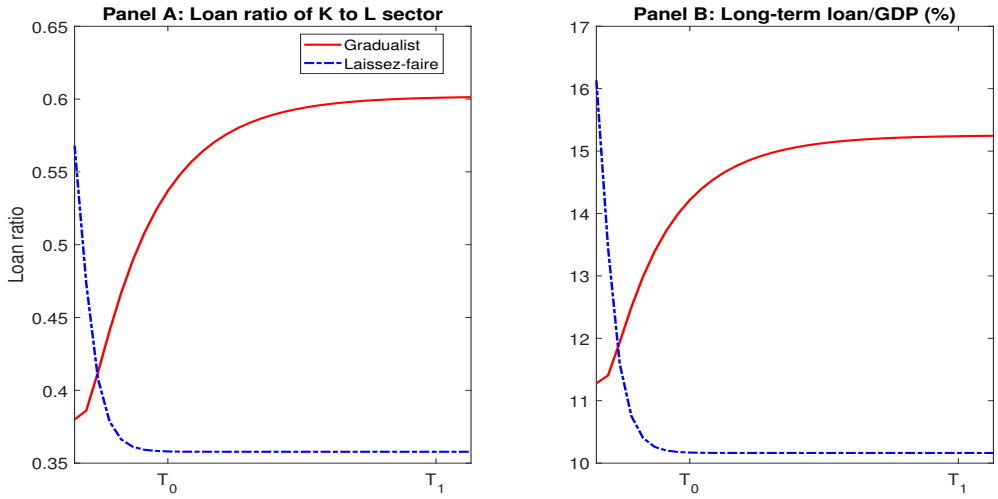

FIGURE 15. Trends of long-term loans in the investment-driven economy. Time T_0 marks the end of the transitional path for the laissez-faire case, and T_1 for the gradualist case, after which the economy enters the steady state.

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