Misallocation, Decentralization, and Growth in China: Empirical Evidence and Theoretical Framework

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Abstract

In this paper I study how a developing country like China with a decentralized political economy structure can overcome poor institutions and policies to address resource misallocation and achieve growth. I present empirical evidence to support the view that China’s decentralized system characterized by conflicting objectives of local and national government serve as a correction mechanism to address resource misallocation induced by national policies. I focus on a recent policy shock known as the supply-side structural reform that supports the state-owned industrial sector at the expense of the private sector. I find evidence from local government documents and firm-level data to show that local governments proactively respond to such national policies that have negative spillover effects on local industries and private businesses by issuing preferential policies to favored private firms. I also develop a simple theoretical model to illustrate the effect of national policy distortions and local policy support on aggregate productivity as well as the trade-off faced by local governments between economic growth and political loyalty.

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1 Introduction

The growth of China is arguably the most consequential macroeconomic event over the last four decades. Economists have tried to explain the spectacular economic development and productivity growth of China. The growth literature suggests that an important source of growth is the improvement of misallocation of resources. In particular, the state-led effort to reallocate productive resources away from the inefficient state-owned enterprises to the more efficient private sector is crucial to unleashing productivity growth since the 1990s (Hsieh and Klenow, 2009; Song, Storesletten, and Zilibotti, 2011; Hsieh and Song, 2015). The political economy literature emphasizes the incentives of local government officials to promote growth of the local economy in a decentralized political system (Blanchard and Shleifer, 2001; Li and Zhou, 2005; Bai, Hsieh, and Song, 2020).

In this paper I explore the interplay between misallocation and decentralization in terms of their contribution to growth of the Chinese economy to bridge the gap between the two strands of literature on misallocation and political economy. I argue that decentralization is conducive to growth in an economy characterized by worsening misallocation. Specifically, local governments serves to mitigate of the impact of policy shocks that have an adverse effect on allocative efficiency, as local officials have strong incentives to provide policy support for the productive private sector.

It is important to understand that improvement of misallocation is a less stable source of growth that depends on national policy objectives whereas decentralization is a more stable source of growth that stems from a built-in institutional feature. Undoubtedly, productivity growth is maximized when both sources of growth are present. However, when national strategy abandons the policy regime that addresses misallocation, the economy loses an important driver of productivity growth. My observation thus becomes important because I show that decentralization partially fills this gap through local policy support that counteracts the change in allocative efficiency.

I start by reviewing the literature on misallocation, political economy structure,
and aggregate growth in China in section 2. Resource misallocation hampers productivity growth in developing countries, and such misallocation can often be attributed to government policies that distort factor prices faced by different producers. This is exactly the case for China, where state-owned enterprises tend to have easier access to credit than private firms. The Chinese growth story can be well explained by the improvement of misallocation through two plausible channels. The first channel is the rise of private sector through reallocation of capital and labor resources from the inefficient state sector. The second channel is the rise of informal institutions, specifically the preferential access of politically connected private firms to factors of production. One can therefore question such growth strategy because China still lacks formal institutions and rule of law that are essential to stable economic growth. Nevertheless, the unique political economy structure of China could dampen such a pessimistic view. In a decentralized economy like China, local officials are given full autonomy to manage the local economy and are evaluated for promotion based on their local economic growth. The decentralized Chinese system thus allowed local governments to actively contribute to the growth of private firms. Local governments would even act against national governments because their objectives are not always aligned. When national government implements policy that adversely affects the private sector, local government may have a strong incentive to support private firms in their locality to maintain stable economic growth. Therefore, the ability of local governments in a decentralized economy to respond to misallocation resulted from unfavorable national policy is the new source of growth that I aim to explore in this paper.

I then present empirical evidence in section 3 to support the hypothesis that China’s decentralized economic system and conflicting objectives of local and national government serve as a correction mechanism to address resource misallocation induced by national policies. Specifically, I study a key shift of national policy regime in 2015 known as the supply-side structural reform. The national government implemented this reform aimed at reducing overcapacity and inefficiency in the predominantly state-owned industrial sector. Industry-level data shows that the consequence of the
supply-side reform is price distortion and worsening resource misallocation between state-owned and private firms.

To show that local governments use preferential policy to respond to the spillover effects of supply-side reform on private sector, I compare how preferential policies are issued before and after 2015. Data collected from local government documents show that local governments respond to the spillover effects of national policies by selectively supporting private firms in their key sector (i.e., sector that have the largest share of contribution to local GDP). Before the policy shock, all cities regardless of sectoral composition tended to provide more policy support to private firms in the service sector, presumably due to the national strategy of developing the service sector. After the policy shock, cities became significantly more likely to issue preferential policy to private firms in their key sector. Data of all listed firms in China also demonstrates that private listed firms saw a larger increase in subsidies after 2015 compared to state-owned listed firms because local governments have the incentives to support private firms adversely affected by the supply-side reform. Admittedly, my empirical analysis is constrained by the availability of detailed and accurate government- and firm-level data in China. Yet, the results still present a compelling case of the powerful role of Chinese local governments in addressing misallocation in a decentralized economy.

I then provide a simple theoretical framework to explain the incentive of policy support of local governments based on my empirical finding. In section 4, I use a standard model of monopolistic competition to illustrate the effect of national policy shocks and local policy support on aggregate productivity as well as the trade-off faced by local governments between economic growth and political loyalty. There are two types of firms in the model, i.e., state-owned enterprises and private firms. Private firms face policy distortions but may receive preferential support from local governments. I follow the general methodology of Melitz (2003) to obtain a closed-form expression of aggregate productivity in equilibrium. The aggregate productivity level of the economy can be considered as a geometric average of the aggregate productivity levels of the state-owned and private sector weighted by their respective
share of total firm mass. I then formulate the problem of local governments which chooses the amount of policy support to private firms that counteracts national policy distortions to maximize its utility. The utility function of local government is additively separable in its utility from local aggregate productivity and its utility from political loyalty. It is increasing in the aggregate productivity of local economy (impacted by policy support) and decreasing in the amount of policy support due to political incentive. Moreover, the effect of policy support on aggregate productivity is ex ante ambiguous, though policy support negatively affects its utility derived from political loyalty. A calibrated version of the model documents a positive effect of policy support on aggregate productivity, which outweighs the negative political consequences.

2 Literature Review

In developing countries, a main obstacle to productivity growth is resource misallocation. Misallocation explains a significant part of the underlying differences in total factor productivity (TFP) between developing and developed countries. Hall and Jones (1999) show that differences in capital deepening and education attainment can only account for the large variation in output per worker across countries to a limited extent. They find huge variations in TFP across countries and argue that productivity differences are driven by varying institutions and government policies, known as social infrastructures.

Restuccia and Rogerson (2008) also find that government policies that distort prices faced by different producers affect the allocation of labor and capital resources across the economy and have substantial effect on aggregate productivity. The basic idea is that if two firms face different interest rate and equate the marginal product of capital to interest rate, then marginal product of capital of firms with lower interest rate would be lower, leading to a misallocation of capital. Therefore, aggregate productivity would increase if capital was reallocated from the firm with a low marginal product to the firm with a high marginal product. They estimate that policies that lead to heterogeneity in prices faced by producers contribute to a decrease in TFP by
close to 50 percent. Their empirical findings add to the consensus that institutions
and policies are key factors in accounting for cross-country differences in productivity.

Hsieh and Klenow (2009) demonstrate the important contribution of resource mis-
allocation to TFP growth in China and India. They provide quantitative evidence
of the impact of misallocation on aggregate TFP by using plant-level data to mea-
sure the dispersion of marginal products of labor and capital in China, India, and
the US. They specifically perform a counterfactual exercise to measure how much
manufacturing TFP would increase in China and India if capital and labor were real-
located to equalize marginal products of capital and labor across firms to the extent
observed in the US. The result is significant: if both countries hypothetically move
to “US efficiency” then aggregate TFP would increase by 30-50 percent in China and
by 40-60 percent in India. The impact of resource misallocation on TFP growth is
also present in developed countries. Baqee and Farhi (2020) introduced a measure
of aggregate TFP growth that can be decomposed into changes in technical efficiency
and allocative efficiency. They apply their decomposition to US data and find that
allocative efficiency plays a significantly more important role than other factors in
explaining TFP growth. Even in more efficient economies like the US, eliminating
resource misallocation resulting from the large and dispersed markups as observed in
the data would raise aggregate TFP by about 15 percent.

Resource misallocation is clearly hampering productivity growth in developing
countries. However, policies and institutions that distort factor prices and lead to
resource misallocation can be different across different countries. Banerjee and Duflo
(2005) discuss the role of financial market imperfection in misallocation of credit
across firms. De Vries (2014) argue that labor and credit market regulations in Brazil’s
retail sector increase the cost of labor and lead to difficulty in access to credit for
successful retailers and allowed inefficient retailers to survive the competition despite
lower productivity. Song, Storesletten, and Zilibotti (2011) shows that in China state-
owned enterprises have easier access to cheap credit supplied by state-owned banks
despite lower productivity, whereas private firms typically finance investment through
internal savings though they have higher productivity.
The natural question to ask at this point is how developing countries can address resource misallocation by switching to policies and institutions that promote efficiency. Nevertheless, institutional conditions and political economy structure has often made this effort challenging, if not impossible. This discussion is especially relevant for China, where government policies are crucial to allocative efficiency and growth. The consensus view is that economic growth requires the rule of law and institutions that protects property rights and enforces contracts as well as a strong financial system that supports firm growth. The astonishing growth of the Chinese economy seems to defy this logic because China’s legal institution and financial system has remained significantly less developed than most developed countries (Robinson and Acemoglu, 2012; Allen, Qian, and Qian, 2005). Clearly, China’s growth is not the result of improved legal or financial institutions. We need to look elsewhere to explain China’s growth story in the past few decades.

A key development in the Chinese economy is the rise of the private sector since the 1990s. Hsieh and Song (2015) document the growth of China’s private sector and the reallocation of resources away from the inefficient state sector. They argue that the state-led campaign of shutting down or privatizing loss-making state-owned enterprises is an important contributor to China’s growth during the 1990s and 2000s. They find that the growth of private firms explains 70-80 percent of growth of the Chinese industrial sector between 1998 and 2012. Moreover, the corporatization, or quasi-privatization, of surviving state-owned enterprises also led to a convergence of productivity to private firms.

Another perhaps surprising explanation of China’s growth in the past few decades focus on the rise of informal institutions. Bai, Hsieh, and Song (2020) argue that the preferential access of politically connected private firms to resources allow these private firms to circumvent formal rules and grow successfully. Local governments have strong incentives to provide “special deals” to favored private firms. First, local officials who display support for private businesses are recognized and promoted. Second, local governments compete to attract private business investment to stimulate economic growth. Third, local political leaders extract rents from supported busi-
nesses in terms of tax revenues and even personal benefits. They present empirical and anecdotal evidence of the key role of preferential policy in the Chinese economy but left the task of establishing the causal relationship between the rise of preferential policy and China’s growth miracle to future research.

Both the pivot from state to private sector and the rise of informal institutions are plausible explanations of the Chinese growth story, with a special focus on the roles of national and local governments. These policies had the effect of reallocating capital and labor resources to the more efficient private firms and thus improving aggregate productivity. In short, productivity growth in China is highly policy dependent. This observation seems to imply that if national strategy moves away from the support for such growth-enhancing policies, the lack of formal institutions and rule of law presents a grim picture for economic growth in China.

Yet, such pessimism is not necessarily well justified. I argue that preferential policies, in the form of regulatory exemptions, tax reductions and subsidies, allow the local governments to reallocate resources to favored private firms and support the growth of private firms when national government either abandons growth-enhancing policies or implement policies that have negative spillover effects to local industries. Specifically, local governments can use preferential policy to correct the price distortion resulted from national policy and improve allocative efficiency. These policies are implemented not to support the private sector and address misallocation per se, but rather because of the self-interest of local politicians whose objectives are to maximize the probability of promotion.

It is worth emphasizing that such preferential policies are made possible by two unique features of the Chinese economy. The first feature is political centralization and economic decentralization. In a seminal literature survey, Xu (2011) characterizes the Chinese system as a “regionally decentralized authoritarian (RDA) regime”, an institutional arrangement where national leaders appoint and promote local officials who are given almost full autonomy to run their local economy.1 This system is intentionally designed to allow local governments to compete against quantifiable growth

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1See Brandt, Ma, and Rawski (2014) for a comprehensive analysis of the history of China’s economic decentralization well before the twentieth century.
targets and compete in testing new and gradual reform policies. Xu argues that this competition mechanism improves the institutional quality of the Chinese system, partly compensating for other problems of the Chinese system such as the absence of rule of law and weak property right protection. Lin and Liu (2000) also highlight the enhanced efficiency due to economic decentralization. They argue that local governments can better allocate resources and meet local demands because of their informational advantage. While both Xu (2011) and Lin and Liu (2000) note that economic decentralization involves the capacity for local governments to control local state-owned enterprises and issue preferential policy to favored private firms, they focus on different aspects of decentralization and are muted on the important role of preferential policy in economic growth in China. Blanchard and Shleifer (2001) is the closest to my hypothesis. They provide a simple theoretical framework that shows the federalist/decentralized Chinese system allowed local governments to actively contribute to the growth of private firms but stop short of explaining the important role of preferential policy and the growth dynamics when national policies conflict with the objectives of local officials.

The other key feature of the Chinese economy is precisely that the objectives of national and local governments are not always aligned. The main incentives of local leaders are career promotion through local economic growth and private benefits through rent extraction, whereas the objective of national government is more multifaceted. Li and Zhou (2005) famously show that the likelihood of promotion for local officials increases with the economic performance over their tenure. They argue that the national government uses personnel control to promote economic growth, and selects capable politicians based on local economic performance. This high-powered incentive to achieve local economic growth, coupled with the ability to manage provincial budget and issue preferential policies, clearly imply that local officials would be willing to support the growth of local private businesses even when such policies go against the will of national leaders.

The discussion of misallocation, political economy structure, and aggregate growth

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2See Brunnermeier, Sockin, and Xiong (2017) for a theoretical framework of China’s gradualist reform method that optimizes policy through experimentation.
in China is especially important in recent years. The national strategy in favor of the private sector improved allocative efficiency and contributed to China’s rapid growth in the 1990s and 2000s. However, the revival of state sector and the decline of private sector in the past decade worsened the allocative efficiency of the Chinese economy. The national government under Xi’s presidency embraced a return to the state sector through increased support for state-owned enterprises in the industrial sector. The so-called “supply-side reform” reduced cost of production for industrial SOEs and increased product prices. Yet, the support for SOEs came at the expense of the private firms, which faced intense competition and more difficult access to credit due to a crowding-out effect described by Huang, Pagano, and Panizza (2020). Price distortion (to borrow the phrase from the misallocation literature) leads to severe misallocation of resources. This also gives rise to an unprecedented scenario where local governments find their objectives at odds with the consequences of national policy. Misaligned interests and economic decentralization could induce local governments to address the efficiency loss by issuing preferential policies to targeted private firms. Therefore, China’s decentralized political economy structure could potentially self-correct resource misallocation to a certain extent because of the ability of local governments to respond to undesirable national policy.

3 Empirical Evidence

To explore the hypothesis that China’s decentralized economic system and conflicting objectives of local and national government serve as a self-correcting mechanism for resource misallocation induced by national policies, we study a key policy shift in 2015 known as the supply-side structural reform. The national government implemented the supply-side reform aimed at reducing overcapacity and inefficiency in the predominantly state-owned industrial sector (China Daily, 2015). The reform reduced the cost of financing for upstream industrial state-owned enterprises (SOE) and raised the prices of commodities and industrial products nationwide. Producer price index (PPI) increased dramatically at the beginning of 2016 when the policy was implemented nationwide. This can be seen in comparison with other major economies in
China’s producer price index started to climb in January 2016 but PPI in other economies did not experience a significant change until mid-2016. Moreover, China saw the largest increase in PPI among leading world economies in 2016. This notable increase in producer price index in China and worldwide is the direct result of China’s supply-side reform policy which heavily focus on addressing overcapacity in state-owned commodity producers (Chen, Ding, and Mano, 2018).

The consequence of the supply-side reform is price distortion and resource misallocation between state-owned and private firms. State-owned enterprises in the industrial sector benefited from the policy through easier access to cheap credit supplied by state-owned banks and higher product prices. Lower cost of financing and higher product prices led to an increase in profits for industrial SOEs, especially producers of raw materials and commodities due to their inelastic demand. This can be seen in Figure 2, where we compare total profits of state-owned and private industrial firms for 40 industries in industrial sector which include mining and manufacturing. This shows that the share of industry profits for state-owned producers increased after 2015 and this increased profit share is even greater for state-owned raw material producers. Meanwhile, this policy had a negative spillover effect on private firms in both upstream industrial sector and downstream service sector. Industrial private firms
faced increased difficulty of receiving loans because of a “crowding-out” effect when increased supply of cheap credit to state-owned firms tightened the funding constraint for private firms (Huang, Pagano, and Panizza, 2020). Upstream private firms thus faced more intense competition with industrial SOEs who acquired a cost advantage. Downstream private firms also became worse off because they faced higher product prices, especially for firms that purchase raw materials and commodities in factor markets. The trajectory of the share of industry profits for state-owned and private firms after 2015 in Figure 2 clearly illustrates the rise of state sector and decline of private sector as a direct consequence of the supply-side reform.

We have clearly shown the positive direct effect of supply-side reform on the state-owned enterprises and its negative spillover effect on private firms in both industrial and service sectors. This policy is highly consequential because it reversed the trend of improving allocative efficiency through the reform of state-owned enterprises and the gradual rise of private sector since the 1990s. It also poses a challenge to productivity growth in China which heavily depended on addressing resource misallocation in the absence of a pro-growth and business-friendly institutional environment. We argued that preferential policy provides a self-correcting mechanism that allowed local governments to respond to national policies that have negative spillover effects
on local industries and private businesses. This policy change provides a setting where we can test this hypothesis.

Another policy development in 2015 that coincided with the supply-side reform can help us understand the role of preferential policy in addressing misallocation. In 2013, the Chinese government tried to move away from the regime of preferential policy by stopping local leaders from issuing preferential policies to favored private firms (State Council, 2013). However, this attempt was not successful because of the vested interests of both local politicians and private firms in preferential policies. Official data obtained using web-scraping methods suggests that the number of cities that announced new preferential policies did not decrease by a significant number: 39 out of 291 cities in the sample explicitly announced new preferential policies in 2012, but still 30 out of 291 cities continued to explicitly announce new preferential policies in 2013 despite the attempt made by national government to prohibit the use of preferential policy. In 2015, the year when the supply-side reform was implemented, the national government reversed the decision on preferential policy (State Council, 2015). One possible explanation is that national government found the previous policy constraint on preferential policy either ineffective or unnecessary. A more likely explanation is that national government tries to send an implicit signal to local governments that they should be prepared to issue more preferential policies in response to the potential spillover effects of the supply-side reform.

We first find that there was a notable increase in the number of cities that explicitly announce new preferential policy from 24 in 2014 to 54 in 2015, which is unsurprising given that national government had relaxed the constraint that discouraged local government from issuing preferential policies to private enterprises. However, to understand how local governments use preferential policy to respond to the supply-side reform, we specifically compare how preferential policies are issued before and after 2015. Ideally, local governments would want to issue preferential policies to all private firms. But this is clearly not feasible because local governments face budget constraints. Therefore, local governments have to take a targeted approach to selectively support a subset of private firms, as observed by Oi (1992). When a national
Table 1: Effects of national policy change on local support for preferential policy to private manufacturing versus service sectors

<table>
<thead>
<tr>
<th>Variables</th>
<th>Manufacturing (1)</th>
<th>Manufacturing (2)</th>
<th>Manufacturing (3)</th>
<th>Manufacturing (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-2015</td>
<td>0.009</td>
<td>0.009</td>
<td>0.011</td>
<td>0.011</td>
</tr>
<tr>
<td></td>
<td>(0.016)</td>
<td>(0.016)</td>
<td>(0.014)</td>
<td>(0.014)</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>-0.068*</td>
<td>-0.163***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.039)</td>
<td>(0.0092)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-2015 × Manufacturing</td>
<td>0.048**</td>
<td>0.048**</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.022)</td>
<td>(0.022)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service</td>
<td></td>
<td></td>
<td>0.212***</td>
<td>0.545***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.079)</td>
<td>(0.011)</td>
</tr>
<tr>
<td>Post-2015 × Service</td>
<td>0.061**</td>
<td>0.061**</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.027)</td>
<td>(0.027)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>2,002</td>
<td>2,002</td>
<td>2,002</td>
<td>2,002</td>
</tr>
<tr>
<td>Number of clusters (cities)</td>
<td>281</td>
<td>281</td>
<td>281</td>
<td>281</td>
</tr>
<tr>
<td>Year FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>City FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Province FE</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Notes: This table reports difference-in-differences estimates of local policy support for private manufacturing (service) sector in cities whose main industry is manufacturing (service) in response to central government relaxing the constraint for issuing preferential policy to private enterprises. We report robust standard errors clustered at the city level in parentheses. *** denote significant at the 0.01 level; ** denote significant at the 0.05 level; * denote significant at the 0.10 level.

Policy impacts a large number of private firms in their localities, local officials again have to provide preferential treatment to a selected set of firms in key industries.

To compare how local governments issue preferential policy before and after 2015 when the supply reform was implemented, we collect data from local government policy documents to identify cities that announce preferential policy in a specific year. We use PKULaw, an online search engine of all Chinese legal documents, to collect these data and construct a balanced panel of preferential policy legislation in all Chinese cities during 2011-2017. These preferential policy documents are typically explicitly targeted to either the private manufacturing or service sector, which enables me to empirically test my hypothesis. Specifically, we can estimate the following difference-in-differences specification:

\[
Pref_{it} = \alpha_0 + \alpha_1 Post \times Sector_{it} + \alpha_2 Post_t + \alpha_3 Sector_{it} + \lambda_t + \gamma_i + \phi_j + \epsilon_{ijt} \quad (1)
\]
where $Post_t$ indicates whether year $t$ is after 2015, $Sector_{it}$ indicates whether manufacturing (or services) is the sector that contributes to the largest share of GDP in city $i$ at year $t$ (i.e. key sector), $Pref_{it}$ indicates whether city $i$ issues preferential policy to its key sector at year $t$. $\lambda_t, \gamma_i, \phi_j$ are the usual year, city, and province fixed effects. Our coefficient of interest is $\alpha_1$, which shows the change in the probability that a city announces preferential policy support to its key sector after the national policy change in 2015.

Table 1 presents the empirical result. We find that after the supply-side policy was implemented in 2015, cities where manufacturing is the key sector became significantly more likely to issue preferential policies to private firms in the manufacturing sector compared to cities where services is the key sector, and cities where service is the key sector became significantly more likely to issue preferential policies to private service firms compared to cities where manufacturing is the key sector. This pattern is also quite different from before 2015, when all cities regardless of sectoral composition tended to provide more policy support to private firms in the service sector, presumably due to the national strategy of developing the service sector. This result is consistent with the conjecture that local governments respond to the spillover effects of national policies by selectively supporting private firms in the key sector.

We also estimate the following dynamic difference-in-differences specification to understand the year-by-year effect and to test for pre-trend:

$$Pref_{it} = \beta_0 + \beta_1 \mathbb{1}[year = t] \times Industry_{it} + \beta_2 Industry_{it} + \lambda_t + \gamma_i + \phi_j + \epsilon_{ijt} \quad (2)$$

We first notice from Figure 3 that there is no statistically significant pre-trend in the relative likelihood of local policy support for private manufacturing (or service) sector in cities where manufacturing (or services) is the key sector prior to the supply-side reform in 2015. The absence of pre-trend in our estimation gives us reassurance that the changing patterns of preferential policy after 2015 is unambiguous. For cities where manufacturing is the key sector, the increase in preferential policy announcement for private manufacturing firms is the greatest in 2015, declined in 2016, and
bounced back in 2017. For cities where services is the key sector, the increase in preferential policy announcement for private service firms is also the greatest in 2015, and this effect persisted until 2017.

Due to data limitation, we cannot yet claim that our estimation results reveal a causal effect of supply-side reform on the change in how local governments issue preferential policies, because we have not definitively ruled out confounding events or policies that may have coincided with supply-side reform. However, from a descriptive standpoint, our empirical result is clearly valuable because we have clearly identified a changing orientation of local preferential policy after 2015, which motivates subsequent analyses.

The data on announcement of preferential policy by local government clearly helps us understand a part of the changing dynamics in the relationship between local gov-
ernments and the private sector in the aftermath of the supply-side reform. However, policy announcements reveal neither the size nor the scope of preferential policies, which involve regulatory exemptions, tax reductions, and subsidies. Firm-level data on regulatory exemptions and tax reduction is almost impossible to obtain. However, we can take advantage of existing firm-level data to study and compare the evolution of subsidies received by state-owned enterprises and private firms. The only available database to the best of our knowledge is CSMAR, which provides financial data of all publicly traded firms in China.\(^3\)

We can then compare the total amount of government subsidies received by private and state-owned listed firms before and after 2015. We would expect that private listed firms saw a larger increase in subsidies after 2015 compared to state-owned listed firms because local governments have the incentives to support private firms adversely affected by the supply-side reform. To see how the difference in subsidy between private and state-owned listed firms evolve over time, we again estimate a dynamic difference-in-differences regression design as follows:

\[
\log(Subsidy)_{it} = \beta_0 + \beta_1 \mathbb{1} \{\text{year} = t\} \times Private_{it} + \beta_2 Private_{it} + \lambda_t + \gamma_i + \epsilon_{it} \tag{3}
\]

where \(\log(Subsidy)_{it}\) is the total amount of subsidy (in log form) received by firm \(i\) in year \(t\), \(Private_{it}\) is an indicator variables that takes value 0 if the firm is controlled by state-owned equity and 1 if the firm is controlled by private equity. We specifically want to test the null hypothesis that \(\beta_1 > 0\) for all \(t \geq 2015\).

Our empirical result shows that the dynamic effects of supply-side reform (post-2015) on government subsidy received by private firms is positive and statistically significant. Figure 4 shows that total government subsidy for private listed firms compared to state-owned listed firms increased by about 20 percent in 2015-2017. The event-study plot also shows that the difference in subsidy for private and state-owned listed firms remained stable before 2015 (though state-owned listed firms received much greater amounts of subsidies).\(^4\) The sizable increase in government subsidy

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\(^3\)CSMAR is similar to the Compustat database for US listed firms, which has been widely used in academic research.

\(^4\)This cannot be seen from the event-study plot. This result is from the negative \(\beta_2\) term in the
Figure 4: Event-study plot of subsidy gap between private versus state-owned listed firms

for private listed firms after 2015 is consistent with the potential need faced by local governments to counter the worsening misallocation and support key revenue-making, tax-generating, and growth-enhancing firms in their localities.

4 Model

This section develops a standard model of monopolistic competition with heterogeneous firms in an economy where private firms compete with state-owned enterprises and face policy distortions or support from local governments. The objective of this model is to illustrate the effect of national policy shocks and local policy distortions on aggregate productivity. The level of policy distortion is a key parameter in this model, which can be considered as a variant of Melitz (2003) and Hsieh and Klenow (2009).

4.1 Setup

The setup of the model is standard. The representative consumer has preferences characterized by a constant elasticity of substitution (CES) utility function over a regression, which will be included in the appendix.
continuum of goods indexed by their technology $\varphi$ \(^5\):

$$U = \left(\int_{\varphi \in \Phi} q(\varphi) \frac{\sigma - 1}{\sigma} d\varphi\right)^{\frac{1}{\sigma - 1}}$$

where the set $\Phi$ represents the productivity space of the available goods. The goods are substitutes, so the elasticity of substitution $\sigma > 1$. As shown by Dixit and Stiglitz (1977), consumer demand can be modeled equivalently as consuming the aggregate good $U$ associated with the aggregate price index $P$:

$$P = \left(\int_{\varphi \in \Phi} p(\varphi)^{1-\sigma} d\varphi\right)^{\frac{1}{1-\sigma}}$$

The result of this standard CES demand system yields the optimal consumption and expenditure decision:

$$q(\varphi) = Q \left[\frac{p(\varphi)}{P}\right]^{-\sigma}$$

$$r(\varphi) = R \left[\frac{p(\varphi)}{P}\right]^{1-\sigma}$$

where $Q$ denotes aggregate consumption and $R = PQ$ denotes aggregate expenditure.

We follow the general methodology of Melitz (2003) to obtain a measure of aggregate productivity, though we note that our economy is more complicated because of the distinction between private versus state-owned enterprises and the existence of policy distortions. We make similar assumptions about firm production. Specifically, production exhibit increasing returns to scale. All firms have the same fixed cost (indexed by $f$) but face different variable costs determined by their productivity level (indexed by $\varphi$). More importantly, firms could face output and cost distortions. We denote distortions that change the level of firm productivity as output distortion $\tau_y$, and denote distortions that change the marginal cost of input as cost distortion (indexed by $\tau_x$). Input is thus a linear function of output (indexed by $y$):

$$x = f + \frac{y}{(1 - \tau_x)\varphi}$$

\(^5\)For notational simplicity, product variety here is represented by producer technology. As in Melitz (2003), higher productivity can be considered as producing a higher quality variety at identical cost.
Therefore, firms that have a higher productivity level and lower cost distortion produce at a lower marginal cost.

**Proposition 1.** Monopolistic competition yields the following pricing rule, where each firm choose the same profit-maximizing markup \( \frac{\sigma}{\sigma - 1} = \frac{1}{\rho} \) and factor price can be normalized to 1:

\[
p(\varphi) = \frac{1}{\rho (1 - \tau_x)(1 - \tau_y) \varphi}
\]

**Proof.** Firm profit is given by:

\[
\Pi = p(1 - \tau_y)y(p) - (f + \frac{y}{(1 - \tau_x)\varphi})
\]

The first-order condition then yields:

\[
\frac{\partial \Pi}{\partial p} = (1 - \tau_y)y + \frac{\partial y}{\partial p}(p(1 - \tau_y) - \frac{1}{(1 - \tau_x)\varphi}) = 0
\]

\[
p(\varphi) = \frac{1}{(1 - \tau_x)(1 - \tau_y)\varphi} - \frac{y}{\frac{\partial y}{\partial p}}
\]

Since the Marshallian demand is \( y = q(\varphi) = Q\left[\frac{\mu(\varphi)}{P}\right]^{-\sigma} = p(\varphi)^{-\sigma}P^{\sigma-1}I \), it follows that

\[
\frac{\partial y}{\partial p} = -\sigma p^{-\sigma-1}P^{\sigma-1}I
\]

\[
\frac{y}{\frac{\partial y}{\partial p}} = \frac{p^{-\sigma}P^{\sigma-1}I}{-\sigma p^{-\sigma-1}P^{\sigma-1}I} = -\frac{p}{\sigma}
\]

Therefore, the pricing rules follows immediately by substituting the above expression into the first-order condition and recalling that \( \rho = \frac{\sigma - 1}{\sigma} \).

\[
\square
\]

### 4.2 Aggregate Productivity in Equilibrium

The equilibrium is characterized by a mass of state-owned firms \( M_s \) and a mass of private firms \( M_p \) (the total mass of firms is hence \( M = M_s + M_p \)) as well as a common probability distribution of productivity level with density \( \mu(\cdot) \) for both types of firms. However, the two types of firms have different range of distribution: the minimum level of productivity for state-owned firms is lower than that of private firms, and
the maximum level of productivity for private firms is higher than that of state-owned firms. Denote the productivity level for state-owned and private firms to be $\varphi_s$ and $\varphi_p$ respectively. Our assumption implies that $\varphi_s \in (\bar{\varphi}_s, \bar{\varphi}_s)$, $\varphi_p \in (\bar{\varphi}_p, \bar{\varphi}_p)$, and $\bar{\varphi}_s < \bar{\varphi}_p$, $\bar{\varphi}_s < \bar{\varphi}_p$. Then we can derive a closed-form formula of aggregate productivity that allows us to understand the equilibrium dynamics of aggregate productivity in response to the relative sector mass and productivity level.

**Proposition 2.** The aggregate productivity level of the economy $\tilde{\varphi}$ can be considered as the geometric average of the aggregate productivity levels of the state-owned and private sector $\tilde{\varphi}_s, \tilde{\varphi}_p$ weighted by their respective share of total firm mass.

$$\tilde{\varphi} = \frac{1}{(1 - \tau_x)(1 - \tau_y)} \left( \frac{M_s}{M} \varphi_s^{\sigma-1} + \frac{M_p}{M} \varphi_p^{\sigma-1} \right)^{\frac{1}{\sigma - 1}}$$

**Proof.** Notice that the aggregate price index can be expressed as the following:

$$P = \left( \int_0^\infty p(\varphi)^{1-\sigma} M \mu(\varphi) d\varphi \right)^{\frac{1}{1-\sigma}}$$

$$= \left( \int_0^\infty p(\varphi)^{1-\sigma} (M_s + M_p) \mu(\varphi) d\varphi \right)^{\frac{1}{1-\sigma}}$$

$$= \left( \int_{\varphi_s}^{\bar{\varphi}_s} p(\varphi_s)^{1-\sigma} M_s \mu(\varphi_s) d\varphi_s + \int_{\varphi_p}^{\bar{\varphi}_p} p(\varphi_p)^{1-\sigma} M_p \mu(\varphi_p) d\varphi_p \right)^{\frac{1}{1-\sigma}}$$

$$= M^{\frac{1}{1-\sigma}} \left( \int_{\varphi_s}^{\bar{\varphi}_s} p(\varphi_s)^{1-\sigma} M_s \mu(\varphi_s) d\varphi_s + \int_{\varphi_p}^{\bar{\varphi}_p} p(\varphi_p)^{1-\sigma} M_p \mu(\varphi_p) d\varphi_p \right)^{\frac{1}{1-\sigma}}$$

The aggregate pricing rule is given by $P(\tilde{\varphi}) = \frac{M^{\frac{1}{1-\sigma}}}{\rho(1-\tau_x)(1-\tau_y)}$, where $\tilde{\tau}_x, \tilde{\tau}_y$ denotes the aggregate cost and output distortions in the economy. Therefore, the aggregate productivity can be written as follows:

$$\tilde{\varphi} = \frac{1}{\rho(1-\tau_x)(1-\tau_y)} \left( \int_{\varphi_s}^{\bar{\varphi}_s} p(\varphi_s)^{1-\sigma} M_s \mu(\varphi_s) d\varphi_s + \int_{\varphi_p}^{\bar{\varphi}_p} p(\varphi_p)^{1-\sigma} M_p \mu(\varphi_p) d\varphi_p \right)^{\frac{1}{\sigma - 1}}$$

Plugging in the pricing rule for the state and private sector yields (recall that only
private firms face policy distortions):

\[
\tilde{\varphi} = \frac{\int_{\tilde{\varphi}_s} \varphi_s^{-1} M_s \mu(\varphi_s) d\varphi_s + \int_{\tilde{\varphi}_p} [(1 - \tau_x^p)(1 - \tau_y^p) \varphi_p]^{\sigma-1} \frac{M_p \mu(\varphi_p) d\varphi_p}{(1 - \tilde{\tau}_x)(1 - \tilde{\tau}_y)}}{(1 - \tau_x)(1 - \tau_y)}
\]

where it is easy to show that aggregate productivity for state-owned and private firms are the following:

\[
\varphi_s = \left( \int_{\tilde{\varphi}_s} \varphi_s^{-1} \mu(\varphi_s) d\varphi_s \right)^{\frac{1}{\sigma-1}}
\]

\[
\varphi_p = \left( \int_{\tilde{\varphi}_p} [(1 - \tau_x^p)(1 - \tau_y^p) \varphi_p]^{\sigma-1} \mu(\varphi_p) d\varphi_p \right)^{\frac{1}{\sigma-1}}
\]

Since state-owned firms face zero policy distortions, aggregate policy distortions completely depends on policy distortions faced by private firms. Therefore, given that aggregate productivity is an ordinal variable for our analysis, we can normalize and set \( \tilde{\tau}_x = \tau_x \) and \( \tilde{\tau}_y = \tau_y \). Hence our result follows.

\[
\tilde{\varphi} = \frac{1}{(1 - \tau_x)(1 - \tau_y)} \left( \frac{M_s \varphi_s^{-1} + M_p \varphi_p^{-1}}{M \varphi^{-1}} \right)^{\frac{1}{\sigma-1}}
\]

4.3 Local Government Problem

Local politicians are only interested in career promotion accomplished through local economic growth and political loyalty (Li and Zhou, 2005; Xu, 2011; Blanchard and Shleifer, 2001). When national policy distortions adversely impacts local economic growth, local politicians have the incentive to strike a careful balance between supporting private firms through preferential policy and refraining from acting too much against national policy.

Local government chooses the amount of policy support that counteracts national policy distortions to maximize its utility. The utility function of local government is increasing in the aggregate productivity of local economy (impacted by policy
support) and decreasing in the amount of policy support due to political incentive.

The optimization problem of the local government is formulated as the following:

$$\max_{\delta_x, \delta_y} U(\tilde{\varphi}((\delta_x, \delta_y))) + V(\delta_x, \delta_y)$$

Here the choice variables $\delta_x, \delta_y$ represents the amounts of policy support that reduce national cost and output distortions, respectively. Moreover, $U$ is increasing and strictly concave; $V$ is decreasing and strictly convex; $V$ is discontinuous at zero because high political costs are incurred from acting against national policy by the slightest amount. Note that this is a one-period problem because local politicians are not forward-looking due to their short term length.

Substituting the equilibrium level of aggregate productivity that we derive in the previous section into the utility function, we can write the local government problem as the following:

$$\max_{\delta_x, \delta_y} U\left(\frac{1}{(1 - \tau_x + \delta_x)(1 - \tau_y + \delta_y)} \left( \frac{M_s}{M} \tilde{\varphi}_s^{-\frac{1}{\sigma - 1}} + \frac{M_p}{M} \tilde{\varphi}_p^{-\frac{1}{\sigma - 1}} \right) \right) + V(\delta_x, \delta_y)$$

subject to:

$$\tilde{\varphi}_p = \left( \int_{\varphi_p}^{\tilde{\varphi}_p}(1 - \tau_x + \delta_x)(1 - \tau_y + \delta_y)\varphi_p \right)^{-\frac{1}{\sigma - 1}} \mu(\varphi_p) \varphi_p^{-\frac{1}{\sigma - 1}} d\varphi_p$$

The symmetric property of $\tau_x, \tau_y$ and $\delta_x, \delta_y$ allows us to simplify the expression by considering a generic national policy distortion variable $\tau$ and a generic local support variable $\delta$. Simplifying:

$$\max_{\delta} U\left(\frac{1}{(1 - \tau + \delta)} \left( \frac{M_s}{M} \tilde{\varphi}_s^{-\frac{1}{\sigma - 1}} + \frac{M_p}{M} \tilde{\varphi}_p(\delta)^{-\frac{1}{\sigma - 1}} \right) \right) + V(\delta)$$

subject to:

$$\tilde{\varphi}_p(\delta) = \left( \int_{\varphi_p}^{\tilde{\varphi}_p}(1 - \tau + \delta)\varphi_p \right)^{-\frac{1}{\sigma - 1}} \mu(\varphi_p) \varphi_p^{-\frac{1}{\sigma - 1}} d\varphi_p$$

Recall that there exists a high political "fixed cost" of acting against national policy,
as captured by the discontinuity of political utility function $V$

$$V(\delta) = \begin{cases} 
0 & \delta = 0 \\
-c - \hat{V}(\delta) & \delta > 0 
\end{cases}$$

where $c > 0$ and $\hat{V}(\delta) > 0$, $\hat{V}'(\delta) > 0$, $\hat{V}''(\delta) < 0$.

### 4.4 Analysis

We start by realizing that the choice of policy support $\delta^* > 0$ must satisfy the following welfare-improving condition:

$$U\left(\frac{1}{1 - \tau + \delta^*}\left[\frac{M_s}{M} \varphi_s^\sigma - 1 + \frac{M_p}{M} \varphi_p(\delta^*)^{\sigma - 1}\right]^{\frac{1}{\sigma - 1}}\right) + V(\delta^*) \geq U\left(\frac{1}{1 - \tau}\left[\frac{M_s}{M} \varphi_s^{\sigma - 1} + \frac{M_p}{M} \varphi_p(0)^{\sigma - 1}\right]^{\frac{1}{\sigma - 1}}\right) + V(0)$$

This is because otherwise the local government would be better-off by not providing any policy support to private firms due to the presence of political penalty.

Hence, there exists a cutoff political fixed cost $\bar{\delta}$ where the above welfare-improving condition holds strictly. If the actual political fixed cost of acting against national policy is below the cutoff value, then the positive effect of policy support on local aggregate productivity outweighs the negative effect on political loyalty; vice versa.

Nevertheless, it is not clear ex ante in terms of how much policy support the local government provides when the political penalty is sufficiently small. This analysis requires imposing specific functional forms on utility functions that are beyond the scope of this study.

### 5 Conclusion

In this paper I study how a developing country like China with a decentralized political economy structure can overcome poor institutions and policies to address resource misallocation and achieve growth. I present empirical evidence to support the view that China’s decentralized economic system characterized by conflicting objectives of
local and national government serve as a correction mechanism to address resource misallocation induced by national policies. I leverage a recent policy shock known as the supply-side structural reform that supports the state-owned industrial sector at the expense of the private sector. I present empirical evidence from local government documents and firm-level data to show that local governments proactively respond to such national policies that have negative spillover effects on local industries and private businesses through preferential policies. A simple theoretical model is able to illustrate the effect of national policy distortions and local policy support on aggregate productivity as well as the trade-off faced by local governments between economic growth and political loyalty.

While this paper tells a novel story of the unique role of local government in counteracting worsening misallocation and restoring stable growth in a decentralized economy like China, it is not without its limitations in terms of empirical and theoretical analysis. Due to limited availability of firm-level data, the empirical findings does not have a definitively causal interpretation. However, the combined set of evidence tells a rather compelling story. Moreover, the theoretical framework is not a fully fledged general equilibrium model. On the firm side, dynamic entry and exits of firms should be incorporated into the model, if this study were to be continued in the future. The results derived from the theoretical analysis does not fully account for the empirical findings, and they are highly dependent on functional forms and other external assumptions. Despite these limitations, this study still points to a direction worthy of future research. Establishing a causal relation between decentralization and growth under misallocation would be an exciting challenge to undertake in the future.
References


