Great Turning: How Has the Chinese Economy Been Trapped in an Efficiency-and-Balance Tradeoff?*

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Abstract

Xiang is the corresponding author. Large-country development faces the challenge of meeting the dual goals of economic growth and re-gional development, while resolving the tension between these two objectives. Over the past decade, the Chinese government has attempted to use the allocation of construction land and fiscal transfer payments to encourage the industrial development of its underdeveloped areas. This paper shows that this attempt was accompanied by an overall economic slowdown and a decline in resource alloca-tion efficiency, which not only undermines the international competitiveness of China's economy, but also creates an elevated risk of debt. The paper points out that the realization of China's dual goals of efficiency and regional balance will require increased labor mobility rather than a simple increase in the scale of policy driven resource relocation.

1. Introduction

Confronted with slowing economic growth and the accumulation of local government debt, the Chinese economy faces the strategic challenge of achieving both efficiency and

regional balance. On the efficiency side, the concern is to allocate resources to their most productive regions, sectors, or firms while fostering firm productivity increases. At the same time, concerns about balance center on reducing interregional income disparities. Over the past three decades, it appears that efficiency and balance goals have been irreconcilable. As market forces drove economic growth, concentrated in China's coastal regions, the income gaps between China's inland and coastal areas grew ever larger. Indeed, the continued presence of institutional barriers that impede labor mobility (e.g.,the household registration system and the land system) may explain China's ongoing difficulties in achieving both its regional balance and efficiency goals. Both economic theory and past international experience have demonstrated that the expansion of inter-regional gaps should be a temporary phenomenon if a country does not have obstacles to labor mobility. In these cases, as the economic development continues and goes beyond a particular stage, the country's economic concentration will be accompanied by the gradual narrowing of regional disparities (Word Bank 2009). Thus, while China's policies have involved transfer payments targeted with the intention of sustainable development in its underdeveloped regions, a combination of its policy with the promotion of full labor mobility would present a strategic choice that would facilitate the simultaneous achievement of its efficiency and balance goals.

More important, as China's government crafts strategies for internal development, it should also consider the effects of these strategies on China's comparative advantage in the global economy. Even if fragmentation of factor markets (e.g., restrictions on interprovincial labor mobility and prohibition of trans-provincial construction land quota transactions) might lead to a decentralized economy that would achieve regional balance, this fragmentation may ultimately damage China's advantages as a large country. In the era of globalization, China as a large economy stands to gain important advantages if its domestic market is unified. As suggested by economic theory and international experience economies of scale have led to agglomeration clusters in the world economy. Three factors have favored the integration of China's coastal regions into the global economy: China's deepening involvement in globalization, its short coastline relative to the large total land area, and lower shipping costs compared with land transport. At the early stage of Chinese economic reform, policies that promoted the flow of factors into coastal areas allowed for an "unlocking" of resources through a trans-regional reallocation of factors. A consequence of this strategy was the possibility of the expansion of gaps between regions. In addition, because of the household registration system and the land system, both of which impede labor mobility (especially free flow of unskilled workers); inter-regional disparities in per capita earnings were exacerbated.

In the past decade, however, rather than promoting internal factor mobility, China's government has addressed expanding regional disparities through increased resource transfers in support of the less developed regions. Similar to place-based policies that have met

with short-run success in other countries,[1] China's resource transfer had the effect of promoting inland China's rapid economic development immediately following the launch of these policies. Nevertheless, it is even more important to ask whether place-based policies are sparking self-sustaining economic gains (Moretti 2012) and how these policies affect aggregate welfare (Neumark and Simpson 2014). In China, it should also be noted that the use of economic transfers as a means of supporting the advancement of less-developed regions may entail substantial efficiency losses resulting from the misallocation of resources at the regional level. It is worth noting that less-developed regions turn to investment as a means of fostering short-run economic growth as much as they can regardless of poor returns to investment. The financing of investment largely depends on the growing government debt. If this policy continues and the investments fail to yield the expected benefits, the growth of local government debt burdens may eventually compromise the goal of evenly balanced regional development. This paper argues that ongoing policies that impede the free flow of labor, and that transfer resources to less-developed areas in a fashion that is too rapid and distortionary, is predicted to lead to an inefficient inter-regional and regional allocation of resources. In turn, the misallocation arising as a consequence of these policies may ultimately endanger the sustainability of the economic growth in the less-developed regions, while imposing a heavy burden on the national economy as a whole.

As of 2015, it is important for China to pay attention to the efficiency losses caused by its regional balance policies. For example, Perkins and Rawski (2008), who forecast China's 2005–25 economic growth using historic data through 2005, forecasted a decline in China's future economic growth. Their conclusion was largely based on potential supply-side changes. In particular, they argued that it would be difficult to maintain rapid growth if labor force expansion slows due to the rise of dependency ratio as China's population ages. Others have identified demand-side concerns that may further limit future economic growth. Notably, the declining labor income share (Bai and Qian 2010), and the high and continuously rising saving rate (Chen et al. 2015a), have increased China's dependence on investment and exports as the drivers of growth. Two factors limit China's export expansion, however: (1) global economic recovery from the 2008 financial crisis has been slow, and (2) China's export cost advantage has gradually eroded because of the significant increase of labor costs in recent years (Cai 2007). Therefore, to maintain a high speed of economic growth, China must improve its efficiency rather than production factor accumulation. This paper argues that China's regional balance policies over the past decade have distorted the allocation of resources, and the removal of these distortions will help to sustain a high growth of China's economy.

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1 Neumark and Simpson (2014) summarize the existing evidence of place-based policies in other countries.

The remainder of the paper is laid out as follows. Section 2 discusses possible strategies for balanced regional development, and the relationship between policies that lead to a free-flowing labor force (referred to as "moving people") as compared with policies that transfer of economic resources across regions (referred to as "moving money"). Section 3 describes the implementation of the moving money policies from land, finance, labor, and other areas, as well as the major turning point in the regional development policies in the past decade. Section 4 uses change in total factor productivity (TFP) over time to characterize the overall slowdown of economic efficiency after 2003. Decomposition of TFP across time and regions indicates that the declining growth rate after 2003 appears to be driven by limits on development in eastern regions. Section 5 uses information on TFP dispersion to characterize the declining efficiency of resource allocation in China, and summarizes relevant evidences from the literature. Section 6 provides conclusions and discusses the implications as they relate to policy.

2. Approaches to balanced regional development and their effectiveness

For China, a vast and populous country, balanced economic development between regions is of significant importance. As China's level of economic development has risen and its involvement in globalization has deepened, however, agglomeration factors have enabled coastal areas and China's largest cities to grow much more rapidly than other areas in the country. Because of the benefits of openness, coastal areas and cities near major ports have further benefited from a high degree of industrial agglomeration (Lu and Chen 2006), and a higher economic growth rate compared with other areas (Ho and Li 2008). The rapid development of coastal areas has led to widening economic disparities between regions since 2004–05, whether comparisons are based on regional economic size (Zhu and Tao 2011), per capita GDP (Li and Gibson 2013), or per capita income (Cai and Du 2011).

Increasing inter-regional disparities have led to pressures on the central government to increase its efforts to balance regional development. When seeking to balance regional development, it should be emphasized that the goal of balanced development between regions should target the narrowing of regional gaps in per capita income,[2] rather than the goal of achieving equality of economic scale in terms of regional GDP in different regions. Theoretically, there are two approaches to achieving balanced inter-regional development per capita. First, if full population mobility cannot be achieved, *moving money* policies

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2 In fact, it is impossible for per capita nominal incomes to be absolutely equal. People will move until their real incomes, accounting for differences in local amenities, are equalized. Hence, the ultimate goal of balanced development should be the balance of actual income and quality of life. The goal to balance quality of life means that policies need not go so far as to balance even actual income, because even if all barriers of labor mobility is removed, there are still parts of the population willing to stay in regions with lower real income but cleaner air and more pleasant climate.

may provide less-developed regions with transfer payments and investment focused on the improvement of the less-developed regional economies. To date, China's primary response to inter-regional income disparities, has involved *moving money* methods. Note, however, that the removal of barriers to trans-regional labor movements would present an alternative means for balancing real income per capita across regions. Unimpeded labor mobility allows individuals from less-developed regions to move to developed areas. For example, Gao et al. (2015) found that in China, migrants are more likely to be employed in larger cities. In turn, as the relative supply of labor in developed regions rises, the relatively rapid growth of developed region wages will abate.[3] Similarly, population outflow from the less-developed regions increases the level of resources per capita (including farmland, natural resources, etc.), which boosts the income levels earned by individuals who continue to reside in the less developed regions. Together, the effects of population flows on the developed and less developed regions combine to reduce regional income disparities. Thus, achieving balanced development in per capita sense between regions through the "moving people" approach has a relative strong advantage regarding efficiency, and this advantage may be getting stronger as the knowledge economy and the service industry benefits from economic agglomeration in large cities.

If labor mobility is limited, the pursuit of inter-regional balance through the *moving money* approach may not only result in a loss of economic efficiency, but may also breed certain risks. Two potential channels will lead to efficiency losses. First, if resources are artificially allocated to regions where their productivity is low, then this will diminish the efficiency of resource allocation. For example, in China the amount of non-agricultural land converted from agricultural land is controlled by a quota system that sets a ceiling for each region's construction land for non-agricultural use. When the central government allocates larger construction land quotas to central and western China than to other areas, rapid increases in the supply of construction land in the favored locations leads to inefficient land use. Meanwhile, the central government's investment in the central and western regions also faces similar problems of low efficiency. For the overall economy, the flow of resources into inland regions with low productivity and low market potential will damage the efficiency of resource allocation between regions. Second, in an executive-led system, resources allocated to the less-developed regions are largely controlled by local governments. Thus, when funds are allocated by the local governments instead of market forces in less developed regions, there is the further possibility of allocation inefficiency.

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3 In the early stage economic clustering, due to the effect of economies of scale, the rate of wage growth in developed regions may be faster than in less developed regions. Yet in the next stage, "equal return of factors" will play a dominant role, and the actual incomes in different regions will tend to be the same. In this way, regional disparities show a time course of initial rise followed by decline (World Bank 2009).

If regional balance is a high priority, sacrifices due to efficiency losses in the allocation of resources may be understandable. Because of globalization, however, the loss of overall efficiency may also reduce national competitiveness, and consequently may lead to unsustainable economic growth. Further, when there is fierce GDP competition among local governments, resource allocation in favor of the inland areas also may exacerbate financial risk. When the local governments in the less-developed areas are allowed to use more land, receive larger transfer payments from the central government, and have a more relaxed financial environment than the coastal areas do, the incentives for economic development may encourage local governments to blindly increase investment as much as possible, absent careful consideration regarding the industries that are best suited to their area. Consequently, the scale and structure of investment will probably deviate from the potential need that is optimal for the local economic development. This is particularly relevant when a large portion of a local government's investment is financed by loans and bonds; if the return on investment is not sufficiently high, these expenditures will generate huge financial risks. In China, neither the local governments nor the state-controlled banks that provide funds can go bankrupt. Thus any local government debts which are not repaid by local governments ultimately become a burden on the central government.

Although the current approach for balancing inter-regional development involves potential risks and a loss of efficiency, this does not imply that China's inland areas would not benefit from industrialization. The question is what kind of industrialization. Theoretically, land resources are evenly distributed geographically, so that in each area has a part of its local population engaged in agriculture. When transport costs between regions exist, to meet the non-agricultural demand of agricultural population, it is possible that to locate near agricultural hinterland is a better choice for some non-agricultural firms because of lower transportation costs. Along with the crowding and competition effect in economic center, the non-agricultural demand of agricultural population contributes one of the dispersion forces which will breed the possibility of the emergence of sub-centers. In addition, the larger a country's population, the greater the possibility that it will evolve an industrial structure that includes a number of sub-centers.[4] Indeed, because of the size of China's population and its geographic span, the emergence of non-agricultural sub-centers in the inland areas is consistent with economic geography theory.

Currently, the undesirable aspects of China's inland industrial development stem from its development mode, involving difficulties tied to the pace of development, as well as location choice and industrial structure. The first problem involves the speed of industrial development. China's industrial development relies heavily on investment relative to consumption; this is even more serious in the inland areas than in the coastal areas (Lu 2013).

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4 For a detailed analysis, see Fujita and Mori (1996).

Because of the geographical disadvantage, rapid industrial development in the inland areas inevitably requires increased investment growth—although overly hasty investment growth will lead to declines in the return on capital and in productivity. Location choice presents the second problem for the industrial development efforts in China's inland regions. Clustering allows for efficiency gains through agglomeration, therefore inland industries would benefit from locating in the areas surrounding the large inland cities. Rather than placing new investments to support the formation of regional metropolitan areas in many inland provinces of China, however, industrial development zones are widely dispersed and the competition for investment between counties is fierce. Indeed, in some provinces population concentration has even decreased (Lu 2013). The third drawback in current industrial policies involves the choice of industry. It must be stressed that due to the locational disadvantages to export and to serve the developed area, for inland China the best choice for industrial development should be aimed at serving local demand or industries that rely on natural resources (e.g., agriculture, tourism, natural resource industries), to avoid competition with coastal areas. Therefore, effective industrial development may support these industries (e.g., agro-processing and resource processing), or industries with products that meet local living needs within a certain range (such as clothing and food for local sales), or a small number of products that do not rely on sea transport (e.g., chips, software).
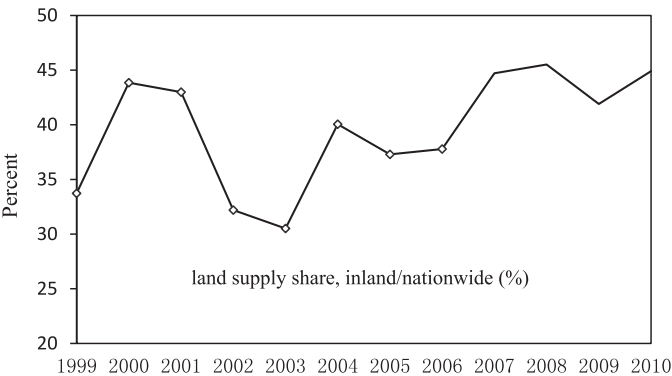
Without sufficient labor mobility, from the early 2000s onward the central government responded to the growing regional income gap by attempting to guide resource transfers to the less-developed regions in China. Data suggest that China was successful in making progress towards its balance goals. First, for the full economy, Herfindahl–Hirschman indexes[5] constructed using provincial GDP or regional gross industrial output decreased slightly after 2005 (Zhu and Tao 2011). Second, while the gap in total economic output decreased and population flow was insufficient, the increasing trend of the gap in provincial GDP per capita since the 1990s also showed a reversal after 2005 (Li and Gibson 2013). Third, evidence based on income levels also recognized the decline in regional disparities. For example, when the Theil index is used to measure the regional wage inequality, the extent of regional disparities fell from 0.175 in 2005 to 0.093 in 2010 (Cai and Du 2011). The next sections will show that this inter-regional convergence of GDP growth and per capita income is achieved largely through the *moving-money* policies at the loss of efficiency.

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5 The Herfindahl–Hirschman index (HHI) was originally used to measure the degree of market concentration; the formula is $HHI = \sum_{i=0}^{n} s_i^2$ where s_i is each company's market share. A small HHI value means a small difference in the market share of enterprises, namely, low concentration. Similarly, a small HHI of provincial economy represents the small degree of spatial concentration of economy.

Figure 1. Changes in the proportion of construction land supply in the inland provinces

Percent

land supply share, inland/nationwide (%)

1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010

Source: China Land and Resources Statistical Yearbook, 1999–2010.

3. A major turning point: Regional balance policies over the past decade

Since 2000, a number of government efforts approved by the central government have sought to balance regional development. These efforts include, for example, western China development, revitalization of the old northeast industrial base, and the development of central China. The implementation of these regional strategies has led to the adoption of concrete policies, many of which have played an important role in guiding factor flows and resource allocation. Around 2003 a clear policy turning point emerged as administrative efforts sought to introduce major changes in the regional allocation of economic resources, including construction land quotas and transfer payments, were enacted.

The allocation of land resources experienced a notable change when the construction land quota came into use as a policy tool to support economic development in the inland areas. In April 1999, the State Council approved the "The National Land Use Plan in 1997–2010," which emphasized the overall balance of land use in different regions. The new emphasis on balance was manifested by the restriction on the expansion of construction land in the southeast coastal areas and the Bohai Sea region. Although land that is available for development can only come from local areas, the quota of new construction land use in each area and each year is controlled by the central government. Construction land supply in local regions largely reflects the quota allocation made by the central government and its regulation on the execution of these quotas at the local level. As illustrated in Figure 1, the proportion of the construction land supply in the central and western provinces (hereinafter referred to as "inland") in China's total land supply increased significantly after 2003.

Since 2003, development zones have also been used to support the inland development. Prior to 2003, local governments engaged in fierce investment competition as they sought to develop their local economies. In this competition, cheap land was one of the primary attractions. Therefore, because the central government was not always aware of all actions taken at the local level, the amount of land use opened through local government actions often exceeded the levels intended by central planners. In order to control the excessive "development zone frenzy" and excessive expansion of construction land, at the end of July 2003 the central government began to rein in the amount of land that was contained in development zones or opened for construction. In this round of rectification, the number of development zones nationwide decreased from 6,866 to 1,568—by 77.2 percent; the planned area was reduced from 38,600 km^2 to 9,949 km^2—or by 74.0 percent. During the rectification of the development zones, for resource-exhausted cities in the old northeast industrial base as well as some old, minority-dominant, remote, or poor regions, the number of enterprises, the level of infrastructure construction, the industrial development scale, and other specific conditions for approval of development zones were not as strict as for developed regions. To reflect changes in the development zone policies from prioritized coastal development to balanced inter-regional development, this paper analyzes data from China Annual Surveys of Industrial Production; the proportion of enterprises located in the development zones of each city over each year as a percentage of all enterprises in all development zones nationwide was calculated.[6] Figure 2 plots the proportion of enterprises in development zones located in each prefecture versus the distance from the city to Hong Kong, Shanghai, and Tianjin, whichever is the shortest. We can see that the number of enterprises in the development zone in areas more than 500 km away from the three major ports, as a percentage of all enterprises in the development zones nationwide, notably increased after 2003.

2003 was a significant policy inflection point, not only for land resource allocation in favor of inland development, but also for capital allocation between regions. First, regarding financial resource allocation between regions, as illustrated in Figure 3, the share of transfer payments received by inland provinces in the national total continued to rise after 2003.[7] Micro-enterprise evidence also reveals a similar phenomenon. Figure 4 shows that among

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6 Because appropriate data of development zones prior to 2003 is not available, it is not possible to make a comparison of changes over time. By turning to the industrial enterprise database and using the address information that indicates whether an enterprise was in a development zone, however, we are able to calculate the proportion of the number of enterprises in the development zones in inland areas before and after the rectification, in order to examine the regional bias in the location of development zones.

7 Tax-sharing reform caused the decline in the proportion of transfer payments to inland provinces in 2002–03. Before the end of 2001, central shares of income tax were decided province by province and were not unified; after the end of 2001, central share of income tax increased to 50 percent in 2002 and 60 percent since 2003. At the same time, the central government returns part of its share of income tax back to provincial government in the name of general transfer payments. Along with

**Figure 2. Changes in the proportion of development zone (DZ) enterprises**
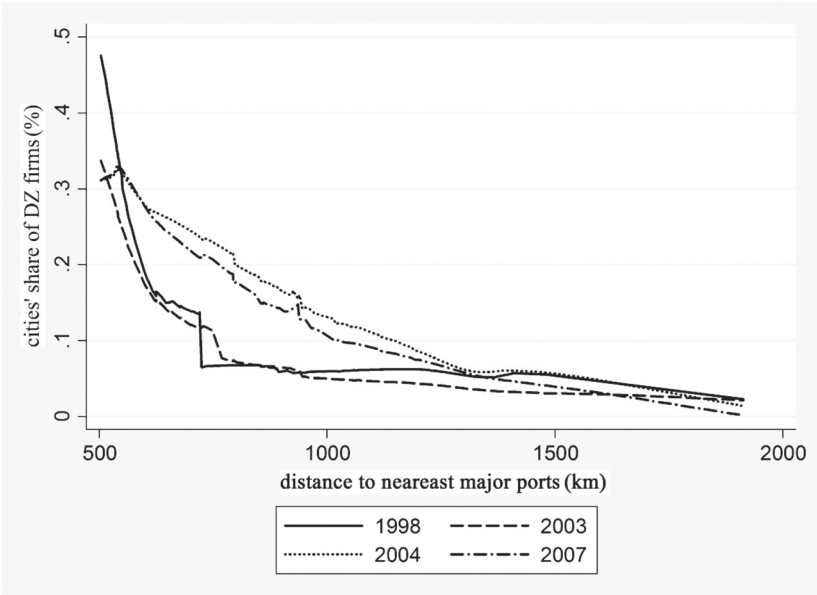
all subsidized enterprises, both the proportion of the number of subsidized enterprises and the amount of subsidies received in the central and western regions exhibits an inflection point around the year 2003, from which both increased.

Not only has the fiscal transfer the inland provinces received increased quickly, the scale of city investment bonds issued by the inland provinces has also risen significantly in recent years. As can be seen from Figure 5, both the proportion of the number and of the scale of the city investment bonds in inland provinces were subject to a rising trend. By 2012, both of these shares exceeded 50 percent,[8] whereas the GDP of inland provinces only accounted for 41.5 percent of the national GDP in 2011. Because the local government debt was put into infrastructure and the long-term economic growth of inland provinces is limited by their geographical disadvantage, the returns to investment are poor and the growing debts of inland provinces bred debt risks that cannot be ignored.

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the income tax return from the central to the local government, the high tax base of the coastal areas led to the increase in their proportion of transfer payments.

8 Before 2006, the overall scale of the city investment bonds was small. Thus the analysis does not include data prior to 2006.

Figure 3. Transfer payments to inland provinces
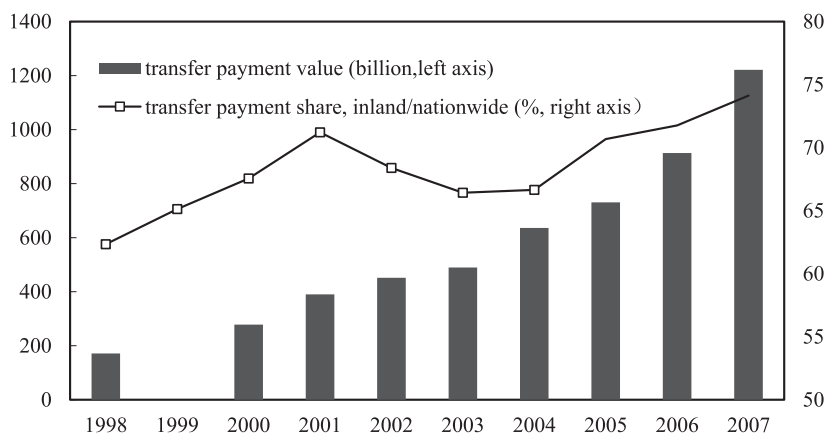
Figure 4. Subsidies for inland province enterprises
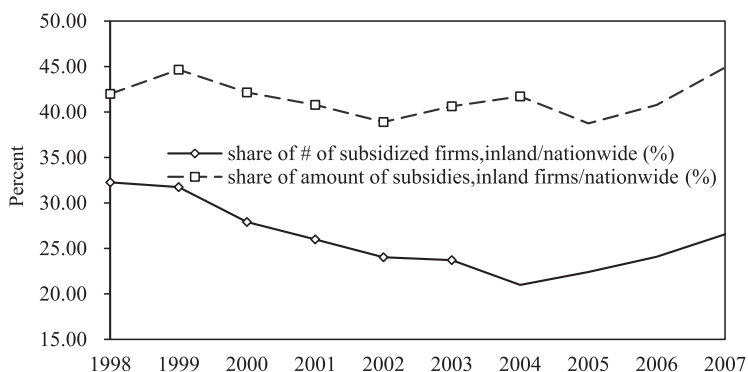
An inflection point in the labor market appeared simultaneously with the 2003 inflection in allocation of economic resources between regions. The first remarkable phenomenon was the notable increase in wages both in coastal and inland area from 2003 to 2007 (Zhang et al. 2011), which provides evidence that is consistent with a labor shortage in the dual urban–rural economy.[9] This phenomenon might alternatively reflect administrative intervention, however. As noted, regional-balance land and finance policies exhibited rather visible inflection points. Economic resource allocation in favor of the inland areas

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9   See the review by Lu et al. (2011).

Figure 5. The proportion of city investment bonds of the inland provinces
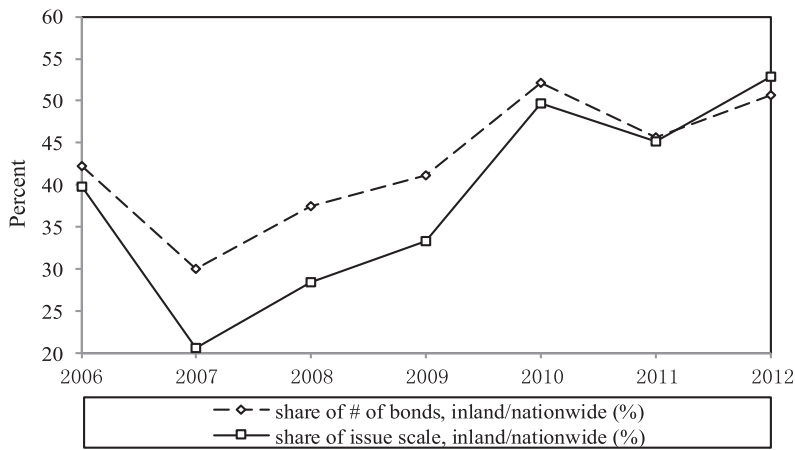
led to investment and, correspondingly, an increase in demand for labor in the inland areas. Lu et al. (2015) show that the rising demand for labor as a result of investment to the inland, and the increase in the minimum wages increased the wage in inland China. In the eastern provinces, the relatively strict land supply policy inflated housing prices, thus leading to a significant increase in living costs, and consequently wage growth. The mechanism for such wage increases appeared in the eastern region after 2003 (Lu et al. 2015). At the same time, to narrow the gap between urban and rural areas, subsidies and support for the agricultural sector and rural areas were strengthened, from 2004 and in the six subsequent consecutive years. To this end, central government documents were circulated that planned to increase the peasant income, primarily by augmenting investments in agriculture and tax cuts, and by increasing the scope and strength of agricultural subsidies. These pro-agricultural policies may also have increased the income of the peasants who stayed in the rural areas, and as well as the reservation wages of former peasants who migrated to the cities to work. It should not be considered a coincidence that around 2003, the inflection point of regional balance policy and that of wages appeared at about the same time.

From the perspective of factor mobility, over the past ten years China's economy has experienced a process of people moving to the developed regions at the same time that government resources have moved to underdeveloped regions. On the one hand, market forces supported an ongoing agglomeration trend that drove labor inflows to China's eastern coastal areas and large cities. On the other hand, the government substantially strengthened the policy measures to guide the flow of government resources into inland

areas through administrative means, which was reflected by the inflection point of policies around the year 2003. It is worth noting that although these policies for balanced inter-regional development indeed improved regional economic convergence, this type of balanced development was under preconditions of insufficient labor mobility, administrative means-based resource allocation and distortion of factor prices. The cost was an enormous efficiency loss. The key to the problem lies in the choice of the regional development strategy. In fact, the relationship between efficiency and regional balance is not either–or. Under the condition that factors flow freely, and the target of balance is set from the per capita perspective, the two are unified. Yet if changes in resource allocation among regions are overly interfered by administrative measures, even though regional economic convergence would have been improved, efficiency loss might also occur. The economic development in China over the past decade was like a natural experiment, which allows us to assess pros and cons of the policies on balanced regional development.

4. Associated consequence of regional convergence: The turning point of productivity growth

In this section, manufacturing enterprise data were used to assess productivity trends. Our data set was constructed using China's Annual Surveys of Industrial Production from 1998 to 2007. This data set contains information on all state-owned manufacturing enterprises and non–state-owned manufacturing enterprises with annual sales exceeding 500 million RMB in 30 two-digit industries. Based on the requirements of our analysis, some outliers were excluded, including any observations where: enterprises were not in business; main business income was below the threshold; key variables such as business age, number of employees, export, or industry code were missing; the number of employees was less than eight; firm age was recorded as negative or greater than 100 years; and observations where information was clearly inaccurate (e.g., negative observations for asset depreciation). After exclusion of the outliers, the number of enterprises in the data set declined from 2,224,380 to 1,779,032, or by about 20 percent. In addition, in order to remove the influence of extreme values, TFP data each year were subjected to winsorization: Enterprises with TFP values in the lowest 0.5 percent and highest 0.5 percent range were re-assigned with the 0.5 percent and 99.5 percent quantile values of all enterprises that year, respectively. Regarding the measurement of enterprise productivity, a common approach in the literature is to use TFP, which is estimated using the Olley and Parks method (1996) in this paper. Our estimation process follows Yang (2015), which improved the TFP estimation in Brandt et al. (2012). Yang uses officially reported price deflators, whereas Brandt et al. use nominal and real output reported by enterprises to construct the deflators. The input deflators used by Yang are input–output tables from 1997, 2002, and 2007, whereas Brandt et al. only used the table for a single year, ignoring changes over time. We also follow Yang's approach to attain more accurate estimates of firm-level capital stock.

Figure 6. TFP growth rate in China
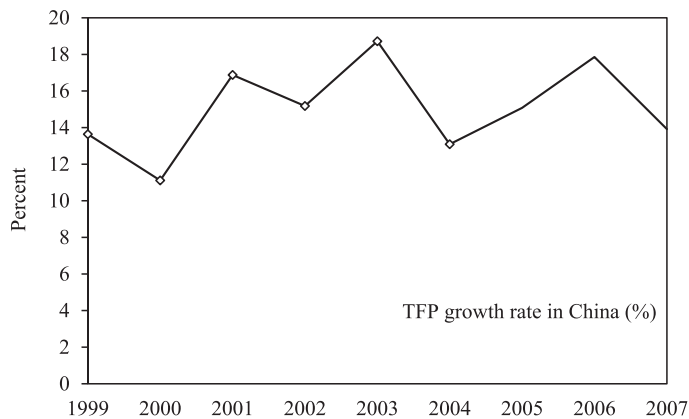
As illustrated in Figure 6, although the TFP growth rate varied from year to year prior to 2003, the main trend was upward; yet between 2003 and 2007, the increasing trend of TFP growth rate stopped.[10] The overall efficiency of a country or a sector is based on the combined effects of organizational efficiency and allocative efficiency. *Organizational efficiency* refers to internal efficiency in a specific production unit, such as a firm, whereas *allocative efficiency* indicates whether national resources are allocated to the departments or enterprises with the highest organizational efficiency. Organizational efficiency, which we measure via firm-level TFP, is influenced by two general factors: technology and institutions. Typically, in a stable institutional setting, the enterprise's technological progress will continue to improve TFP. Institutional factors (concerning corporate governance structures and the policy environment), however, may either improve or reduce the TFP achieved by firms. While changes in individual firm TFP may be caused by technological and/or institutional factors, if the average TFP growth rate shows a notable turning point which coincides with a turning point in the policy environment, the coincidence suggests that institutional factors may have played a role.

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10 From 2003 to 2004, the change of TFP growth rate was particularly large compared with other years, possibly related to the sudden increase in sample numbers in 2004. 2004 was a census year, and after exclusion of the outliers the number of enterprises in 2004 increased by 44.57 percent compared with 2003, and the number of enterprises in 2005 was smaller than that in 2004. The abnormal changes in the number of samples might cause a systematic bias in our estimates for business TFP in 2004 and 2005. In all the analyses in the present study, all values in 2004 were treated as outliers.

**Figure 7. The convergence of enterprise TFP across regions**
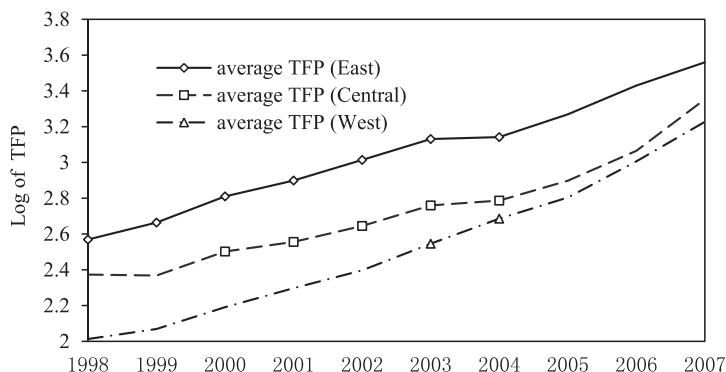
Changes in TFP levels in different regions help to explain developments in TFP growth rates. As illustrated in Figure 7, the overall difference in the mean TFP level between the eastern, central, and western enterprises declined after 2003. This convergence trend was driven primarily by the TFP slowdown in the east, however. In our sample, because firms in the eastern region account for the majority of all enterprises, their share of overall industrial employment always exceeded 70 percent. As a result, the slowdown of TFP growth in the east had a strong influence on the overall national TFP growth rate. The slowdown of mean TFP growth in the eastern region may have something to do with the government's policies, including the closedown of the development zones in 2003. The definitions of development zone enterprises in Figures 8–10 were the same as that in Figure 2. Treated firms are those that were development zone firms in 2003 and were not in 2004, along with the condition that the firms stay in the same county/district in 2003 and 2004. Control groups 1–3 refer to firms that were non-development zone firms throughout 2003 and 2004, development zone firms throughout 2003 and 2004, and the mixture of the former two groups, respectively. Figure 8 shows that after 2003, the enterprises that no longer benefited from preferential policies due to a closedown of the development zones experienced declines in productivity. This suggests that the earlier policies on development zones improved the productivity levels of enterprises within those development zones.

However, if the sample was divided into two groups based on whether the distance between the city where the enterprise located and the three major port cities (Shanghai, Hong Kong and Tianjin, whichever the shortest) exceeded 500 km, it was found that the productivity decline of the enterprises that had originally benefited from preferential policies due to abolishment of development zones involved the enterprises located within
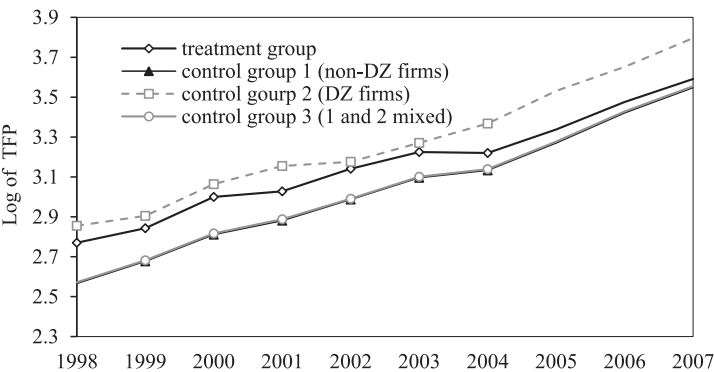
Figure 8. The impact of development zone (DZ) closure on enterprise efficiency
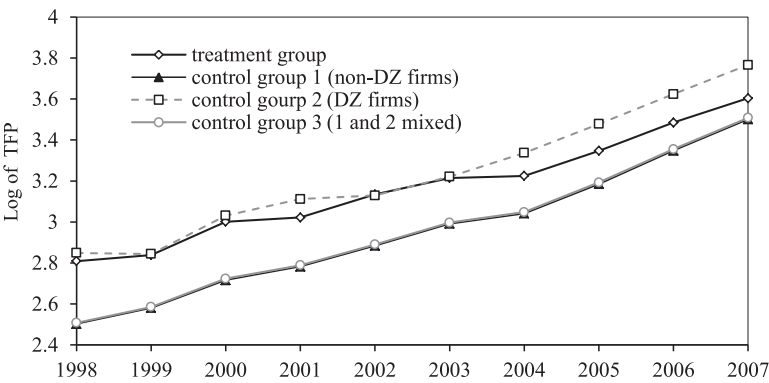
Figure 9. The impact of development zone (DZ) closure on coastal regions (within 500 km from major seaports)

500 km from major ports. In the inland areas, changes in the average TFP of enterprises that had been located in zones that were closed after 2003 did not differ significantly from that of enterprises not affected directly by the closedown of development zones. This is clear if one compares Figure 9 and Figure 10, which suggest that the closedown inhibited the TFP growth in the eastern regions where the development zones played a positive role. The causal effects of development zone closure on firm-level TFP have been formally tested using a difference-in-difference method by Chen et al. (2015b). It is worth noting that the impact on mean TFP of enterprises in eastern China caused by closure of zones was further amplified by the fact that the number of enterprises affected by policy shocks

Figure 10. The impact of development zone (DZ) closure on inland regions (more than 500 km away from major seaports)
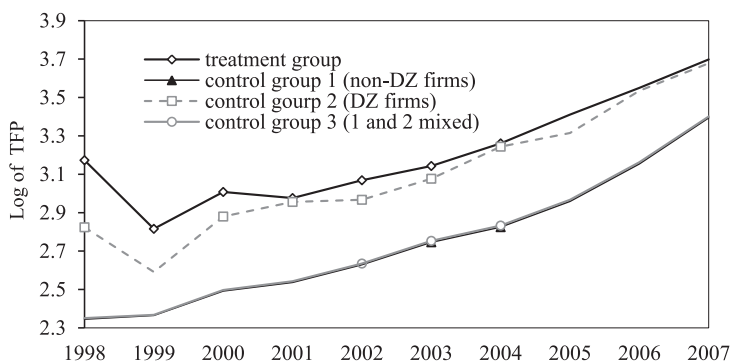
in the coastal areas was larger than the number in the inland areas. In the industrial enterprise database, between 2003 and 2004 there were 13,040 enterprises that were no longer located in a development zone because of development zone closure, and among these, 11,433 were less than 500 km away from a major port. These firms accounted for 87.7 percent of all enterprises affected by the policy shock. In addition, these 11,433 enterprises accounted for about 11.7 percent of all enterprises less than 500 km away from a major port, whereas for enterprises more than 500 km away from a major port, the corresponding proportion was only 4.1 percent.[11]

5. Deterioration of allocative efficiency

In a competitive market environment, if the flow of resources is not impeded by distortions, then total factor productivity measured by output value (TFPR) should be equal for all enterprises. If it isn't, resources will continue to flow from the enterprises with low productivity to those with high productivity (Hsieh and Klenow 2009). As discussed earlier, factor market distortions in China may cause its resource allocation to depart from the ideal. In addition to the labor market and land regulations, which have an effect on resource allocation, financial market regulations have further effects due to the fact that reductions in the cost of capital disproportionately benefit state-owned enterprises (Garnaut et al. 2000). Taken together, we expect the distortions to the free flow of factors may have hindered the convergence of TFPR among enterprises.

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11 In the calculation of the three proportions, abnormal samples were excluded; in addition, only enterprises that were included in both the 2003 sample and the 2004 sample were retained for the calculation.

As described earlier, after 2003 various resources controlled by the government (e.g. construction land quotas and transfer payments) were preferentially allocated to the central and western regions of China. Although these policies were implemented to facilitate regional balance, their effect on resource allocations may have led to three detrimental outcomes. First, because resources are scarce, an allocation bias towards the central and western regions increases factor prices in the east, and may have reduced production by some eastern enterprises. Second, because of policy preferences, some central and western enterprises may have survived only due to the relatively low factor prices provided by the policy. Third, as regional policy bias led to a dispersal of investment among regions and a slowdown of agglomeration-based growth, the efficiency of resource allocation across regions may have suffered.
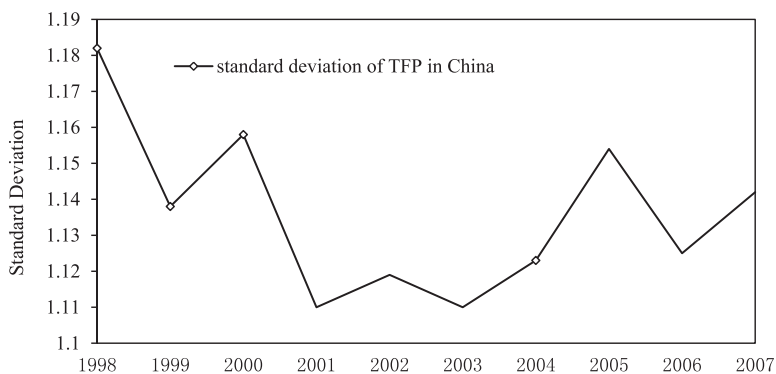
In the present study, we use the standard deviation of firm TFP to measure allocative efficiency across enterprises. Because this indicator reflects differences in efficiency between enterprises, increases in this measure suggest that the allocative efficiency among enterprises has deteriorated.[12]

In the analysis of TFP dispersion, we begin with the overall trend. As illustrated in Figure 11, prior to 2001 the standard deviation of TFP was declining; yet after 2003, it showed a notable increase. Because of the presence of differences in industries, labor heterogeneity, labor specificity and other factors, it is difficult to evaluate the overall efficiency of the TFP distribution of a country over a given period of time, yet the change in the trend direction raises questions.
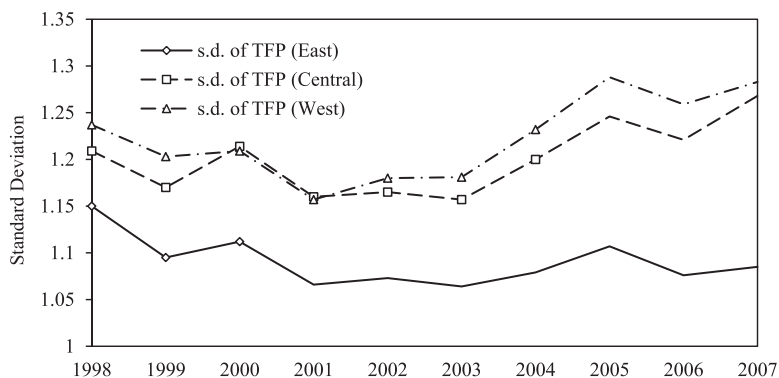
Next, to examine whether changes in the dispersion of TFP were related to different trends in China's regions, enterprises nationwide were divided into three groups based on their location. To this end, we form an Eastern group, a Central group and a Western group. The within-group standard deviation of TFP was calculated and is displayed in Figure 12. The first information in Figure 12 is that in the spatial dimension of the entire sample set, the TFP dispersion of the Eastern group, where enterprises were more clustered and competition was more intense than the other two groups, was lower than both

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12 According to Hsieh and Klenow (2009), when enterprises in the same industry are faced with varying degrees of factor mobility barriers, the marginal value of capital or labor of different enterprises will differ, and this leads to inefficient allocation of resources. They note that when the enterprise's TFP and TFPR fit the joint normal distribution, the damage to the overall TFP of the industry caused by varying degrees of factor mobility barriers among different enterprises could be measured with the variance of TFPR within the industry. Strictly speaking, in the present study, lnTFPR was calculated, where TFPR was defined by Hsieh and Klenow. This was because in estimating TFP, the measure Y in the production function was value-added (the value of output rather than output itself). In addition, there was no way for us to calculate TFP, which is based on output rather than output value, because that would require knowledge on the sales prices of each enterprise's products.

**Figure 11. The dispersion of enterprise TFP in China, 1998–2007**

Figure 12. TFP dispersion by region, 1998–2007

the Central and the Western groups. Second, following the increases in regional policy bias in 2003, the increase in the TFP dispersion was more notable in the Central and the Western groups than in the Eastern group. This suggests that the efficiency of resource allocation in deteriorated after 2003. Because the market economy is less developed in China there is less competition in inland regions compared with the east. Therefore, the flow of resources to regions far away from major ports is not conducive to improving the efficiency of resource allocation.[13]   In addition, regarding changes in the number of

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13 Fan et al. (2011) constructed an index, the National Economic Research Institute (NERI) index, to
    measure the extent of marketization for each province in China. According to their calculation,

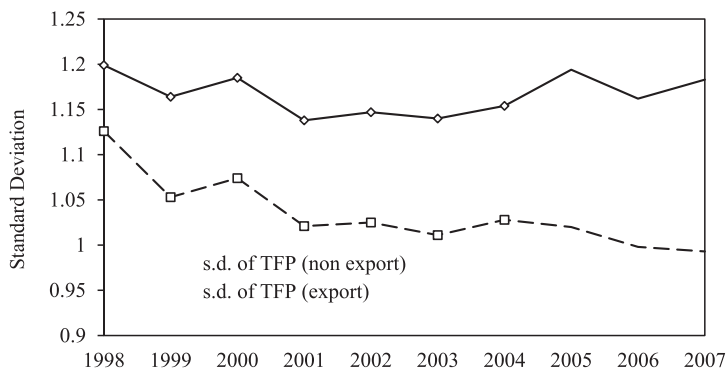**Figure 13. The standard deviation of TFP: State-owned versus non–state-owned enterprises**
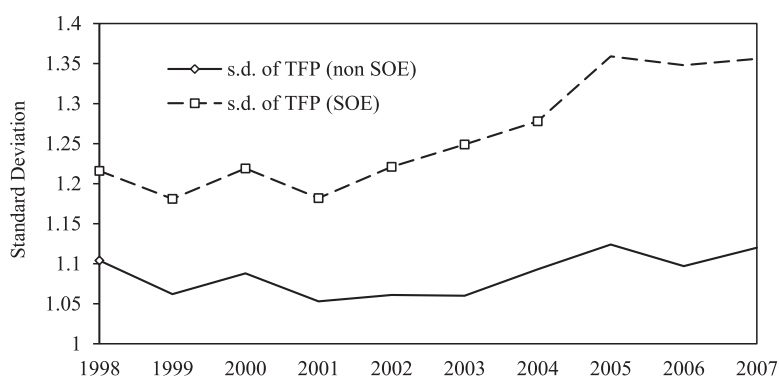
enterprises each year, the number of enterprises in the east did not experience a reduced share after 2003.The fact that the share of enterprises in the east was 73.2 percent in 2003 and 74.1 percent in 2007 suggests that preferential policies favoring central and western regions did not reverse the trend of enterprises clustering in the east.[14]

If, as inferred, the TFP developments in central and western regions after 2003 was due to policies with regional bias that weakened the internal competition within the central and western regions, then a logical conclusion would be that the efficiency of resource allocation in sectors that received more protection from the preferential policies should have declined compared with sectors not protected by these policies, particularly after 2003. To investigate this question, changes in the TFP dispersion of state-owned and non–state-owned sectors, and of export and non-export sectors, were examined. In general, state-owned sectors received more support from the policies.[15] Hence, if protection indeed reduced the efficiency of resource allocation, then the allocative efficiency of state-owned sectors should be lower than that of non–state-owned sectors. As illustrated in Figure 13, compared with non–state-owned sectors, the TFP dispersion of state-owned sectors was indeed higher. In addition, after 2003 the degradation of the allocative efficiency of the state-owed sectors was exacerbated. The degradation of the allocative

in 2007, the average NERI index of eastern, central and western provinces is 8.85, 5.69, and 5.12 respectively.

14 Bao, Chen, and Wu (2013) found that during the period from 2002–09, employment growth in the eastern region was higher than the national average, whereas the employment growth in the central and western regions was lower than the national average. This suggests that from the perspective of employment, the clustering trend in the eastern region in fact increased.

15 Our data showed that during the entire sampling period, on average, subsidies received by state-owned enterprises remained higher than those received by the non–state-owned enterprises.
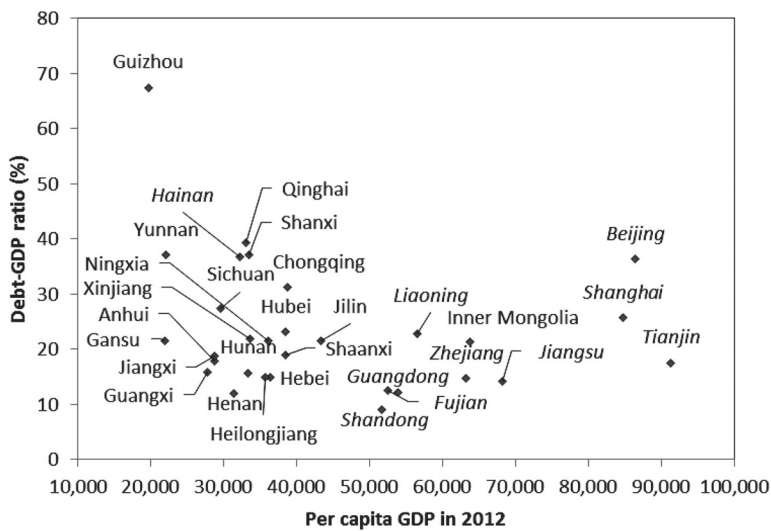
Figure 14. The standard deviation of TFP: export and non-export sectors

efficiency of state-owed sector may well have occurred because of the increasing policy bias favoring state-owned enterprises. Using the sample of listed firms in China, Herrala and Jia (2015) found an increasing favoritism of state-owned firms in credit availability from 2003 to 2011. Changes in the TFP dispersion of the export and non-export sectors over time were also examined. As the export sectors face competition in the international market, their allocative efficiency should be higher than the non-export sectors. Meanwhile, from 2001 the subsidies received by export enterprises were lower on average than those received by non-export enterprises; in other words, relative to the non-export enterprises, the export enterprises were on average less protected by domestic policies. As expected, Figure 14 shows that across the efficiency of resource allocation in the export sectors was superior to that of the non-export sectors, and the allocative efficiency of the exporters did not deteriorate after 2003.

Other work in the literature has noted a decline in the efficiency of resource allocation in China after 2003. Shi (2013) examined the same database and found that the efficiency of inter-provincial resource allocation deteriorated after 2003. He calculated the improvement of TFP at the national level that could result from the optimization of inter-provincial allocation of resources, and found that between 2005 and 2007 the calculated value of such improvement was growing over time. This in turn suggests that between 2005 and 2007, the actual inter-provincial allocation of resources was deteriorating. Moreover, in addition to the dispersion of TFP, the efficiency of resource allocation can also be assessed by examining differences in the economic effects of a particular policy across different regions. In China, the allocation of land for construction was most severely subject to administrative intervention compared to the allocation of other resources. The allocation of construction land between regions is decided entirely by the central government,

Figure 15. The economic development level measured by per capita GDP and the ratio of debt stock to GDP in 2012

and has become an important tool to implement its regional strategy. It can be deduced that the land use efficiency is relatively low in the Central and Western regions, and after 2003, due to only the strict implementation of land use planning biased toward the central and western regions, the efficiency of land use in the central and western regions should have worsened. Regarding the actual data, Lu (2011) calculated the growth rate of non-agricultural population and that of the built-up areas; he found that between 1990 and 2006, the rate of expansion of the built-up areas in the central and western regions were 2.94 and 5.23 percentage points higher than the growth rate of their non-agricultural populations, respectively, whereas in the eastern region, this difference was only 1.8 percentage points. This suggests high land quotas received by the central and western regions in fact disjointed their land urbanization from population urbanization, and urban expansion did not drive synchronized employment growth. In terms of the land use efficiency, compared with the years prior to 2000, the gap in the land use efficiency between the inland and the coastal areas from 2000–06 has expanded substantially.

What is even more worrisome is that while the efficiency of resource allocation in the Central and Western regions deteriorated, the situation regarding local government debts was not the least bit optimistic. Figure 15 is a scatter plot of provincial per capita GDP

versus the proportion of debt stock as a percentage of the provincial GDP in 2012. As can be seen, provinces that had a high proportion of debt stock as a percentage of the provincial GDP all had a relatively low per capita GDP, the most prominent examples being Guizhou, which has the lowest per capita GDP and the highest ratio of debt stock to GDP. Such patterns of inter-provincial debt distribution also resulted from polices that aimed to achieve inter-regional balance through a *moving money* approach. The goal of inter-regional balance throughout the total economy motivated the local governments of the underdeveloped regions to expand their scale of investment. Because of their geographical disadvantages, however, private investments could often only be attracted if they were offered cheaper factors (mainly land) and superior infrastructure relative to conditions in China's more developed areas. The central government's land and financial policies in favor of the central and western regions provided these less-developed regions with conditions to implement these policies. For example, the allocation of construction land quotas ensured that the central and western provinces had ample land supplies for development; preferential policies on finance and transfer payments also made it easier for these provinces to raise funds when compared with other provinces. These factors encouraged the less-developed areas to borrow heavily in order to promote local investment. The cost of land transport is higher than that of sea transport, however. Therefore, in the context of globalization, regions far from the ports are not well-suited for the development of an export-oriented economy. If the geographic conditions of the inland areas limit their potential for industrialization and constrain their future solvency while their debts are growing rapidly, then, for inland provinces with high debts, the debt default risk will be especially high.

6. Conclusions and implications regarding policymaking

For large countries such as China, a challenging theoretical and practical question is how to initiate and implement regional development policies that value both efficiency and regional balance. In theory, there are two ways to balance inter-regional development per capita. In the absence of unimpeded worker migration, resources can be allocated to the less-developed regions,that is, the so-called *moving money* approach. Alternatively, balance can be achieved through the elimination of barriers to trans-regional worker migration, namely, the *moving people* approach. Because of restrictions on migration during a period of growing economic concentration, imbalances in regional development in China intensified. For this reason, around 2003 China strengthened its *moving money* policies to pursue inter-regional balance.

However, attempts to use the *moving money* approach to achieve inter-regional balance also result in a significant loss of efficiency, and may lead to considerable risk. This paper presents evidence based on enterprise TFP which suggests that the allocation of resources

after 2003 deteriorated. This efficiency loss is manifested in the decline in China's overall TFP growth rate—a decline largely due to the limiting effect of inter-regional balance policies on China's eastern regions. The inefficiency of the resource allocation is also suggested by TFP dispersion, which was encouraged by regional factor distortions. In addition to these efficiency losses, the emphasis on *moving money* policies has caused the less-developed provinces to bear heavy debts, and to take on enormous risks.

In retrospect, China's regional development strategy and the resulting economic development over the past decade demonstrate that short-run sacrifices of efficiency in exchange for balance are necessary. In light of China's worsening efficiency and local debts, it must be noted that the continued pursuit of inter-regional balance through the artificial distortion of factor markets will ultimately threaten the ongoing development of the entire country. In particular, since the distortion of factor markets undermines competition, and fragments the spatial allocation of resources, the consequent reductions in the efficiency of resource allocation will ultimately harm the international competitiveness of China's economy. Further, for regions where the future potential for economic growth is subject to natural and geographical conditions, the rapid accumulation of local government's debt, along with inefficient government investment, generates risk in financial markets.

As a large developing country, China must find a regional development path that sustainably benefits both balance and efficiency. In other words, inter-regional balance per capita should be achieved by removing barriers to population flow. If the factors of production (especially labor) can flow freely between urban and rural areas and between regions, the realization of balance in per capita income and quality of life will become relatively easy, as has been proven both in theory and through the experiences of other countries (World Bank 2009). Meanwhile, when the factors flow freely, agglomeration is enabled, which would allow China to realize the advantages that are available to large countries. In this sense, balance and efficiency are not contradictory, and both can be achieved simultaneously.

To implement a regional development strategy to achieve both efficiency and balance, the household registration system and the land system must become the focus of the next round of reform. Over recent years, due to the population aging trend and the ending of demographic dividend, China's economy will face the pressure of reduced growth rates (Perkins and Rawski 2008). To maintain sustained economic growth, a new driving force for economic growth must be sought. Reforming various distorted systems will release tremendous growth potential. As the household registration system will not completely disappear overnight, and the construction land quota system is still the means by which the central government controls the development of its land supply, the key is to match the supply of land for construction with the capacity for creating local non-agricultural employment.

If factors of production are more efficiently allocated in the future, China's economy and population will cluster further along coastal areas and large cities located inland. Meanwhile, the gap in per capita income and quality of life between regions will eventually shrink. Along this path, the central government still needs to play an important coordinating role in promoting relationships between local areas and balanced development. Yet compared to the present, the financial transfer payments from the central government to the less-developed regions should place a higher weight on investments in education, health, and other public services, in addition to the construction of infrastructure that is needed for economic development. In other words, freer labor mobility, complemented by financial transfer payments from the central government to the less developed areas, provides a strategy that combines the benefits of *moving people* and *moving money*.

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