Regional disparity of labor's share in China: Evidence and explanation

Chi, Wei and Xiaoye, Qian

School of Economics and Management, Tsinghua University

November 2011

Regional disparity of labor's share in China: Evidence and explanation

Wei CHI
School of Economics and Management
Tsinghua University
Beijing, China 100084
chiw@sem.tsinghua.edu.cn

Xiaoye QIAN
School of Economics and Management
Tsinghua University
Beijing, China 100084
qianxy.08@sem.tsinghua.edu.cn

Corresponding author: Wei Chi, email: chiw@sem.tsinghua.edu.cn; Tel.: (8610) 62795072; Fax: (8610) 62772021.
This research is supported by Tsinghua University research grant (grant no. 2010THZ0) and Chinese National Social Science foundation key grants (grant no. 10zd&007). We thank the participants of CES 2011 Beijing meeting and the WEA 86th annual conference for valuable comments.

Regional disparity of labor's share in China: Evidence and explanation

Abstract:

Despite the "growth miracle" of recent decades, labor's share, i.e., the share of total labor compensation in GDP, has decreased in China. Labor's share is an important indicator of the primary distribution of national income, and its fall has drawn significant attention from researchers and policymakers. As China's many regions have different development levels and economic structures, it is very likely that labor's share will differ across regions. Thus, it is important to examine the regional disparity of labor's share. Using Chinese provincial data from 1997 to 2007, we find a significant difference in labor's share between eastern and western China. Then, we use spatial cross-sectional and panel models to show the significant effect of industrial composition and ownership structure on regional labor shares.

Key words: labor's share; income distribution; regional disparity

JEL codes: J24 J30 R11

1. Introduction

Despite the recent growth miracle experienced in China, labor's share, i.e., the share of GDP income attributed to labor, has decreased. Labor's share is an important indicator of the primary distribution of national income. Previous research has indicated that the recent widening of income inequality in China is related to the primary distribution of national income and, specifically, a low labor share (Li et al., 2009). Moreover, China has recently attempted to transform its economy from an investment- and export-led system toward a consumption-driven structure. Increasing labor's share and hence raising domestic consumption levels are crucial if China wishes to successfully transform its economy. Therefore, it is not surprising that since 2005, China's falling labor's share has drawn significant attention from both researchers and policymakers (Li S., 2007; Cai, 2005, 2006; Li D., 2007).

While several studies have examined the decrease in labor's share in China at a national level (Bai et al., 2009a; Li et al., 2009), there is little research on regional disparity regarding labor's share. As China's regions display varying levels of development and economic structure, it is likely that labor's share will also vary among regions. Thus, it is important to examine the regional disparity in labor's share to develop regional-specific policies.

First, using provincial panel data from 1997 to 2007, we describe the regional differentials in labor's share and its evolution over the 10-year period. We created spatial maps for each year and our results show that despite the lower levels of labor income, labor's share was high in western provinces from 1997 to 2007. Second, we attempt to explain regional disparity in labor's share. We estimated cross-sectional spatial regression models and spatial panel models. We found that industrial structure and ownership structure are the two main factors that influence labor's share. The

higher levels of labor's share in the western provinces are significantly related to a higher share of agricultural industries and state-owned enterprises.

The structure of this paper is as follows: In Section 2, we review theoretical and empirical studies on labor's share and regional income issues. Section 3 describes regional disparity regarding labor's share and its evolution from 1997 to 2007. Section 4 presents spatial models and empirical results. Section 5 summarizes and discusses the results.

2. Related studies

A fundamental dimension of income distribution is the division of national income between labor and capital. Studies on labor's share are motivated by the desire to better understand this economic feature (Boggio et al., 2009). Labor's share has been a topic of enduring interest to economists, and the earliest work can be traced back to David Ricardo (Kruger, 1999). Empirical studies on labor's share emerged as early as the 1960s. Gujarati (1969) found that from 1949 to 1964, labor's share in the U.S. manufacturing industry had fallen from 0.55 to 0.52. Poterba (1997) showed that the share of labor's income in U.S. GDP had increased by four percentage points from 1959 to 1996; however, this increase was mostly attributed to the expansion of workers' non-cash benefits, while wage share had fallen by three percentage points during this period. Raffalovich et al. (1992) also found that the share of total labor compensation in GDP increased in the U.S. from 1950 to 1980. After examining the labor share of different industries in the U.S. from 1958 to 1996, Young (2006) pointed out that labor's share in U.S. GDP had been relatively stable. This was due, however, to two offsetting effects: on the one hand, the share of labor income in the manufacturing sector had decreased sharply; on the other hand, labor's share in the service industry had increased. In addition to the aforementioned studies that focused on the U.S. labor share, De Serres et al. (2001) and Moral and Genre (2007)

studied labor's share in the Euro zone. Both studies found a downward trend of labor's share from the 1970s to early 2000, yet the absolute value and the change in labor's share were quite different across Euro zone countries. Gollin (2002) used United Nations data from 81 countries, and also found a large cross-country difference in labor shares.

In addition to empirical studies, researchers have also conducted theoretical analyses of the factors that influence labor's share. Bentolila and Saint-Paul (2003) developed a model, showing that labor's share is essentially related to the capital-output ratio and that the relationship may be affected by factors such as capital-augmenting technical progress and discrepancies between marginal products of labor and real wages. These discrepancies could be caused by union bargaining power. Blanchard et al. (1997) have also incorporated firm and employee bargaining power in the model to explain a country's movement in labor's share. Empirically, Rafflaovich et al. (1992) did not find evidence that a tight labor market increased labor income shares by increasing the bargaining power of labor.

Moreover, there is abundant evidence that suggests that the movement of a country's labor share is related to the sectoral composition of the economy. Young (2006) showed that the movement of labor's share varied across sectors and hence the sectoral composition affected the aggregate labor share of an economy. De Serres et al. (2001) and Moral and Genre (2007) also demonstrated that a shift in the sectoral composition of an economy accounted for a significant proportion of the decline in labor's share in both European countries and the U.S. In addition, measurement errors and the different methods used to calculate employee compensation may also contribute to the different labor shares reported across countries (Gollin, 2002; Krueger, 1999). Other factors proposed by researchers to explain labor's share include globalization and international trade (Harrison, 2002).

Empirical studies in China concerning labor's share are relatively new. Cai (2005, 2006) was amongst the first to notice the falling trend in China's labor share. Li et al. (2009) proposed a U-shaped pattern regarding the movement of labor's share and suggested the roles of industrial composition and labor bargaining power in determining labor's share. Bai and Qian (2009a, 2009b) considered measurement errors and other related data problems, and showed that measurement issues were behind a significant proportion of the decline in China's labor share. Bai et al. (2008) used firm-level data to study the determinants of labor's share in different industries in China. They found that a firm's monopolistic power and ownership structure could explain labor's share, for instance, state-owned enterprises had a lower capital share than private companies; however changes in factor input and technology could not explain labor's share for Chinese firms.

Although there are several studies, as mentioned above, that have analyzed China's labor share, these studies have used data at either country or firm-level. There have been no studies regarding the regional disparity in labor's share in China. China is a country with vast territory. Different regions have different levels of economic and social development. Regional economic disparity has been intensively discussed. Previous studies have examined regional disparity regarding economic growth and regional wage differentials (Jian et al., 1996; Fleisher and Chen, 1997; Wang and Yao, 2001; Cai et al., 2002), but not in terms of the primary distribution of national income and labor's share. Our study attempts to fill this void in empirical research by first demonstrating the regional differences in labor's share and, second, by using spatial econometric models to explain regional disparity.

3. Regional differentials in labor's share

We follow previous studies and calculate labor's share as the share of the total labor compensation in national income. Data regarding the total labor compensation are sourced from

National Statistical Yearbooks, in which the total labor compensation is defined as "all the compensation paid to labor for their productive activities." In this definition, labor's compensation contains all forms of wages, bonuses, and allowances. For self-employed workers, due to the difficulty in distinguishing labor compensation and operation profit, both are classified as labor compensation. Gollin (2002) stated that an incorrect measurement of self-employed income represented the majority of bias in the calculation of labor's share. By including the operation profits of self-employed workers, we tend to overestimate labor's share in China.

GDP, employment, and other economic variables are also sourced from National Statistical Yearbooks for 1997–2007. We calculate the average labor compensation for each province by dividing the total labor compensation by total employment. Total employment is defined by the National Bureau of Statistics of China as "the population above 16 years of age who are engaged in work and earn labor income and operating income." It includes both urban and rural workers.

In Table 1 we show the average labor compensation and labor's share for 31 provinces and municipal cities for selected years. Shanghai, the most developed city in China, had the highest average labor compensation (28.6 thousand Yuan per year per worker), but the lowest labor share for 1997–2007. In contrast, labor's shares for Guangxi and Tibet were greater than 0.6, indicating that over 60% of provincial GDP was distributed to labor, rather than to capital and government. In these two provinces, the average labor compensation was relatively low.

To show the movement of labor's share in different regions, we selected five provinces and municipal cities from five major regions in China, Beijing (representing northern China), Liaoning (northeast China), Shanxi (central China), Guangdong (southeast China), and Chongqing (western China). The labor shares for the five provinces and municipal cities are plotted for 1997–2007. Figure

1 suggests that not only are the levels of labor's share different across the regions, but also the movement of labor's share. Generally speaking, the five provinces all experienced a decrease in labor's share between 1997 and 2007. However, the magnitude and timeline of the decrease is different for different provinces. Beijing shows that labor's share was in decline prior to 2003 and then increased after that date.

Figures 2 and 3 show spatial maps of the average labor compensation and labor's share. Each year provinces are classified into five quantiles based on the average labor compensation (Figure 2) or labor's share (Figure 3). The maps show five shades of blue from light to dark, corresponding to the five quantiles.

As shown in Figure 2, there exists a large variation in the average labor compensation across the country. The coastal areas had significantly higher average labor compensation than central and western areas. Guangdong, Fujian, Jiangsu, Shanghai, and Liaoning had the highest average labor compensation levels, and their leading positions have not changed over time.

Compared with Figure 2, the spatial maps in Figure 3 show the different patterns of labor's shares across the regions. While the coastal provinces had relatively high average labor compensation, they had lower labor shares compared with western provinces. Sichuan and Guangdong clearly demonstrate this contradiction.

Figure 3 also captures the movement of spatial distribution regarding labor's share. After 2003, as a whole, China experienced a decrease in labor's share. However, the most significant fall in labor's shares occurred in the north and northeast areas. Take Inner Mongolia as an example—it was in the first tier of provinces in terms of labor's share from 1998 to 2003, and then fell to the bottom tier in the following 5 years.

4. Determinants of labor's shares in China

4. 1 Data

Data used in this study are sourced from China Statistical Yearbooks and China Labor Statistical Yearbooks, from 1997 to 2007.[1] Total labor compensation, GDP, total outputs from the agricultural, industrial, and service sectors, net export, size of labor force, the number of employees working for enterprises of different ownership type, fixed-capital investment and provincial patent applications were selected from the China Statistical Yearbooks. Since 1996, the educational attainment of workers has been reported in Labor Statistical Yearbooks. The share of international trade in GDP is calculated as the ratio of net exports to GDP. In Appendix, the mean and standard deviation of key variables are reported.

A spatial coordinate matrix for spatial regression models is generated using X-Y coordinates obtained from the fundamental geographic information system in the National Geomatics Center of China (NGCC). The fundamental geographic information system was built by NGCC to provide basic geographic information including geographic coordinates, provincial boundaries, administrative areas, rivers, and roads.

4. 2 Estimation of cross-sectional models

In geographical data, neighboring areas often share more common characteristics than those that are far apart due to the interaction and spillover effects between regions. Traditional OLS regressions assume that observations are independent and uncorrelated. Spatial dependence clearly violates these assumptions, thus rendering conventional OLS analysis invalid. Therefore, a spatial econometric

[1] In 1997, Chongqing became the fourth municipal city directly under central government. The other three cities are Beijing, Tianjin, and Shanghai. From 1997, Chongqing began reporting data separately from Sichuan province. As estimating spatial models requires a geographic matrix that consists of a fixed number of sub-areas, and despite the fact that workers' educational attainments have been available since 1996, we chose to use data from 1997 to meet the requirement for a fixed number of sub-areas. China Statistic Yearbooks did not report labor compensation for 2004 or 2008.

method is required in regional studies (Anselin, 1988; Baltagi et al., 2003; Anselin et al., 2008).

China is a country with an extensive land area. Economic variables such as GDP, employment, and fixed-capital investment are likely to be subject to spatial dependence (Wang and Shen, 2007). The spatial maps in Figure 3 already suggest the spatial dependence of labor's share between neighboring regions. To further justify the adoption of spatial regressions, we calculate Moran's *I* for labor's share and other key explanatory variables for 1997 to 2007. As shown in Table 2, Moran's *I* is significant for most variables. These results suggest that labor's share and other major explanatory variables are all significantly spatially correlated. Therefore, we use spatial regressions, including cross-sectional models and panel models, to estimate the regional disparity of labor's share.

The commonly used spatial regression models are Spatial Autoregressive Model (SAR) and Spatial Error Model (SEM). The difference between SAR and SEM lies in whether spatial dependence is modeled by the spatially lagged dependent variable or introduced in the disturbance term. Based on the diagnostic tests of spatial dependence, we choose to use SEM in this study.

$$ls = \beta_1 + \beta_2 X + \varepsilon \qquad (1)$$

$$\varepsilon = \lambda W \varepsilon + \mu$$

$$\mu \sim N(0, \sigma^2)$$

ls : labor's share, which is the ratio of the total labor compensation to GDP in a province. X refers to the factors that influence labor's share. *Xs* include the following variables:

(1) *Industry* represents the economic structure of a province, which is measured by the share of the outputs of the agricultural, industrial, and service sectors, in GDP. As indicated by neoclassic economic theory, the share of labor's income is related to the capital-output ratio and the elasticity of substitution between labor and capital in the production function. When the capital-labor substitution

elasticity is larger than 1,[2] the increase of capital-output ratio is associated with a lower labor's share (Bentolila and Saint-Paul, 2003). Therefore, under the condition of strong substitution between capital and labor, an industry with a lower capital-output ratio, such as the agricultural industry, would have a larger labor's share of output. This suggests that industry structure is a key explanatory variable for a region's labor share. In fact, industrial composition has been frequently used in earlier empirical studies to explain national or regional labor shares (Young, 2006; De Serres et al., 2001; Moral and Genre, 2007).

(2) ln *patent* is used to measure a province's technology progress. It is calculated as the logarithm of the number of invention patent applications per 10,000 population in a province. We have also used the total R&D investment of a province to indicate its investment in technology. As R&D investment data are missing for several years, we chose to report the results using ln *patent* . Bentolila and Saint-Paul (2003) pointed out that when capital and labor were highly substitutable, technical progress, specifically a capital-augmenting technical progress, will negatively influence labor's share, because capital-augmenting technical improvements would increase the marginal productivity of capital rather than that of labor. We use the number of patent applications to indicate technology progress in a region and expect that this measure will be negatively correlated with labor's share.

(3) *Ownership* indicates the ownership structure of a provincial economy, which is measured by "*State*" and "*non-state*", representing, the percentages of employees working in state-owned and collectively-owned firms, and those in the non-state-owned, respectively. The non-state-owned enterprises include private, foreign, and joint-stockholding enterprises. Blanchard et al. (1997) and

[2] This is the case in China. It was found that the elasticity of substitution between labor and capital was greater than 1 in 28 industries during 1996 to 1999 and in 20 industries during 2000 to 2005 (Yuan and Li, 2008).

Rafflaovich et al. (1992) suggest that labor's collective bargaining power affects labor's share. The power of labor, relative to that of capital, cannot be directly measured. However, in firms with different ownership structures, the collective power of labor may be different. Presumably in the state sector, workers may have a greater voice than those in private and foreign sectors. Thus, if a region has a larger state sector, we predict that labor's share is higher.

(4) *International trade* denotes a province's share of net exports in GDP. Previous studies have shown international trade to be a further influential factor in labor's share. Openness to trade is often associated with a fall in the protection of domestic labor-intensive goods (e.g., agricultural products), and is thus expected to lower labor's share (Harrison, 2002). Using cross-country data, Harrison (2002) found that the trade share had indeed a significantly negative effect on labor's share. Thus, we expect those regions with larger export sectors to have lower labor shares.

(5) *HC* refers to human capital variables. Specifically, we use three measures for human capital, "*Tertiary*", "*Secondary*", *and* "*Primary*", which denote the percentage of workers with tertiary, secondary, and primary educational attainment. On the one hand, a higher labor's share may be found for regions with a more educated workforce, as in these regions a higher share of labor compensation would go to high-skilled workers, and the wages of high-skilled workers are generally higher. On the other hand, a higher share of high-skilled workers is often associated with greater capital intensity and advanced technology, and thus a lower labor's share. Evidence from Poland appears to support the second hypothesis (Growiec, 2009).

(6) ln *FCI* is the logarithm of fixed-capital investment in a province in a year.

(7) ln *employee* is the logarithm of the number of employees in the labor force.

Following previous empirical studies (Bentolila and Saint-Paul, 2003; Li et al., 2009),

fixed-capital investment and the size of the labor force are included as control variables in the models.

W is the $n \times n$ spatial weight matrix. The parameter for the spatial error term is represented by λ. To ensure the robustness of the results, we use several spatial weight matrices including a contiguity matrix, K-nearest neighbor (KNN) matrix, and spatial coordinate matrix. Estimations using different matrices provide robust results; the result using the KNN matrix is reported.

The first three columns in Table 3 report the estimates of the impact of industrial composition on labor's share without control variables. The estimates with control variables are listed in the remaining columns. Several important findings emerge from Table 3: industrial composition is a crucial factor to explain the regional disparity of labor's share in China. The coefficient estimates for *agriculture* in the labor's share regression are significantly positive, while those for *industrial* are significantly negative. This result implies that provinces that have a larger share of the agricultural sector and a smaller share of the industrial sector tend to distribute more income to labor than to capital. A further finding is that the effect of the agricultural sector on labor's share has decreased in the last 5 years. Coefficient estimates for *agriculture* were 0.6–0.7 prior to 2003, and fell to approximately 0.4 after 2003. We also observe that the impact of the service sector on labor's share increased between 2005 and 2007. As predicted by Bentolila and Saint-Paul (2003), the growth of the service sector, which is a labor-intensive industry, had a positive effect on labor's share.

Table 4 reports the effect of ownership structure on labor's share. The coefficient estimates are generally positive, indicating that a larger state sector is associated with a higher labor's share, which supports the theory purported earlier. However, the estimate was only significant for 2000–2003, and after 2005 the estimate declined significantly. This may be due, in part, to the decline of labor's

bargaining power and/or increases in both technology and capital intensity in the state sector.[3]

The regressions are also conducted for the effect of human capital, technology progress, and international trade on labor's share. For brevity, the cross-sectional results are not reported. The results are generally consistent with the theory.

4. 3 Estimation with panel data models

Panel data are viewed as being more informative than cross-sectional or time-series data. With more variation and less collinearity among variables, panel data models often provide more efficient estimates (Hsiao, 1986). Elhorst (2003) developed panel models for spatial regression. Based on different decompositions of error terms, panel spatial models can be divided into fixed-effect and random effect models. Baltagi (2001) pointed out that if the data are limited to specific samples (such as the 31 provinces in this study), fixed-effect models are usually the better choice. We built a fixed-effect spatial model, which included all the explanatory factors used in the cross-sectional estimation. In this model, two unobserved effects are controlled for, i.e., spatial fixed-effects and temporal fixed-effects. Spatial fixed-effects refer to the effects that vary across regions but do not change over time, for example, factor endowment. Temporal fixed-effects reflect time-dependent effects, such as business cycles and temporary shocks, affecting all provinces.

$$ls = \beta_1 X + \eta + \delta + \mu \qquad (2)$$

$$\mu = \lambda(I_T W_N)\mu + \nu ,$$

where $\eta = i_T SF$ represents the spatial fixed-effects for each observation, and $\delta = TFi_N$ the temporal fixed-effects. SF and TF are the n-dimension column vectors of spatial and temporal fixed-effects. W_N is the neighboring weighted matrix.

[3] State-owned enterprises increasingly hire contract workers who have less bargaining power than formal employees, resulting in the decline of the overall bargaining power of employees in SOEs. The capital intensity of SOEs has also increased: annual fixed-capital investment of SOEs increased by 79% from 2003 to 2007, while it only increased by 31% from 2000 to 2003 (calculations based on China Statistical Yearbooks 2003–2008).

The estimates of the fixed-effect spatial error model are reported in Table 5. Controlling the two fixed-effects, the model can well explain the movement of labor's share in China. The fixed-effect estimates are consistent with the cross-sectional spatial estimates, indicating that a province's higher agricultural and state sector share is associated with a higher labor's share. Compared with provinces that have a larger share of primary level educated workers, provinces with more college-educated workers have a significantly lower labor share. This result supports Growiec (2009), who argued that higher human capital is complementary to capital and technology, and thus is more likely to be associated with a lower labor share. The negative impact of international trade on labor's share is shown in the spatial fixed-effect estimates, which confirms Harrison (2002). $\ln patent$, which measures the extent of technology progress in a province, also has a significantly negative coefficient estimate. It provides some supporting evidence to the theory that capital-augmenting technology progress is associated with a lower labor share. However, once fixed-capital investment is controlled for, the impact of patents on labor's share is no longer significant. This is due to the correlation between patents and fixed-capital investment, so when the two are included in the regression simultaneously, fixed-capital investment has a negative coefficient estimate, while patent is no longer significant. Finally, the estimates for the spatial autocorrelation coefficient are also reported in Table 5. It is significant in specifications (1) and (6), which justifies the use of the spatial fixed-effect models.

5. Conclusions

This paper addressed the important issues of the pattern and determinants of regional disparity in labor's share in China. Although there have been many studies on regional income disparity in China, few have considered regional disparity regarding the primary distribution of income between labor

and capital. With respect to labor's share in China, further regional level studies are still required. Our study used detailed provincial data and spatial econometric methods to estimate the effect of industrial composition, ownership structure, and other provincial economic factors on labor's share.

Empirical analysis identified several important findings. First, despite the lower average labor compensation, labor's share in western and central areas was high. In contrast, coastal areas with higher GDP and average labor incomes had lower labor shares. As labor's share is an important proxy for the primary distribution of national income, this finding implied that the distribution of aggregate output in underdeveloped areas is weighted more toward labor than capital.

Second, in the 10-year study period, coastal areas had the lowest labor shares, with levels in northern and central areas falling since 2003. With the additional evidence of an upward movement of labor's share in Beijing, our study provided some support to the theory that a U-shaped curve represents the evolution of labor's share. Western areas now lie in the upper left side of the U-shaped curve, while more developed areas sit at the bottom. The most developed areas in China, such as Beijing and Shanghai, appear to have moved away from the lower part of the curve and are now climbing up to the upper right of the curve.

Finally, we examined the factors that explain the regional disparity and movement of labor's share, and found that the industrial composition and ownership structure of a province are the two most important factors. The larger labor share in western provinces is strongly related to the greater share of agricultural industry and the state sector. Moreover, a lower trade share and less-advanced technology may also contribute to the higher labor share in the western provinces. We also drew the important conclusion that an increase in an economy's share of the service sector will have a positive effect on labor's share.

Based on these empirical results, we predict that as industrialization and trade openness increase and technology advances in western regions, these regions are likely to experience the same downward trend in labor's share that eastern and northern regions have experienced. To avoid a falling labor's share, while maintaining rapid economic growth, western regions may, rather than following the traditional path of development from agriculture to manufacturing and then to service, take measures to boost the service sector, especially regarding high-waged professional services, as the service sector has a positive effect on labor's share.

References:

[1] L. Anselin, Spatial Econometrics: Methods and Models, Dordrecht Kluwer Academic, 1988.

[2] L. Anselin, J.Le Gallo, H.Jayet, Spatial Panel Econometrics, Springer Berlin Heidelberg, 2008.

[3] C.B. Bai, Z.J. Qian, Factor income share in China: The Story behind the Statistics, Economic Research Journal. 3(2009a) 27-41 (Chinese).

[4] C.B. Bai, Z.J. Qian, Who has eroded residents' incomes? An analysis of China's national income distribution patterns, Social Sciences in China. 5(2009b) 99-115 (Chinese).

[5] C.B. Bai, Z.J. Qian, K.P. Wu, Determinants of factor shares in China's industrial sector, Economic Research Journal. 8 (2008) 16-28 (Chinese).

[6] B.H. Baltagi, Econometric Analysis of Panel Data (Second Edition).John Wiley & Sons, Chichester, United Kingdom,2001.

[7] B.H. Baltagi, S.H. Song, K. Won, Testing panel data regression models with spatial error correlation, Journal of Econometrics. 117 (2003) 123–150.

[8] S. Bentolila, G. Saint-Paul, Explaining movements in the labor share, the B.E. Journal of Macroeconomics, Contributions to Macroeconomics. 3(1) (2003) Article 9.

[9] O. Blanchard, J. Nordhaus, D. William Phelps, Edmund S. The medium run, Brookings Papers on Economic Activity. 2(1997) 89-158.

[10] L. Boggio, V. Dall'Aglio, M. Magnani, On labour shares in recent decades: A survey, Working paper, (2009).

[11] F. Cai, D. Wang, Y. Du, Regional disparity and economic growth in China: The impact of labor market distortions, China Economic Review. 13 (2002) 197-212.

[12] F. Cai, Exploring the fair distribution mechanism in accordance with economic development, People's Forum, 17th Oct (2005) (Chinese).

[13] F. Cai, Maximum Employment is the economic base of social harmony, Wen Wei Po, 24th Oct (2006) (Chinese).

[14] A. De Serres, S. Scarpetta, C. De la Maisonneuve, Falling wage shares in Europe and the United States: How important is aggregation bias? Empirica. 28 (2001) 375-400.

[15] J.P. Elhorst, Specification and estimation of spatial panel data models, International Regional Science Review. 26 (2003) 244-268.

[16] B. Fleisher, J. Chen, The coastal non-coastal income gap, productivity, and regional economic policy in China, Journal of Comparative Economics. 25 (1997) 220-236.

[17] J. Growiec, Determinants of the labor share: evidence from a panel of firms. National bank of Poland working paper, 69 (2009).

[18] D. Gollin, Setting income shares right, Journal of Political Economy. 110 (2) (2002) 458-474.

[19] D. Gujarati, Labor's share in manufacturing industries, 1949-1964, Industrial and Labor Relations Review. 23(1969) 65-77.

[20] A.E. Harrison, Has globalization eroded labor's share? Some cross-country evidence, mimeo, University of California, Berkeley, 2002.

[21] C. Hsiao, Analysis of Panel Data, Cambridge University Press, Cambridge, 1986.

[22] T. Jian, J. Sachs, A. Warner, Trends in regional inequality in China, China Economic Review. 7(1) (1996) 2-21.

[23] A.B. Krueger, Measuring labor's share, American Economic Review. 89(2) (1999) 45-51.

[24] D.K. Li, Labor's share in GDP has gradually decreased, Caijing Magazine. 2nd July, (2007) http: \\finance1jrj1com1cn\news\ 2007207202\0000023819751.html.

[25] D.K. Li, L.L. Liu, H.L. Wang, The U curve of labor share in GDP during economic development, Economic Research Journal. 1(2009) 70-82 (Chinese).
[26] S. Li, The balance of growth and sharing in China, China Finance News. 28th Augest (2007) http: \\ news.xinhuanet.com\fortune\2007204\28\content - 6038867. html.
[27] Li, X. and Wu, B. A non-cooperative bargaining model of urban unemployment in transitional China, Journal of East China Uni. Of Science and technology. No.3. (2006) 46-50 (Chinese).
[28] E. Moral, V. Genre, Labor share developments in the Euro area, Economic Bulletin, Banco de Espaňa, July (2007).
[29] J.M. Poterba, The rate of return to corporate capital and factor shares: new estimates using revised national income accounts and capital stock data, NBER Working Paper #6263 (1997).
[30] E.L. Raffalovich, T.K. Leicht, M. Wallace, Macroeconomic structure and labor's share of income: United States, 1950 to 1980, American Sociological Review. 57(2) (1992) 243-258.
[31] H. Wang, L. Shen, A spatial panel statistical analysis on Chinese economic growth and Energy Consumption, The Journal of Quantitative and Technical Economics. 24(12) (2007) 98-107 (Chinese).
[32] Y. Wang, and Y.D. Yao, Sources of China's economic growth, incorporating human capital accumulation. WBI Working Paper, the World Bank. 19 (2001) 52-99.
[33] A.T. Young, One of the things we know that aren't so: Why US labor's share is not relatively stable, University of Mississippi Mimeo, August, 2006.
[34] F. Yuan, and Y. Li, Capital deepening and employment adjustment in China's manufacturing sector, China Economic Quarterly, 8(1), October (2008) 198-210 (Chinese).

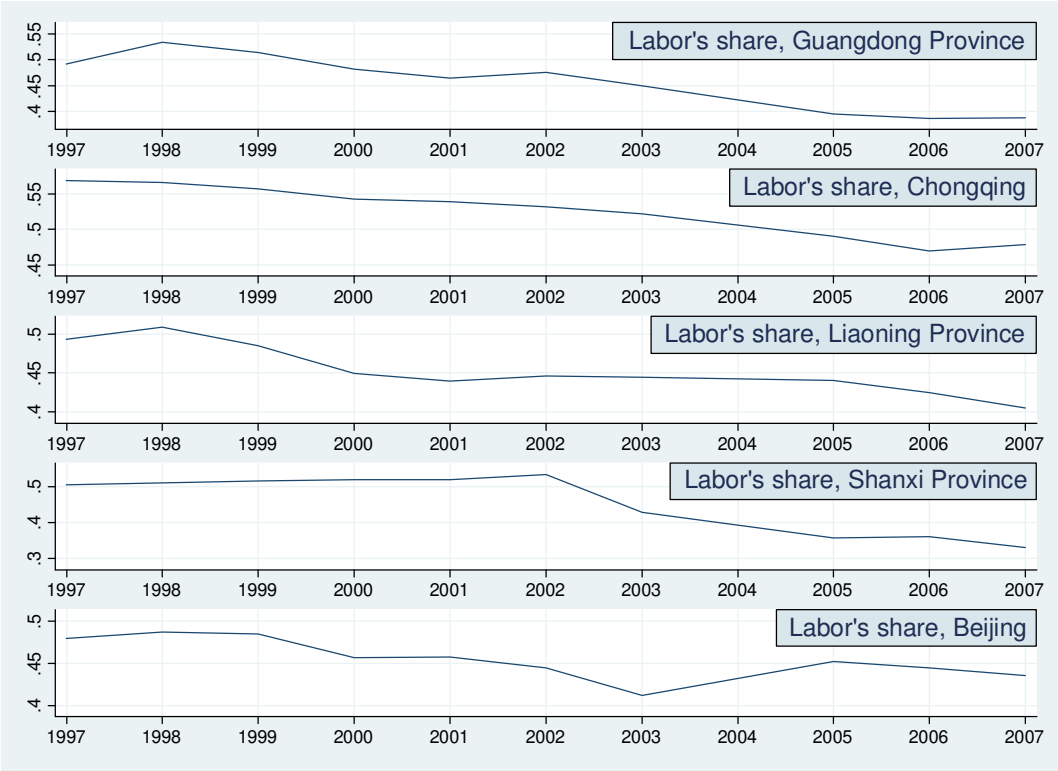
Table 1: The average labor compensation and labor's share of 31 provinces in China, 1997-2007

	Labor's share					The average labor compensation (10,000 Yuan per year)				
	Mean	1997	2000	2004	2007	Mean	1997	2000	2004	2007
Shanghai	0.35	0.35	0.35	0.29	0.35	2.86	1.52	2.37	2.68	4.86
Heilongjiang	0.40	0.48	0.43	0.39	0.36	1.02	0.78	0.85	1.28	1.55
Tianjin	0.43	0.51	0.47	0.36	0.31	2.32	1.28	1.88	2.50	3.67
Shandong	0.43	0.45	0.48	0.38	0.35	1.08	0.64	0.88	1.20	1.73
Zhejiang	0.45	0.48	0.49	0.39	0.40	1.34	0.82	1.10	1.42	2.06
Liaoning	0.45	0.49	0.45	0.39	0.40	1.41	0.83	1.16	1.37	2.16
Beijing	0.46	0.48	0.46	0.35	0.44	2.23	1.31	1.82	1.69	3.66
Guangdong	0.46	0.49	0.48	0.38	0.39	1.48	0.95	1.20	1.42	2.28
Shanxi	0.46	0.51	0.52	0.35	0.33	0.77	0.50	0.60	0.71	1.23
Yunnan	0.46	0.47	0.44	0.39	0.45	0.50	0.34	0.38	0.48	0.81
Jiangsu	0.47	0.51	0.50	0.40	0.37	1.53	0.92	1.20	1.64	2.29
Fujian	0.48	0.52	0.48	0.42	0.42	1.36	0.96	1.14	1.40	1.96
Hebei	0.48	0.53	0.53	0.39	0.38	0.96	0.62	0.78	1.00	1.47
Gansu	0.50	0.53	0.59	0.41	0.44	0.52	0.35	0.49	0.48	0.86
Anhui	0.50	0.49	0.54	0.43	0.44	0.59	0.40	0.48	0.60	0.90
Xinjiang	0.52	0.56	0.50	0.44	0.44	1.29	0.86	1.02	1.31	1.96
Shaanxi	0.52	0.60	0.60	0.45	0.37	0.66	0.44	0.55	0.69	1.06
Chongqing	0.53	0.57	0.54	0.44	0.48	0.68	0.45	0.53	0.70	1.10
Hubei	0.54	0.61	0.59	0.46	0.41	1.07	0.78	1.01	1.13	1.38
Sichuan	0.54	0.56	0.56	0.47	0.46	0.64	0.40	0.51	0.68	1.01
Hainan	0.55	0.60	0.58	0.50	0.42	1.01	0.74	0.90	1.04	1.24
Inner Mongolia	0.55	0.58	0.63	0.49	0.34	1.19	0.60	0.86	1.31	1.94
Jiangxi	0.55	0.64	0.61	0.45	0.45	0.75	0.53	0.63	0.77	1.12
Henan	0.55	0.64	0.60	0.47	0.41	0.71	0.52	0.56	0.75	1.07
Ningxia	0.56	0.60	0.59	0.48	0.45	0.76	0.49	0.57	0.74	1.30
Guizhou	0.56	0.64	0.61	0.47	0.45	0.35	0.26	0.30	0.35	0.54
Jilin	0.57	0.62	0.57	0.55	0.41	1.30	0.72	0.97	1.46	1.98
Qinghai	0.57	0.65	0.61	0.49	0.45	0.83	0.56	0.67	0.87	1.29
Hunan	0.58	0.66	0.62	0.50	0.46	0.76	0.55	0.66	0.78	1.14
Guangxi	0.61	0.70	0.64	0.51	0.46	0.66	0.58	0.52	0.64	1.00
Tibet	0.62	0.75	0.68	0.53	0.51	0.79	0.48	0.65	0.83	1.14

Source: China Statistical Yearbooks, 1997-2007, author's own calculation

Note: "Mean" is the average value across all years. "the average labor compensation" is calculated as the ratio of the total labor compensation to the total employment of a province. "Labor's share" is the share of labor compensation in GDP of a province.

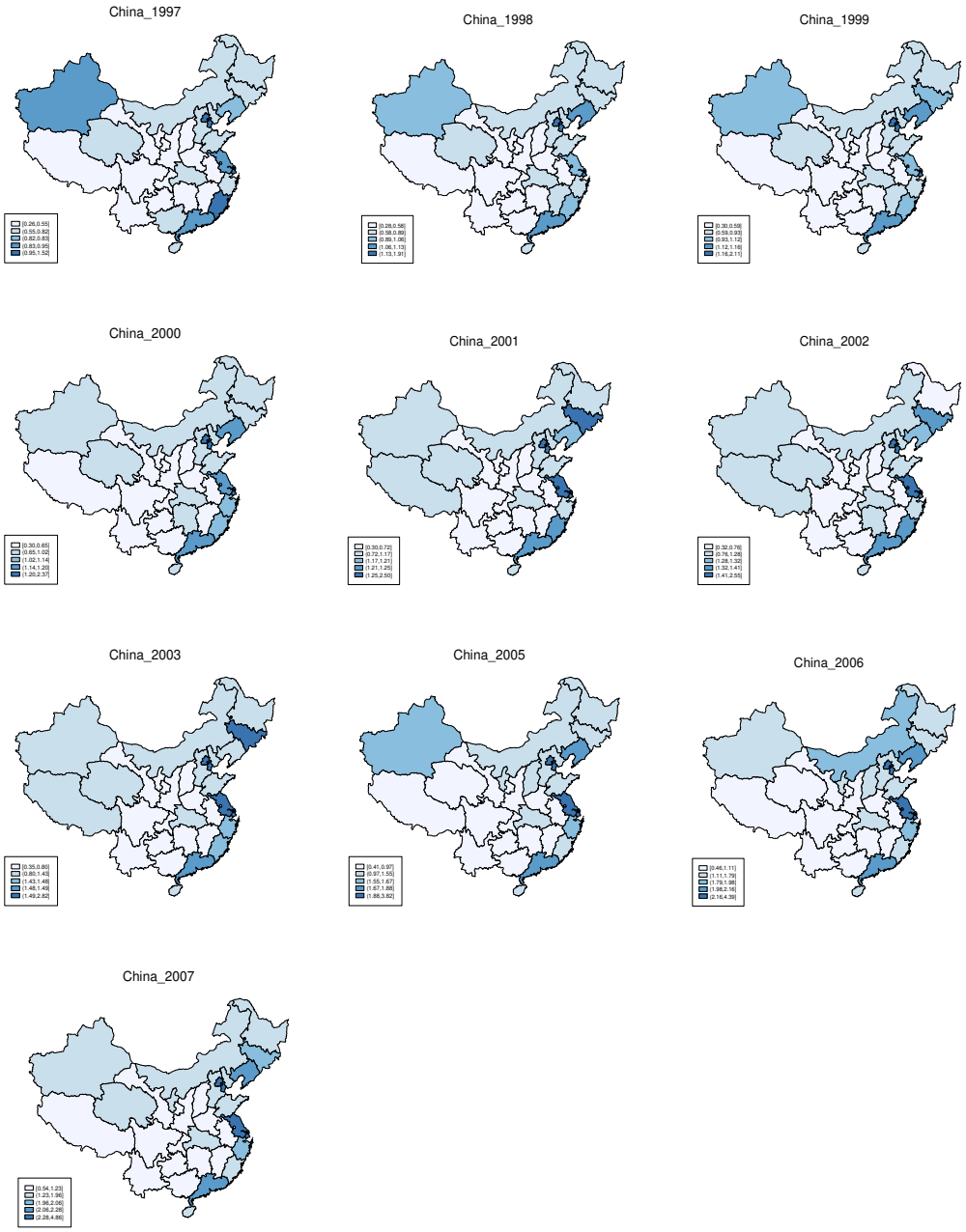
Figure 1: The movement of the labor's share for five representative provinces, 1997-2007



Source: China Statistical Yearbooks, 1997-2007, author's own calculation

Note: Five provinces and municipal cities are selected to represent five major regions in China, Beijing (representing north China), Liaoning (northeast China), Shanxi (central China), Guangdong (southeast China), and Chongqing (western China).

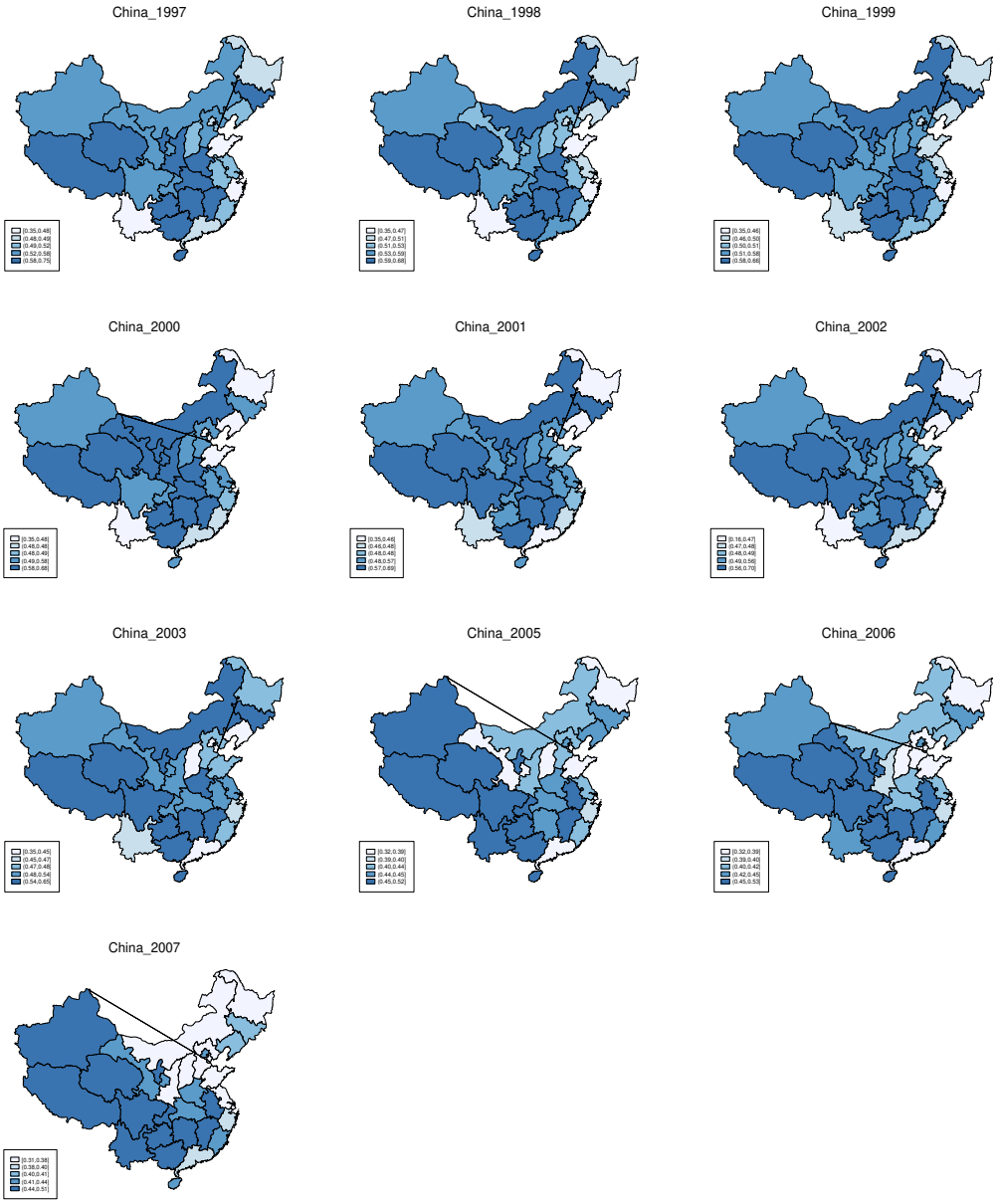
Figure 2: Spatial maps of the average labor companion, 1997-2007



Source: China Statistical Yearbooks, 1997-2007, author's own calculation

Note: Each year provinces are classified into five quantiles based on the average labor compensation. The maps show five shades of blue from light to dark, corresponding to the five quantiles. The map is not drawn for 2004 because labor compensation is not reported in China Statistical Yearbook for 2004.

Figure 3: Spatial maps of the labor's share, 1997-2007



Source: China Statistical Yearbooks, 1997-2007, author's own calculation

Note: Each year provinces are classified into five quantiles based on labor's share. The maps show five shades of blue from light to dark, corresponding to the five quantiles. The map is not drawn for 2004 because labor compensation is not reported for 2004.

Table 2: Moran's *I* for selected variables from year 1997-2007

	Labor's share	Agriculture	State	Tertiary	Intl. trade	Patent
year1997	0.100***	0.131***	0.046	0.095***	0.129***	0.106***
year1998	0.075***	0.120***	0.092***	0.077***	0.111***	0.102***
year1999	0.091***	0.118***	0.084***	0.069**	0.122***	0.096***
year2000	0.101***	0.124***	0.067**		0.115***	0.075***
year2001	0.079***	0.117***	0.046	0.073**	0.105***	0.07***
year2002	0.095***	0.021	0.046	0.08***	0.109***	0.081***
year2003	0.062*	0.122***	0.032	0.070**	0.158***	0.082***
year2004		0.117***	0.030	0.063**	0.159***	0.080***
year2005	0.132***	0.112***	0.030	0.069**	0.187***	0.073***
year2006	0.150***	0.109***	0.026	0.063*	0.192***	0.066***
year2007	0.161***	0.107***	0.023	0.066**	0.176***	0.066***

Source: China Statistical Yearbooks, China Labor Statistical Yearbooks, 1997-2007, author's own calculation

Note: *, **, and ***, indicate the 10, 5, and 1 percent significance level, respectively, based on Z-values. The Moran's *I* of labor's share is not available for 2004 because labor compensation is not reported for 2004. The Moran's *I* for tertiary education is missing for 2000 because educational attainment is not reported in China Labor Statistical Yearbook for 2000.

Table 3: the impact of industrial composition on provincial labor's share, 1997-2007

Dependent Variable: labor's share, measured by the ratio of total labor compensation to GDP

	(1)	(2)	(3)	(4)	(5)	(6)
year1997						
Agriculture	0.743***			0.524***		
Industrial		-0.788***			-0.504***	
Service			-0.269			0.400
year1998						
Agriculture	0.688***			0.516***		
Industrial		-0.628***			-0.407**	
Service			-0.356*			0.196
year1999						
Agriculture	0.679***			0.411***		
Industrial		-0.607***			-0.319**	
Service			-0.349			0.043
year2000						
Agriculture	0.727***			0.385**		
Industrial		-0.575***			-0.244*	
Service			-0.315			0.033
year2001						
Agriculture	0.746***			0.386*		
Industrial		-0.540***			-0.233	
Service			-0.326			0.105
year2002						
Agriculture	0.306***			0.218***		
Industrial		0.065			0.009	
Service			-0.010			-0.072
year2003						
Agriculture	0.736***			0.572***		
Industrial		-0.431***			-0.220	
Service			-0.318			-0.112
year2005						
Agriculture	0.461***			0.426***		
Industrial		-0.417***			-0.364***	
Service			0.128			0.232**
year2006						
Agriculture	0.410***			0.239*		
Industrial		-0.396***			-0.298***	
Service			0.157			0.234***
year2007						
Agriculture	0.402***			0.082		
Industrial		-0.355***			-0.245***	
Service			0.114			0.199***
Number of Observations	31	31	31	31	31	31

Source: China Statistical Yearbooks, 1997-2007, author's own calculation

Note: The first three columns report the results without control variables while the last three columns controlled for the logarithm of fixed asset investment and the logarithm of employment. Coefficient estimates are reported. *, **, and ***, indicate the 10, 5, and 1 percent significance level, respectively. Due to the limited space, standard error estimates are not reported, but available from the authors upon request. The regressions are not estimated for 2004 because labor compensation is not reported for 2004.

Table 4: The impact of ownership structure on provincial labor's share, 1997-2007

Dependent Variable: labor's share, measured by the ratio of total labor compensation to GDP

	(1)	(2)
year 1997		
State	0.016	-0.243
year 1998		
State	0.459	0.120
year 1999		
State	0.546	0.151
year 2000		
State	0.539**	0.311**
year 2001		
State	0.597***	0.528***
year 2002		
State	0.520*	0.393**
year 2003		
State	0.367***	0.336***
year 2005		
State	0.049	0.037
year 2006		
State	0.041	0.043
year 2007		
State	0.013	0.046
Observations	31	31

Source: China Statistical Yearbooks, 1997-2007, author's own calculation.

Note: The first column report the results without control variables while the second column controlled for the logarithm of fixed asset investment. Coefficient estimates are reported. *, **, and ***, indicate the 10, 5, and 1 percent significance level, respectively. Standard error estimates are not reported, but available from the authors upon request. The regressions are not estimated for 2004 because labor compensation is not reported for 2004.

Table 5: The fixed effect spatial regression estimates on the labor's share, 1997-2005

Dependent Variable: labor's share, measured by the ratio of total labor compensation to GDP

	(1)	(2)	(3)	(4)	(5)	(6)
Agriculture	0.503***	0.469***	0.410***	0.396***	0.369***	0.328***
Industrial	-0.153***	-0.156***	-0.133***	-0.129***	-0.125***	-0.117***
State		0.187***	0.162***	0.116**	0.114**	0.117**
Secondary			-0.075**	0.004	0.049	0.044
Tertiary			-0.112	-0.266**	-0.243**	-0.342***
International trade				-0.133***	-0.106***	-0.089**
Ln patent					-0.009**	0.001
Ln FCI						-0.018**
Spatial autocorrelation	0.133*	0.030	0.021	-0.044	-0.051	-0.153*
Log likelihood	365.72	371.66	376.98	384.95	387.51	389.16
Number of observation	248	248	248	248	248	248

Source: China Statistical Yearbooks, China Labor Statistical Yearbooks, 1997-2007, author's own calculation.

Note: Coefficient estimates are reported. *, **,and ***, indicate the 10, 5, and 1 percent significance level, respectively. Standard error estimates are not reported, but available from the authors upon request.

Appendix: Definition and summary statistics of variables, 1997-2007

Variables	Definition	No. of Obs.	All Years Mean	All Years Std. Dev.	1997 Mean	1997 Std. Dev.	2002 Mean	2002 Std. Dev.	2007 Mean	2007 Std. Dev.
Labor's share	The share of labor's compensation in GDP	31	0.492	0.091	0.557	0.084	0.525	0.102	0.414	0.048
Agriculture	The share of agriculture sector in GDP	31	0.166	0.094	0.216	0.087	0.181	0.195	0.125	0.062
Industrial	The share of industrial sector in GDP	31	0.463	0.127	0.435	0.079	0.475	0.324	0.477	0.081
Service	The share of service sector in GDP	31	0.390	0.101	0.350	0.059	0.375	0.258	0.398	0.079
State	The share of employment of state and collectively owned firms in the total employment	31	0.658	0.102	0.760	0.054	0.662	0.081	0.577	0.096
Non_state	The share of non-state employment in the total employment	31	0.342	0.102	0.240	0.054	0.338	0.081	0.423	0.096
Patent	The number of invention patent applications per year	31	2018.5	3944.3	378.1	333.1	1123.1	1303.4	4555.2	6420.2
Intl. trade	The share of net export of goods and service in GDP	31	-0.041	0.136	-0.007	0.078	-0.040	0.139	-0.061	0.146
Primary	The percentage of workers with primary education in the labor force	31	0.393	0.164	0.466	0.163	0.386	0.157	0.356	0.159
Secondary	The percentage of workers with secondary education in the labor force	31	0.538	0.132	0.490	0.137	0.546	0.128	0.562	0.127
Tertiary	The percentage of workers with tertiary education in the labor force	31	0.070	0.055	0.044	0.036	0.068	0.045	0.082	0.068
Employees	The number of employees in 10,000	31	2123.3	1467.0	2053.8	1408.8	2057.4	1435.8	2301.6	1611.1
FCI	Fixed capital investment in 100 million RMB Yuan	31	2186.9	2443.4	779.7	633.6	1356.0	1020.1	4348.2	3181.7

Source: China Statistical Yearbooks, China Labor Statistical Yearbooks, 1997-2007, author's own calculation.

Note: Labor compensation is not reported in China Statistical Yearbooks for 2004, and employee educational attainment not reported in China Labor Statistical Yearbooks for 2000, which are not included in the calculation.