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The factor income distribution in China: 1978–2007

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ABSTRACT

This paper investigates changes in aggregate labor share in China during 1978 and 2007 with a particular focus on the 1995–2007 period during which official statistics report a drop of 12.45 percentage points in labor's share of national income (labor share). Our main findings are: (1) The reported fall in aggregate labor share is overstated. According to the official statistics released by the NBS (2007a), the labor share fell 5.25 percentage points from 2003 to 2004. However this dramatic decline, 42.16% of the total reported decline of the labor share from 1995 to 2007, is completely due to the changes in the way NBS break down the operating surplus state-owned and collective-owned farms and the mixed income of the owners of individual economy; (2) For the last three decades, two main forces have been driving shifts in the aggregate labor share: (i) structural transformation between the agriculture and non-agriculture sectors and (ii) shifts in the labor share within the industry sector; (3) From 1995 to 2003, these two effects are both negative and together drive down aggregate labor share by 5.48 percentage points. The structural change explains 61.31% of the decline and the remaining 38.69% of the decline is due to the changes in the labor share within sectors, primarily in the industry sector; (4) Labor share in agriculture is lower than labor share in services. Therefore, when the service sector grows relative to the agriculture sector in the economy, the aggregate labor share of income declines; and (5) Restructuring of the SOEs and expanded monopoly power are the main reasons for the decline of labor share within industry after 1998. Relative price shifts, the factor input ratio, and biased technological progress are all insignificant forces for this decline because the substitution between factors in the industry sector is nearly unit elastic.

1. Introduction

During the last one and half decades, labor share in the national income of China has declined over 12.48 percentage points according to the official data released by the National Bureau of Statistics of China (NBS). Although many economies have observed a drop in the labor share in recent years, no other economy in the world has experienced a factor income distribution shift comparable to that of China (Economists, Oct 11th 2007). This precipitous decline in China's labor share has attracted wide attention.

Changes in factor income distribution are significant for two main reasons. First, a shift in factor income distribution impacts the flow of income to groups of different wealth levels in a population (Atkinson, 2000). Because labor ability is more equally distributed across a population than the capital is, a decline in the labor share exacerbates income inequality across a population. Since the *Reform and Openness*, China has experienced a steady increase in its GINI coefficient, nearly reaching 0.5 in recent years. For this reason, it has been proposed that the significant decline in the labor share may explain the steady increase in income inequality in China (Cai, Oct 17th 2005), which in turn might hinder China's future development (Subramanian, 2008).

Second, studying the changes in factor income shares improves our understanding of the investment ratio, which has been rising in China since the mid-1990s. According to NBS, today, China has the highest investment ratio in the world, exceeding 40% since 2003. Bai, Hsieh and Qian (2006) find that aggregate capital return does not show a clear decline after 1978 even though both

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the investment ratio and the capital–output ratio have been increasing since the mid-1990s. They cite the increase of the capital share of national income (i.e. decrease in the labor share) since 1995 as an explanation for these findings. In turn, Kuijis (2006) argues that the consumption ratio has declined because the share of China's household income has fallen. Since labor compensation is the main source of household income, the decline in the labor share is, of course, a key contributor to the drop in household income as a share of national income. The Bai, Hsieh and Qian (2006) and Kuijis (2006) conclusions are supported by Nicholas Kaldor's theory that economies with a high capital share of income tend to have a high ratio of investment to output (Solow, 2000). These sources suggest that the increase in the investment ratio in China might be related to the increase in the capital share (and parallel decline in the labor share) since the mid-1990s.

In the present paper, we first discuss data sources and accounting methods for factor income shares in China. Using GDP by income approach at the provincial level we calculated the aggregate labor share since 1978. We find that the labor share fluctuates before 1995 after which it has been declining, most dramatically between 2003 and 2004.

We then investigate the large drop in the labor share between 2003 and 2004 and find that this abrupt decline is mainly caused by a change in categorization of the income of state-owned and collective-owned farms and the owners of the individual economy. Using 2004 National Economic Census data, we obtain estimates of operating surplus of state-owned and collective-owned farms and the mixed income of the self-employed owners of individual economy in 2004. We reclassify these two types of income as they were before 2004 to obtain an adjusted labor share for 2004. This adjustment reduces the decline of aggregate labor share between 1995 and 2007 from 12.45 to 7.2 percentage points.

Following the decomposition method advanced by Solow (1958), we quantify the relative importance of the two forces driving the movement in the aggregate labor share during 1978 and 2007: sectoral transformation and labor share changes within sectors. We find that both of them are important to understand shifts in aggregate labor share. Structural transformation from agriculture to non-agriculture sectors has shown negative impact on aggregate labor share since the mid-1980. Industry takes the major role in the within-sector change effect on aggregate labor share. The main reason for the accelerated decline of the aggregate labor share since the mid-1990s is that the labor share in the industry sector, which had been rising, began declining from its 1995 peak after 1998.

We further investigate the fundamental source of the significant structural change effect. NBS counts mixed income of rural household from agriculture as labor compensation. This accounting method has overstated the labor share in agriculture to a large degree. As a result, the differential labor share between agriculture and non-agriculture sectors is overstated, which causes the significant negative structural change effect on aggregate labor share when relative importance of agriculture declines.

To understand why the labor share in the industry sector began to decline in 1998, we design an econometric model to show the determinants of the labor share in this sector. By applying industrial survey data to our model, we determine that the decline of the SOEs and the increase in monopoly power are the main reasons for the shift in factor income shares within the industry sector. This conclusion contradicts the influential arguments that the decline of labor share after 1995 is caused by biased technological improvement (Huang and Xu, 2009), or depressed wage rate caused by declining labor bargaining power (Economists, Oct 11th 2007; Li, Liu and Wang, 2009; Wang, Oct 29th 2007), or over capital-intensive industry structure (Lin, April 28th 2007).

As far as we know, this paper is the first one that attempts to explain the movement in China's factor shares in the past three decades. In the literature of growth accounting, the measurement of factor shares are repeatedly visited (Ezaki and Sun 1999; Wang and Yao 2003; Young 2003). However, these works just make use of official GDP by income approach to calculate factor shares and pay little attention to its movement at all. As a matter of fact, with the pre 1995 estimates, they usually conclude that there are no trends in China's aggregate factor shares and use 0.5 as the average aggregate labor share. Furthermore, this paper particularly discusses the accounting method of GDP by income approach and also its implication on official factor shares for the first time. The problems with China's national income accounts have invited the attention of many scholars. For example, Wu (2001) pointed out that official price deflators were understated and hence exaggerated the growth rate of GDP. Rawski (2001) doubted that the official GDP growth by the NBS reflects the official objective rather than economic outcomes. Holz (2004) discussed the estimation of household consumption and concluded that the official consumption is unreliable. This paper contributes this line of literature by examining the NBS' accounting method of GDP by income approach.

The paper is organized as follows. Section 2 is devoted to the presentation of factor income distribution in China since 1978. We compare labor share computed with all available data in the National Accounts of China and discuss the trends of aggregate labor share. In Section 3, we explain how changes in GDP accounting method led to a precipitous decline of labor share in 2004. Adjustment in Section 3 shows that the abrupt decline of labor share from 2003 to 2004 completely originated from the changes in GDP accounting method. In Section 4, we analyze how the aggregate labor share changes with the structural transformation and labor share changes within sectors from 1978 to 2007. In Section 5, we show that the structural change effect is overestimated by the inaccurate inflated NBS statistics on the labor share in agriculture. Section 6 explains the movement of labor share in the industry sector. We present an econometric model of the determinants of the labor share in the industry sector and calculate the contribution of each factor to the decline of the labor share in this sector since 1998. Section 7 concludes.

2. The official estimates of aggregate labor share

In this section, we first explain how labor share is calculated with GDP by income approach data. Then we introduce all available sources for GDP by income approach in China's National Accounts. We compare the labor share estimates calculated with all possible sources and summarize the shifts of aggregate labor share from 1978 to 2007 at the end of this section.

2.1. Calculation of labor share

Labor share is generally defined as the share of labor income in national income. Although GNI, by definition, is the most natural choice of national income, we employ GDP by income approach in this paper. GDP by income approach has two advantages. First, GDP by income approach is readily obtainable. The generation of income account is an elementary table of the National Accounts System in most countries including China. Second, the GDP by income approach data reflect the factor income distribution of domestic production, which is most relevant in analyzing the factor income distribution in an economy. For these two reasons, we, along with many other researchers, use GDP as the denominator in our calculation of the labor share, while employ the labor compensation from GDP by income approach as labor income.

Another important issue is whether or not to subtract "indirect tax" from the GDP denominator. Economists have computed the labor share using total GDP as the denominator (e.g. Hansen, 1985; Harrison, 2002; Krueger, 1999; Kydland and Prescott, 1982; Poterba, 1997) and also using GDP net of indirect tax (also known as value-added at factor cost) as the denominator (e.g. Bentolila and Saint-Paul, 2003; Bernanke and Gürkaynak, 2002; Cooley and Prescott, 1995; Gollin, 2002). The choice depends on two considerations: whether or not the government sector is treated as competing sector to the household and corporate sectors; and whether or not indirect tax is significant in the taxation system of an economy. Indirect taxes are a significant category of taxes in China's taxation system so we computed both definitions of labor share.

2.2. Sources of GDP by income approach provided by the NBS

In China's National Accounts, GDP by income approach for the aggregate economy are available in the Input–Output Table (I–O table) and Flow of Funds Accounts (FFA). NBS does not update the I–O table annually so a continuous time-series for factor income shares cannot be constructed with this source alone. In 2008, NBS published *Data of Flow of Funds of China: 1992–2004* (NBS, 2008b). According to this publication, the NBS has adjusted FFA between 1992 and 2003 published in China Statistical Yearbook, employing data from the China Economic Census 2004. Because NBS does not provide GDP by income approach for the aggregate economy for the earlier period of 1978–1991, we cannot calculate changes of the labor share before 1991 with either the I-O table or the FFA. Nevertheless, NBS released GDP by income approach at provincial level in Hsueh and Li (1999) for the 1978–1995 period, each volume of China Statistical Yearbook (NBS-CSY) after 1993, and NBS (2007a) for the 1993–2004. With provincial GDP by income approach (hereafter provincial GDP), one can calculate the weighted average of the labor share across provinces as proxy measurement for the aggregate labor share.

In Table 1, we report five different measures of the labor share calculated using the three types of data sources described previously, where the denominator of labor share is GDP net of indirect tax. Column (1) represents the labor share calculated using the I–O table; column (2) represents the labor share calculated using FFA; and columns (3)–(5) each represent the labor share calculated using provincial GDP by income approach. We also computed the corresponding series in Table 1 using GDP as denominator, and obtain the same pattern for each of the five series. For simplicity, we do not report labor share using GDP denominator here.

Data in columns (3)–(5) of Table 1 suggest that the labor share in 1993 and 1994 varies little using the three different data sources. This is because the accounting method of provincial GDP by income approach is consistent in Hsueh and Li (1999), NBS-CSY (vol1995–vol2008), and NBS (2007a). However, the estimates of the labor share during 1996 and 2003 are significantly different between columns (4) and (5), since the provincial GDP data have been updated using the 2004 National Census data in NBS (2007a). To obtain a continuous estimate with provincial GDP by income approach, we combine the labor share calculated with Hsueh and Li (1999), NBS-CSY, and NBS (2007a) into a series displayed in column (6), where the 1978 to 1992 data are obtained from column (3), the 1993–2004 data from column (4), and the post 2004 numbers from NBS-CSY (vol2006–vol2008).

2.3. Comparison of labor share estimates

To compare the labor share in Table 1 calculated with the I–O table and the FFA to the series obtained using the provincial GDP data, we plot the estimates from columns (1), (2) and (6) in Fig. 1. The labor shares in columns (1) and (2) move in tandem with those in column (6) for most years, as Fig. 1 illustrates. Furthermore, the labor share has decreased significantly since the mid-1990s according to the estimates computed using the I–O table and provincial GDP, and this is also true for the FFA estimates from 1995 to 2003.

Nevertheless, the estimates calculated with the I–O table are more volatile than those calculated using the other two sources. One possible explanation is that there are measurement errors in the I–O table, since the data in I–O table are calculated industry-by-industry and should be balanced with input–output data from each industry.

The FFA estimates are volatile from 2003 to 2007, even though they follow a similar trend to those of the I–O and provincial GDP estimates between 1995 and 2003. According to Bai and Qian (2009), the NBS estimates labor compensation in FFA by assuming that its growth rate equals the growth rate of household income (for details see NBS, 2008b).

These two facts imply that the labor share calculated using the I–O table or FFA cannot illustrate the true change in the aggregate labor share through time. Therefore, the following discussion focuses on the labor share calculated using the provincial GDP by income approach reported in column (6).

In Fig. 2, we plot the labor share calculated with the provincial GDP data using GDP and GDP net of indirect tax as denominator respectively, where 1978–1992 data are from Hsueh and Li (1999), 1993–2004 data are from NBS (2007a), and 2005–2007 data are from NBS-CSY (vol2006–vol2008). From 1978 to 2007, the two series have been moving together exactly with an almost constant gap, implying that indirect tax is not an important factor affecting the movement of the income share. Therefore, unless

Table 1
The labor share in value-added at factor cost by various sources.[a]

Year	Input–Output	Flow of Funds	Income Approach			Combined
	(1)[b]	(2)[c]	(3)[d]	(4)[e]	(5)[f]	(6)[g]
1978			0.5696			0.5696
1979			0.5904			0.5904
1980			0.5821			0.5821
1981			0.5980			0.5980
1982			0.6062			0.6062
1983			0.6056			0.6056
1984			0.6086			0.6086
1985			0.6015			0.6015
1986			0.6037			0.6037
1987			0.6011			0.6011
1988			0.5950			0.5950
1989			0.5941			0.5941
1990			0.6144			0.6144
1991			0.5769			0.5769
1992	0.5157	0.6385	0.5783			0.5783
1993		0.6095	0.5960	0.5758	0.5869	0.5758
1994		0.6192	0.5918	0.5842	0.5928	0.5842
1995	0.5256	0.6136	0.6061	0.5910		0.5910
1996		0.6132		0.5869	0.6108	0.5869
1997	0.6346	0.6281		0.5868	0.6079	0.5868
1998		0.6282		0.5858	0.6136	0.5858
1999		0.6278		0.5772	0.6059	0.5772
2000	0.6324	0.6024		0.5668	0.5985	0.5668
2001		0.5964		0.5603	0.5988	0.5603
2002	0.5647	0.6086		0.5540	0.5909	0.5540
2003		0.5949		0.5362	0.5790	0.5362
2004		0.5533		0.4837		0.4837
2005	0.4830	0.6047			0.4821	0.4821
2006		0.5978			0.4731	0.4731
2007	0.4837	0.5913			0.4665	0.4665

[a] Labor share is the share of labor compensation in GDP net of indirect taxes.
[b] Input–Output tables in NBS-CSY (various years).
[c] Flow of Funds Accounts, 1992–2004 data from NBS (2008b) and 2005-2006 data from NBS-CSY (vol2008-vol2009).
[d] Hsueh and Li (1999).
[e] NBS (2007a).
[f] NBS-CSY (vol1995–vol2008).
[g] We combine the labor share computed with GDP by income approach at provincial level into one series, where 1978–1992 data are from column (3), 1993–2004 data are from column (4), and 2005–2007 data are from column (5).

otherwise specified, the analysis in the remainder of this paper focuses on the movement of the labor share defined by the ratio of labor compensation to GDP net of indirect tax.[1]

As Fig. 2 shows, labor share takes different trends over time. From 1978 to 1984 the labor share increases slightly, then fluctuates and decreases slightly from 1984 to 1995 and then decreases dramatically from 1995 to 2007. As depicted in Table 1, the labor share of GDP net of indirect tax declined 12.45 percentage points from 1995 to 2007. Particularly, labor share drops 10.73 percentage points between 1995 and 2004, with a dramatic 5.25 percentage points from 2003 to 2004, and continues to decline through 2007.

3. The impact of changes in GDP accounting method

This section explains the abrupt drop from 2003 to 2004 in the aggregate labor share from the provincial GDP by income approach. We first introduce the two main changes in the accounting method of GDP by income approach by the NBS since 2004 and their qualitative impact on aggregate and sectoral labor share. To quantify the impact of these changes on labor share, we estimate the operating surplus of state-owned and collective-owned farms and the mixed income of individual owners in 2004. In the final subsection, we compute quantitative impact on the aggregate and sectoral labor share that are caused by the changes in GDP accounting method.

3.1. The changes in GDP accounting method since 2004

The dramatic drop of the labor share between 2003 and 2004 is suspected, since the labor share shifts were relatively smooth over the past two decades and also during the post 2004 period. Therefore, before conducting further analysis of factors explaining

[1] Most results with the labor share defined by the ratio of labor compensation to GDP are similar to those reported in this paper. We can provide the results upon request.

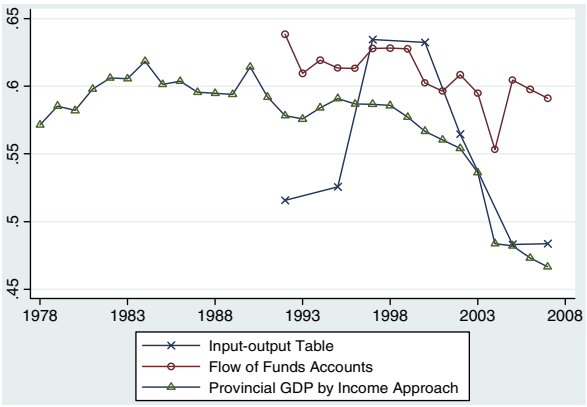


Fig. 1. The labor share in GDP net of indirect taxes: various sources.

Fig. 2. The labor share under different definitions.

the decline between 1995 and 2004, we first attempt to explain this abrupt change by exploring whether there were changes in statistical methods affecting the factor income distribution in 2004.

In 2004, China performed the first National Economic Census. In this Census, there were many changes in the statistical methods and scope. Most of these modifications have been followed in later years. According to the NBS, there have been two changes relevant to GDP by income approach since 2004. The first change pertains to the agriculture sector. Before 2004, operating surplus in agriculture included profits of the state-owned and collective-owned farms. Because it is difficult to obtain the financial statements of state-owned and collective-owned farms (NBS, 2007b, 2008a), the NBS decided to count all the income excluding depreciation and net production tax in those farms as "labor compensation" since 2004. As a result of this change, over half of the provinces in China reported zero or close to zero operating surplus in agriculture in 2004, according to the NBS (2007a).

The second change is relevant to the mixed income of the owners of individual economy, the self-employed in the non-agriculture sectors.[2] In individual economy, the self-employed owners earn "mixed-income" and the employees hired by them earn "wages." Prior to 2004, the income of both owners and employees in the individual economy was counted as labor compensation according to China's National Accounts 2002 (NBS, 2003). Since 2004, the income of the employees remains included in "labor compensation" but the income of owners is considered as "operating surplus" (NBS, 2007b, 2008a).

These two changes in GDP accounting method should affect labor share in both the agriculture sector and the non-agriculture sectors. We suspected the first change would result in a sudden increase in the labor share in agriculture, while the second change would cause an abrupt decline in the labor share in non-agriculture sectors. To verify these, we used the GDP by income approach data by province and sector (NBS, 2007a) to calculate the labor share for agriculture, industry, construction and service sector in 2003 and 2004 (rows (1) and (2), Table 2[3]). As expected, the labor share in agriculture sector increased significantly while the labor share in all non-agriculture sectors declined significantly from 2003 to 2004.[4]

[2] The NBS counts income of the self-employed in agriculture and non-agriculture sectors as labor compensation before 2004, while the income of the self-employed is reported separately as mixed income or capital income in most other countries. We'll discuss this in details afterwards.

[3] The aggregate labor shares in Table 2 are weighted average of sectoral labor share using labor value-added at factor cost as weights. Please find the calculation of sectoral labor share in Section 4.

[4] Unless otherwise specified, agriculture sector refers to the whole primary sector, including agriculture, forestry, animal husbandry and fishery and all relevant service activities. The service sector in this paper means the tertiary sector.

Table 2
Aggregate and sectoral labor share by sector, and various adjustments.
Source: NBS (2007a) and Author's calculations, see text for details.

	Aggregate	Agriculture	Industry	Construction	Service
(1) 2003: official	0.5362	0.8607	0.4444	0.6810	0.4900
(2) 2004: official	0.4837	0.9222	0.3823	0.5975	0.4098
(3) 2004: adjustment 1	0.4757	0.8654	0.3823	0.5975	0.4098
(4) 2004: adjustment 2	0.5547	0.9222	0.4221	0.6253	0.5411
(5) 2004: adjustment 3	0.5466	0.8654	0.4221	0.6253	0.5411

Notes: Adjustment 1 count operating surplus of state-owned and collective-owned farms as operating surplus (item (3) in Fig. 3); Adjustment 2 count the mixed income of individual owners as labor compensation (item (1) in Fig. 3); Adjustment 3 combine adjustment 1 and 2.

Because the non-agriculture sectors take much larger proportion in the economy than the agriculture, the aggregate labor share, which is the weighted average of each sector's labor share, appears to be much lower in 2004 than in 2003. As a result, the changes in the accounting method in GDP by income approach overestimate the decline of aggregate labor share between 2003 and 2004.

3.2. The components of GDP by income approach in 2004

The changes in GDP accounting method since 2004 alter the classification in GDP by income approach and the two types of income are basically relevant: the operating surplus of the state-owned and collective-owned farms and the mixed income of the owners of individual economy. They would have been counted as operating surplus and labor compensation respectively if there were no changes in GDP accounting method in 2004. To quantify the effect of changes in accounting method on aggregate labor share in 2004, one must obtain the above two estimates in 2004 and reclassify them as what they were before 2004.

According to NBS (2007a), the operating surplus in the agriculture sector has been reported as zero or close to zero in over half of the provinces in 2004. This reminds us that these provinces follow NBS to count operating surplus of the state-owned and collective-owned farms as labor compensation. We estimate the operating surplus of farms in theses provinces as follows. First we calculated the proportion of operating surplus in GDP by income approach of the agriculture sector in 2003 by province, and assumed that this proportion in each province did not change in 2004 from 2003. For provinces reporting zero or close to zero operating surplus in the agriculture sector in 2004 (NBS, 2007a), we estimated the operating surplus in the agriculture sector by multiplying the value-added of the agriculture in 2004 by the proportion of operating surplus obtained in 2003.

The mixed income of the owners of individual economy is counted as operating surplus of the individual economy in 2004. From China Economic Census Yearbook 2004 (NBS, 2006), we obtained data on employment, the labor compensation of employees, book-value of fixed assets, operating revenue and operating expenses for the individual economy by sector. With these data we calculated each items of GDP by income approach in 2004 for the individual economy as follows: the operating surplus of the individual economy is the operating revenue net of operating expenses; the depreciation of fixed assets is 5% of the book value of fixed assets; labor compensation is the employees' compensation; and net production tax is the tax and fee paid to the government.[5] Table 3 reports these estimates for the aggregate economy and non-agriculture sectors.[6]

However, one shortage with the above estimates is that the caliber is inconsistent to the provincial GDP. Since we use the provincial GDP by income approach to proxy the aggregate labor share, the operating surplus of the individual economy should also be estimated at the provincial level. In the National Economic Census 2004, special effort has been given to collect information of the individual economy and therefore cover more complete individual economy than the provincial data. As shown in the first two columns of Table 3, total employment in the individual economy reported in Economic Census Yearbook 2004 is 94 million, which is more than double the estimate of 46 million across provinces from China Statistical Yearbook 2005. Obviously, the operating surplus of the individual economy estimated with the 2004 National Economic Census data might be larger than that which is actually counted in the provincial GDP by income approach. Using this estimate to re-compute labor share in 2004 would overestimate the impact of accounting change of the mixed income of individual owners.

To obtain mixed income of individual owners that is actually counted as operating surplus in the provincial GDP by income approach in 2004, we assume that the labor productivity and individual owner's share in the value-added of the individual economy are the same for those included in the National Economic Census and those recorded in the provincial GDP. Under this assumption, we multiplied the operating surplus obtained from the National Economic Census Yearbook with the ratio of employment of the individual economy counted in the provincial data to that counted in the census data, and obtained an estimate of the provincial mixed income of individual owners (the *adjusted* column of the operational surplus, Table 3).[7]

In Fig. 3, the official GDP obtained from the provincial GDP by income approach is divided into six components, and they are (1) operating surplus of the state-owned and collective-owned farms, (2) labor compensation including mixed income of rural

[5] We calculate each term of the GDP by income approach for the individual economy following the formula published by NBS (2007b).

[6] We do not have estimates for agriculture sector in Table 3. The reason is that individual economy in China only exists in non-agriculture sectors, according to NBS. Individuals working in agriculture sector are rural households and their mixed incomes are counted as labor compensation in China's National Accounts.

[7] The adjusted estimate is the operating surplus estimated with the National Economic Census Yearbook 2004 times the ratio of employment in individual economy in provincial data to that in census data. The employment in individual economy in the provincial data is the summation across provinces reported in NBS-CSY (vol2005). The employment in census data is the employment in individual economy reported in National Economic Census Yearbook 2004 (NBS, 2006).

Table 3
Components of GDP by income approach for the individual economy in non-agricultural sectors in 2004 (Unit: billion RMB, million person).
Source: Authors' calculation, see text for details.

	Employment		Labor compensation [a]	Depreciation [a]	Net production tax [a]	Operating surplus [a]	
	Whole nation [a]	Sum across provinces [b]				Official	Adjusted
National	94.22	45.87	406.46	81.86	199.69	2098.09	1021.42
Industry	25.66	12.49	162.74	21.20	43.06	454.41	221.22
Construction	4.62	2.25	31.32	1.74	3.94	50.78	24.72
Service	63.95	31.13	212.40	58.92	152.69	1592.90	775.47

[a] Numbers calculated with China Economic Census Yearbook 2004 (NBS, 2006).
[b] Numbers calculated with NBS-CSY (vol2005).

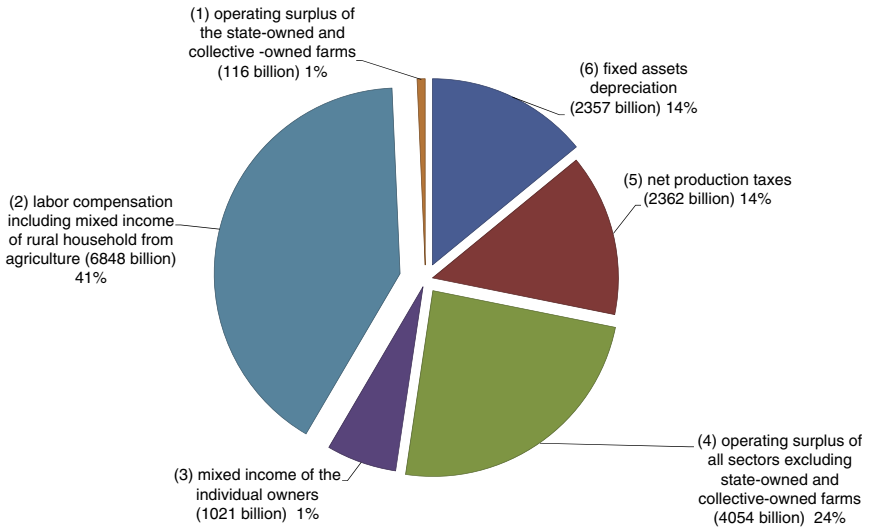
household from agriculture, (3) provincial mixed income of the individual owners, (4) operating surplus of all sectors excluding state-owned and collective-owned farms, (5) net production taxes, and (6) fixed assets depreciation. By this way, the official labor compensation in 2004 is separated into (1) and (2) and the official operating surplus in 2004 is separated into (3) and (4), as explained in the text at the bottom of Fig. 3.

3.3. The effect of changes in GDP accounting method on labor share

In the 2004 official GDP by income approach, the operating surplus of the state-owned and collective-owned farms is categorized as labor compensation, while the mixed income of individual owners is counted as labor compensation. In contrast, the former would be counted as operating surplus and the latter would be classified as labor compensation before 2004. In this subsection, we quantify the contribution of each of the two changes on aggregate and sectoral labor share in 2004 by reclassifying income items (1) and (3) as what they were before 2004. Specifically, we computed three sets of adjusted labor share in 2004, which are reported in Table 2 and the reclassification of income items (1)–(4) in each adjustment is also stated at the bottom of Fig. 3.

In adjustment 1 (row (3), Table 2), the operating surplus of state-owned and collective-owned farms is classified as operating surplus as it was before 2004. Among all sectors, only agriculture labor share is adjusted downward, since Adjustment 1 actually reclassifies the operating surplus of farms from labor compensation to operating surplus in agriculture. The difference between adjustment 1 and the official estimate in 2004 reflects the impact of counting the operating surplus of state-owned and collective-owned farms as labor compensation in 2004, which increases official aggregate labor share by 0.8 percentage points.

Adjustment 2 (row (4), Table 2) counts provincial mixed income of individual owners as labor compensation. This adjustment leads to much higher labor shares in all non-agriculture sectors than the official ones, as mixed income in individual economy, which only exists in non-agriculture sectors, is counted as labor compensation in Adjustment 2. Comparing Adjustment 2 to official estimate in 2004, we find that official aggregate labor share is understated by 7.09 percentage points by the change of accounting method of the mixed income of individual owners in 2004.



Notes: 1. Official: labor compensation=(1)+(2); operating surplus=(3)+(4); 2. Adjustment 1: labor compensation=(2); operating surplus=(1)+(3)+(4); 3. Adjustment 2: labor compensation=(1)+(2)+(3); operating surplus=2; 4. Adjustment 3: labor compensation=(2)+(3); operating surplus=(1)+(4).

Fig. 3. The components of GDP by income approach in 2004.

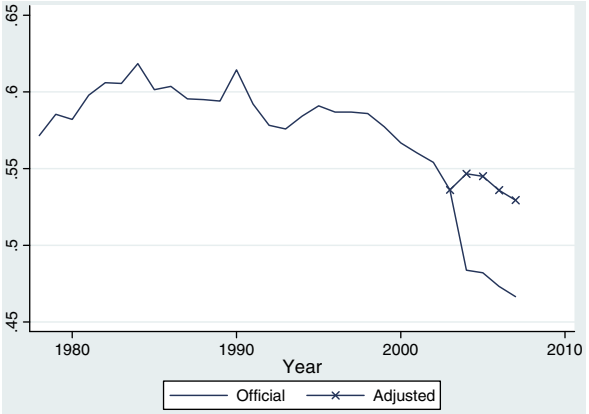


Fig. 4. The labor share in GDP net of indirect tax: official vs. adjusted.

Finally, in the last row of Table 2, we combine Adjustment 1 and Adjustment 2 together to show the net impact of the two changes, with an aggregate labor share of 0.5466 in Adjustment 3. Since the official estimate of the labor share in 2004 is 0.4837, the net effect of the two changes in the GDP accounting method is a decline of 6.29 percentage points in aggregate labor share in GDP net of indirect tax,[8] which also equals the sum of the impact obtained separately in Adjustments 1 and 2. Adjustment 3 has converted income items (1) and (3) in the GDP by income approach back to what they were before 2004. Therefore the aggregate labor share of 0.5466 in 2004 is comparable to official labor share in 2003 in terms of GDP accounting method.

The changes in the GDP accounting method in 2004 have remained in succeeding years. Unfortunately, we have no reliable way to obtain estimates of the operating surplus of state-owned and collective-owned farms for 2005–2007 or the mixed income of individual owners. We then assumed that the net impact of the two changes in the accounting method on the aggregate labor share during 2005–2007 equaled their impact on the 2004 estimate. Particularly, we subtracted 6.29 percentage points from the 2005–2007 official aggregate labor shares to obtain adjusted ones. In Fig. 4, we compare the adjusted labor share to the original estimates. As Fig. 4 illustrates, while the original labor share estimates suggested a sharp decline from 2003 to 2004 the adjusted ones indicate a slight increase. The apparent increase in the adjusted labor share from 2003 to 2004 is probably due to the assumption in estimating the operating surplus of state-owned and collective-owned farms.

Our adjustment reveals that the actual decline of the aggregate labor share between 1995 and 2007 is 7.2 percentage points instead of 12.45 percentage points from the official unadjusted statistics, among which a net decline of 6.29 percentage points in aggregate labor share from 2003 to 2004 is caused by the two changes in the GDP accounting method.

4. The driving forces of aggregate labor share

This section quantifies the impact of structural change and labor share changes within sectors on the movement of aggregate labor share from 1978 to 2007 with the decomposition method initiated by Solow (1958). We first introduce the methodology in Section 4.1. Section 4.2 is devoted to sectoral labor share and sectoral value-added share employed in decomposition work. We report and discuss decomposition results in Section 4.3. Section 4.4 obtains the same conclusions as the decomposition analysis by calculating three hypothetical series of aggregate labor share, which further strengthen our conclusions on the driving forces of aggregate labor share.

4.1. Methodology

Though Ricardo famously originated the theory that factor income shares evolve as economies develop, it was Solow (1958) who first proposed an empirical method to analyze the impact of economic development on factor income shares. Even some of the most recent research on factor income distribution follows Solow's approach. For example, Serres et al. (2002) find that the decline of the labor share in European countries such as France, Italy, and Germany during the mid-1980s and the mid-1990s can be explained by the structural change using Solow's decomposition method.

In Solow (1958), the period-t aggregate labor share,α_t, is the average of each sector's labor share, $\alpha_{i,t}$, weighted by the value-added share of that sectors, $vsh_{i,t}$:

$$\alpha_t = \sum \alpha_{i,t} \cdot vsh_{i,t}$$

where i is sector index, and vsh_i is value-added share of sector i.

[8] With the estimates of operating surplus in individual economy and agriculture sector, we can also calculate their net impact on the labor share in GDP. We find this impact is a decline of 5.4 percentage points and the two types of changes in GDP accounting method have overestimated and underestimated aggregate the labor share by 6.1 and 0.69 percentage points respectively.

Using this formula, the change in aggregate labor share can be decomposed into the changes in sectoral value-added share (hereafter *structural change effect*) and changes in sectoral labor share (hereafter *within-sector effect*) as follows:

$$\begin{aligned}\alpha_{t1}-\alpha_{t0} &= \sum \alpha_{i,t1}\cdot vsh_{i,t1}-\sum \alpha_{i,t0}\cdot vsh_{i,t0}\\ &= \left(\sum \alpha_{i,0}\cdot\left(vsh_{i,t1}-vsh_{i,t0}\right)\right) \quad (structural\,change\,effect)\\ &\quad+\left(\sum\left(\alpha_{i,t1}-\alpha_{i,t0}\right)\cdot vsh_{i,t1}\right) \quad (within-sector\,effect)\end{aligned} \tag{4.1}$$

Eq. (4.1) has four qualifications we must explain before applying it to the changes in aggregate labor share. First, Eq. (4.1) only reflects changes in the labor share in single-year increments, for example from year $t0$ to year $t1$, but overlooks the whole period movement.

Second, the structural change effect is defined as the sum of the changes in each sector's value-added share weighted by that sector's labor share in year $t0$. Since the sum of the value-added shares across sectors is always one, an increase in the value-added share of one sector is always accompanied by a decrease in another sector. For example, consider a two sector economy in which the value-added share of sector p increases and the value-added share of sector q correspondingly declines. The structural change effect on the aggregate labor share is negative if $\alpha_p<\alpha_q$, positive if $\alpha_p>\alpha_q$, and zero if $\alpha_p=\alpha_q$. In other words, labor share difference between sectors will determine the direction and magnitude of the structural change effect between sectors on aggregate labor share.

Third, the within-sector effect is defined as the sum of the changes in each sector's labor share weighted by that sector's value-added share. As Eq. (4.1) shows, the size of the sector weight, vsh_i, determines the impact of its change in labor share on the aggregate labor share. If vsh_i is relatively low, labor share changes in sector i, even if they are significant, will have negligible effects on the aggregate labor share.[9] As a result, the within-sector effect is determined primarily by the labor share movements in sectors with high value-added shares.

Finally, the most important qualification of Eq. (4.1) is that it is not the only possible way of decomposition. Specifically, the change in the labor share can also be decomposed into:

$$\begin{aligned}\alpha_{t1}-\alpha_{t0} &= \sum \alpha_{i,t1}\cdot vsh_{i,t1}-\sum \alpha_{i,t0}\cdot vsh_{i,t0}\\ &= \left(\sum \alpha_{i,t1}\cdot\left(vsh_{i,t1}-vsh_{i,t0}\right)\right) \quad (structural\,change\,effect)\\ &\quad+\left(\sum\left(\alpha_{i,t1}-\alpha_{i,t0}\right)\cdot vsh_{i,t0}\right) \quad (within-sector\,effect),\end{aligned} \tag{4.2}$$

The structural change effect and within-sector effect computed using the two approaches will be virtually the same when α_i and vsh_i only undergo small changes from $t0$ to $t1$.

Another more popular decomposition is as follows:

$$\begin{aligned}\alpha_{t1}-\alpha_{t0} &= \left(\sum \alpha_{i,0}\cdot\left(vsh_{i,t1}-vsh_{i,t0}\right)\right) \quad (structural\,change\,effect)\\ &\quad+\left(\sum\left(\alpha_{i,t1}-\alpha_{i,t0}\right)\cdot vsh_{i,0}\right) \quad (within-sector\,effect)\\ &\quad+\left(\sum\left(\alpha_{i,t1}-\alpha_{i,t0}\right)\cdot\left(vsh_{i,t1}-vsh_{i,t0}\right)\right) \quad (co-movement\,effect),\end{aligned} \tag{4.3}$$

Eq. (4.3) is based on the labor productivity decomposition proposed by Foster et al. (2001) and is applied in more recent research (Morel, 2005; Ruiz, 2005; Young, 2005). This way is most appropriate when the sectoral labor shares and value-added shares have both undergone obvious changes between $t0$ and $t1$. Otherwise, the co-movement effect calculated with this approach is trivial which implies that the results of Eqs. (4.1) and (4.3) are equivalent.

4.2. The data

In Section 2, we have obtained aggregate labor share from 1978 to 2007 with the provincial GDP by income approach. In addition, we have the adjusted aggregate labor shares for 2004–2007 that are comparable to those before 2004 in Section 3. To apply the decomposition method introduced previously on these aggregate labor shares, we need sectoral labor shares and sectoral value-added shares. This subsection introduces how to obtain these series and predicts the decomposition results with these estimates.

In China's National Accounts, the sectoral GDP by income approach is available at the aggregate level in I–O tables and at the provincial level in Hsueh and Li (1999) and NBS (2007a). As we calculated the aggregate labor share using the provincial GDP by income approach, we must also use this source to obtain sectoral labor share in GDP net of indirect tax. We obtained a continuous time series for GDP by income approach by province and sector from 1978 to 2004 by combining data from Hsueh and Li (1999) for

[9] As will be shown later, change in sectoral labor share generally does not exceed 10 percentage points in China during 1978 and 2004. Therefore, we actually mean a change around 10 percentage points by a significant change here.

1978–1993 and in NBS (2007a) for 1994–2004. With these data, we computed the annual labor share of major sectors (including agriculture, industry, construction and service sector) from 1978 to 2003 as the weighted average of each sector's labor share across provinces, which are reported in Table 4. For 2004, we employ adjustment 3 in Table 2 to avoid artificial within-sector effect because changes in GDP accounting method have resulted in abrupt change in official sectoral labor share. However, sectoral labor share is unavailable after 2004, which preclude us from employing Eqs. (4.2) and (4.3) for 2005–2007.

Parallel to sectoral labor share in value-added net of indirect tax, we need estimates of sectoral value-added share in GDP net of indirect tax. We summed up the sectoral value-added net of indirect tax across the provinces with GDP by income approach by province and sector, and then calculated the value-added share of each sector for 1978–2004. For 2005–2007, we do not have GDP by income approach by sector and hence we cannot obtain official value-added share in GDP net of indirect tax for each main sector. However, we estimated indirect tax for each sector by assuming each sector's share in the net production taxes of GDP by income approach is the same through 2004 and 2007. Then, from 2005 to 2007, value-added share of each sector is calculated with sectoral value-added by production approach net of the estimated indirect tax. Table 5 reports estimates of sectoral value-added shares from 1978 to 2007.

In Fig. 5, we present sectoral labor share on the left panel and sectoral labor share on the right panel. We can tentatively predict the structural change effect and within-sector effect from decomposition analysis with these series. As Fig. 5 illustrates, the relative size of agriculture sector increased from 1978 to 1984 and then steadily declined since the mid-1980s. The service sector's share of the economy has grown since 1978 while the industry sector's relative size has fluctuated much during the past three decades. The construction sector follows no detectable trend from 1978 to 2007. Because the labor share in agriculture has historically been greater than that in the other three sectors, as shown on the right panel of Fig. 5, we expect that the structural change effect is positive before 1984 and negative since then.

The labor share in the industry sector over time follows a hump-shaped trend, increasing steadily until 1995 and then falling since 1998. Compared with the labor share in the industry sector, the labor share in service sector changes a little, but the agriculture and construction sectors both experience small fluctuations in the labor share. As explained in the previous discussion, the within-sector effect is dominated by shifts in the labor shares of the largest sectors. Therefore, judging from the time-trend of the labor share in the industry sector, we expect that the within-sector effect is positive before the mid-1990s and negative after that.

4.3. The decomposition results

In this subsection, we present decomposition on aggregate labor share from 1978 to 2007. Before that, we introduce periods that we chose to analyze, since decomposition results are sensitive to the beginning and ending year. As Fig. 4 illustrates, the

Table 4
Sectoral labor share in GDP net of production tax: 1978–2004.

Year	Aggregate [a]	The labor share			
		Agriculture	Industry	Construction	Service
1978	0.5719	0.8945	0.3452	0.7348	0.4769
1979	0.5859	0.8913	0.3487	0.7345	0.4852
1980	0.5822	0.8938	0.3546	0.7149	0.4876
1981	0.5981	0.9075	0.3537	0.7132	0.4898
1982	0.6052	0.9011	0.3558	0.7033	0.4917
1983	0.6057	0.9077	0.362	0.6946	0.4738
1984	0.6087	0.9108	0.3746	0.715	0.4776
1985	0.6014	0.917	0.3854	0.7216	0.4701
1986	0.6037	0.9062	0.3963	0.7413	0.4823
1987	0.5943	0.8961	0.4049	0.7306	0.4668
1988	0.598	0.8927	0.4237	0.7391	0.4719
1989	0.5937	0.8865	0.4396	0.7335	0.4683
1990	0.614	0.8856	0.4663	0.7539	0.4799
1991	0.6014	0.8892	0.4777	0.7569	0.4614
1992	0.5792	0.8869	0.4513	0.7245	0.4589
1993	0.5758	0.8787	0.4744	0.6929	0.4635
1994	0.5842	0.8728	0.4777	0.6822	0.4873
1995	0.591	0.8833	0.4901	0.6945	0.4865
1996	0.5869	0.8879	0.4856	0.6914	0.4826
1997	0.5868	0.8876	0.4923	0.6944	0.4897
1998	0.5858	0.8889	0.493	0.7112	0.4923
1999	0.5772	0.8866	0.4885	0.6935	0.4936
2000	0.5668	0.8792	0.47	0.706	0.5014
2001	0.5604	0.8764	0.4677	0.6976	0.4984
2002	0.554	0.8712	0.4619	0.6803	0.5019
2003	0.5362	0.8607	0.4444	0.681	0.4900
2004 [b]	0.5466	0.8654	0.4221	0.6253	0.5411

[a] Aggregate labor share series are the weighted average of sectoral labor share, which are not the same as those in Table 1 for statistical discrepancy.
[b] We employ Adjustment 3 in Table 2 instead of original results.

Table 5
Sectoral composition of value-added at factor cost.

Year	Sectoral value-added share [a]			
	Agriculture	Industry	Construction	Service
1978	0.3242	0.4180	0.0569	0.2009
1979	0.3484	0.4016	0.0563	0.1936
1980	0.3327	0.4034	0.0576	0.2062
1981	0.3527	0.3787	0.0556	0.213
1982	0.367	0.3574	0.0561	0.2195
1983	0.366	0.3524	0.0565	0.2251
1984	0.3551	0.3547	0.058	0.2322
1985	0.3275	0.3629	0.0623	0.2472
1986	0.3205	0.3535	0.0613	0.2647
1987	0.3105	0.3539	0.0612	0.2744
1988	0.301	0.3449	0.0603	0.2938
1989	0.2901	0.3503	0.0531	0.3065
1990	0.3069	0.3215	0.051	0.3207
1991	0.2798	0.319	0.051	0.3503
1992	0.2512	0.3355	0.0579	0.3554
1993	0.2262	0.3622	0.0629	0.3487
1994	0.2299	0.3623	0.0604	0.3473
1995	0.2297	0.3619	0.058	0.3503
1996	0.2254	0.3599	0.057	0.3577
1997	0.212	0.3616	0.0577	0.3687
1998	0.2014	0.3562	0.0614	0.3811
1999	0.1861	0.3548	0.0616	0.3975
2000	0.1704	0.3617	0.0603	0.4076
2001	0.1616	0.3576	0.0597	0.4212
2002	0.151	0.3591	0.0602	0.4298
2003	0.1386	0.3753	0.0621	0.424
2004	0.1423	0.3855	0.0618	0.4104
2005 [b]	0.1400	0.3915	0.0563	0.4122
2006 [b]	0.1300	0.4010	0.0570	0.4119
2007 [b]	0.1291	0.4005	0.0573	0.4132

[a] Value added share are the share of each major sector in GDP net of indirect tax. For the 1978-2004 period, we obtain sectoral value-added net of indirect tax in the whole nation by summing across provinces and GDP net of indirect tax is the sum across sectors.
[b] We estimate sectoral net production tax by assuming that each sector's share in the net production taxes of GDP by income approach are the same from 2004 to 2007 and calculate sectoral value-added share for 2005–2007 with sectoral value-added by production approach net of the estimated indirect tax.

aggregate labor share increases by about 4 percentage points from 1978 to 1984, fluctuates from 1984 to 1995, and then falls after 1995. For the post 1995 period, the aggregate labor share does not trend smoothly from 2003 to 2004 even though we have adjusted the sectoral labor shares in 2004. To ensure that the direction of the labor share's movement does not change over each period, we divide the post 1978 period into five periods: 1978–1984 period, 1984–1995 period, 1995–2003 period, 2003–2004 period and 2004–2007 period.

On the whole, we have official aggregate labor share and sectoral value-added share from 1978 to 2007 and sectoral labor share from 1978 to 2004. Lack of sectoral labor share for 2005–2007 prevents us from employing Eqs. (4.2) and (4.3) to the post 2004 period. Therefore, we will adopt Eq. (4.1) in order to obtain comparable decomposition results for all periods. For the 2003–2004 period, we use the adjusted sectoral labor share and aggregate labor share in 2004 to eliminate the impact of GDP accounting method. For the 2004–2007, we use both official and adjusted sectoral labor share in 2004 for comparison.

Table 6 reports the decomposition results with Eq. (4.1). In column (1), we present the change of the aggregate labor share from year $t0$ to year $t1$, $(\alpha_{t1}-\alpha_{t0})$. The structural change effect and within-sector effect computed with Eq. (4.1) are respectively reported in columns (2) and (3). In columns (4)–(7), we report the contribution of each sector to the within-sector effect, i.e.$(\alpha_{it1}-\alpha_{it0})\cdot vsh_{it1}$.

For the period of 1978–1984, the value-added share of agriculture and the labor share in industry both increased. As a result, the structural change effect and the within-sector effect were both positive, which resulted in the increase of the aggregate labor share by 3.68 percentage points.

During 1984 and 1995, the agriculture sector was eclipsed in size by the service sector and the labor share in industry continued to increase. As a result the structural change effect for this period was negative while the within-sector effect was positive. These conflicting forces explain why the aggregate labor share moved a little during the decade, declining by only 1.77 percentage points over 10 years.

From 1995 to 2003, both the structural change effect and the within-sector effect were negative, causing the aggregate labor share to decline by over five percentage points. The structural change effect had been always negative since 1984 which implies that the labor share trend reversal since 1995 was caused by changes in the industry labor share. As illustrated on the right panel of Fig. 5, labor share in this sector plateaued in 1995 and declined after 1998.

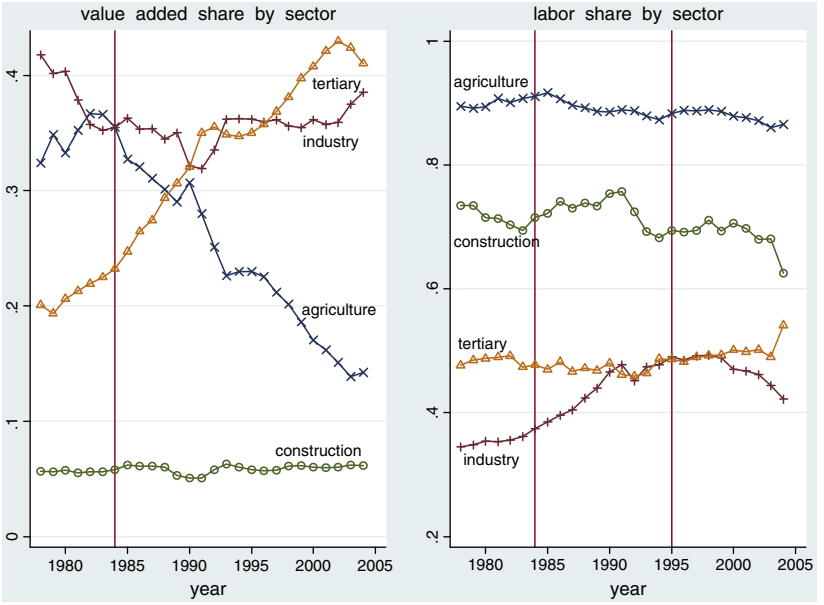


Fig. 5. Sectoral value-added share and sectoral labor share.

The structural change effect and within-sector effect between 2004 and 2007 both remain negative although the within-sector effect is relatively more significant than the structural change effect. This holds in both of the two decomposition results with official and adjusted sectoral labor share in 2004, therefore revision of sectoral labor share does not change the decomposition results.[10]

4.4. Robustness analysis

The decomposition results presented in Table 6 reveal that both the structural change effect and the within-sector effect have proved to be significant for the shifts in the aggregate labor share over the last thirty years. In the meantime, change of labor share in industry sector is the main source of within-sector effect.

However, our decomposition analysis is done for selected period and we decompose the labor share change from that in a fixed year, i.e. the beginning of each period. Furthermore, lack of sectoral labor share after 2004 has restricted our decomposition analysis only with Eq. (4.1). These convenient choices may affect the robustness of the previous conclusions. To demonstrate these conclusions in another way, we compute three hypothetical series of aggregate labor share in this subsection as robustness check for decomposition analysis, and they are: the aggregate labor share with fixed sectoral labor share, the aggregate labor share with fixed economic structure, and the aggregate labor share with all fixed except for the labor share in industry.

We plot the actual aggregate labor share and the first two hypothetical series on the left panel of Fig. 6. The one with triangle markers is an average of sectoral labor share in 1978 weighted by actual sectoral value-added share since 1978, labeled *Fixed Sectoral Labor Share*. By fixing sectoral labor share at 1978, this hypothetical series only captures the impact of structural change from 1978 to 2007, corresponding to the structural change effect in decomposition analysis. If there had not been the change of labor share within-sector, the aggregate labor share would have started to fall in 1984 and declined by over 10 percentage points by 2003. This hypothetical series also declines more moderately than the actual series after the mid-1990s because the downward trend of actual series is intensified by the decline in the labor share of industry after 1998.

In Fig. 6, the other hypothetical series with plus markers, labeled *Fixed Economic Structure*, is the weighted average of actual sectoral labor share from 1978 to 2004 using sectoral value added share in 1978 as weights, which only captures changes in the sectoral labor share, the within-sector effect. This time series illustrates that if there had been no structural change shift from agriculture to service sector, a graphical plot of the aggregate labor share over time would be hump-shaped, increasing from 1978 to 1998, and declining by 3 percentage points from 1998 to 2003, much less than the 5 percentage points of decline in the actual aggregate labor share.

Actually, the hump-shaped plot of *Fixed Economic Structure* is similar to that of the industry sector's labor share, since the change of the labor share in the industry sector dominates the within-sector effect (columns (3) and (5), Table 6). The third hypothetical aggregate labor share which is the weighted average of actual labor share in industry from 1978 to 2004 but 1978 labor share of other sectors using sectoral value-added share in 1978 as weight, is denoted by *All Fixed Except for The labor share in*

[10] The change of aggregate labor share is the same for official and adjusted estimates since we obtain the adjusted ones by subtracting the same value, 6.3 percentage points, from the official ones. The difference lies in that the decomposition analysis uses official and adjusted sectoral labor share respectively.

Table 6
Decomposition of aggregate labor share with Eq. (4.1).
Source: Authors' calculation and see text for details.

Period	Change in labor share	Structural change effect	Within-sector effect	Contribution of the labor share by sector			
				Agriculture	Industry	Construction	Service
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1978–1979	0.0140	0.0120	0.0020	−0.0011	0.0012	0.0000	0.0019
1978–1980	0.0103	0.0059	0.0044	−0.0002	0.0033	−0.0012	0.0025
1978–1981	0.0262	0.0168	0.0094	0.0046	0.0030	−0.0013	0.0030
1978–1982	0.0333	0.0256	0.0077	0.0023	0.0038	−0.0018	0.0034
1978–1983	0.0338	0.0262	0.0076	0.0047	0.0060	−0.0023	−0.0007
1978–1984	0.0368	0.0216	0.0152	0.0058	0.0104	−0.0011	0.0002
1984–1985	−0.0073	−.0104	0.0031	0.0014	0.0039	0.0004	-0.0026
1984-1986	−0.0050	−0.0150	0.0100	−0.0011	0.0079	0.0015	0.0016
1984–1987	−0.0144	−0.0191	0.0047	−0.0034	0.0110	0.0009	−0.0038
1984–1988	−0.0107	−0.0237	0.0130	−0.0042	0.0178	0.0014	−0.0020
1984–1989	−0.0150	−0.0308	0.0158	−0.0056	0.0235	0.0011	−0.0033
1984–1990	0.0053	−0.0252	0.0305	−0.0058	0.0332	0.0023	0.0008
1984–1991	−0.0073	−0.0364	0.0291	−0.0050	0.0373	0.0024	−0.0057
1984–1992	−0.0295	−0.0458	0.0163	−0.0055	0.0278	0.0006	−0.0066
1984–1993	−0.0329	−0.0554	0.0225	−0.0074	0.0361	−0.0013	−0.0049
1984–1994	−0.0245	−0.0546	0.0301	−0.0087	0.0373	−0.0019	0.0034
1984–1995	−0.0177	−0.0551	0.0374	−0.0063	0.0418	−0.0012	0.0031
1995–1996	−0.0041	−0.0012	−0.0029	0.0006	−0.0017	−0.0002	−0.0017
1995–1997	−0.0042	−0.0070	0.0028	0.0006	0.0008	0.0000	0.0014
1995–1998	−0.0052	−0.0106	0.0054	0.0008	0.0011	0.0010	0.0025
1995–1999	−0.0138	−0.0166	0.0028	0.0005	−0.0006	−0.0001	0.0030
1995–2000	−0.0242	−0.0231	−0.0011	−0.0006	−0.0075	0.0007	0.0063
1995–2001	−0.0306	−0.0265	−0.0041	−0.0010	−0.0084	0.0002	0.0050
1995–2002	−0.0370	−0.0304	−0.0066	−0.0017	−0.0106	−0.0009	0.0065
1995–2003	−0.0548	−0.0352	−0.0196	−0.0031	−0.0172	−0.0008	0.0015
2003–2004 [a]	0.0104	0.0008	0.0096	0.0007	−0.0086	−0.0034	0.0210
2004–2005 [a]	−0.0017	−0.0019	0.0003	N.A.	N.A.	N.A.	N.A.
2004–2006 [a]	−0.0107	−0.0062	−0.0044	N.A.	N.A.	N.A.	N.A.
2004–2007 [a]	−0.0172	−0.0064	−0.0108	N.A.	N.A.	N.A.	N.A.
2004–2005 [b]	−0.0017	−0.0024	0.0007	N.A.	N.A.	N.A.	N.A.
2004–2006 [b]	−0.0107	−0.0076	−0.0031	N.A.	N.A.	N.A.	N.A.
2004–2007 [b]	−0.0172	−0.0080	−0.0092	N.A.	N.A.	N.A.	N.A.

[a] Sectoral labor share in 2004 used in the decomposition is the estimates of adjustment 3 in Table 2.
[b] Sectoral labor share in 2004 used in the decomposition is the official estimates.

Industry on the right panel of Fig. 6. This hypothetical series only captures the movement of labor share in industry sector. We compare this series with *Fixed Economic Structure* on the right panel of Fig. 6. For each year, these two series have very similar values and follow parallel trends. This comparison reinforces the conclusions that the industry sector is the dominant driver of the within-sector effect.

Combining the first two hypothetical series on the left panel of Fig. 6, we can explain the movements of aggregate labor share over the past three decades. As explained earlier, the shifts of aggregate labor share are determined by the net effect of the two forces: the structural transformation and the labor share changes within sectors. When the two effects are in the same direction during 1978–1984 and 1995–2003,[11] aggregate labor share significantly increases and decreases respectively. The aggregate labor share fluctuates during 1984 and 1995 because the two effects have opposite signs and thus their impacts are counterbalanced.

Nevertheless, the structural change has always been relatively more important than labor share change within sectors on the movement of the aggregate labor share. We can observe in Fig. 6 that the actual aggregate series and *Fixed Sectoral Labor Share* series follow similar trends in the three decades. This conclusion is supported by the decomposition results in Table 6 also, since the structural change effect is always larger than the within-sector effect in absolute value.

On the whole, decomposition results and hypothetical series calculated in this subsection both lead to the conclusions that structural transformation and within sector change of labor share prove to be both important in directing the movement of the aggregate labor share. Over the period studied, the structural change effect is relatively more important and the within-sector effect is mainly from labor share change in industry sector. For the 1995–2003 period, we find that around 2/3 of the decline in the aggregate labor share can be explained by structural change effects and the remaining 1/3 is explained by the labor share changes within sectors, as shown in Table 6. However, the relative importance has changed since 2004, during which over half of the decline is from the labor share changes within sectors.

[11] Actually the two effects also shared the same sign for 2004–2007, according to the decomposition results reported in Table 6.

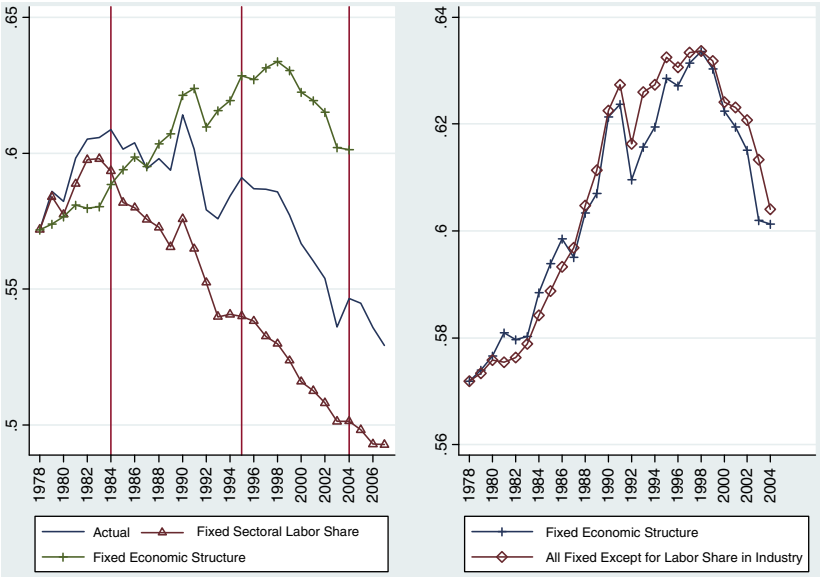


Fig. 6. The labor share in GDP net of indirect tax: actual vs. hypothetical.

5. The impact of accounting method on structural change effect

The structural transformation has been the major driving force of the aggregate labor share over the last three decades. As illustrated in Table 4, the labor share in the agriculture sector (around 0.9) has been much higher than those in the non-agriculture sectors. As a result, the structural change effect was positive when the relative size of the agriculture sector grew from 1978 to 1984, and negative when it fell after 1984.

However, the importance of structural transformation on aggregate labor share exists conditional on the significant difference in labor share between agriculture and non-agriculture sectors, which is artificial in China because of the accounting method of rural household income from agriculture adopted by the NBS. This section first compares agriculture labor shares in China to other countries and states that NBS has overstated agriculture labor share by counting mixed income of rural household as labor compensation. The second part in this section presents how aggregate labor will be with different ways of accounting the mixed income of rural household.

5.1. International comparison of agriculture labor share

In Fig. 7, we compare the labor share in the agriculture of China with that of other economies.[12] Among 41 economies, China has by far the highest agriculture labor share. The agriculture labor share in China is more than ten percentage points greater than that of Israel, the country with the next highest labor share value. Most economies except for China, Israel, and Taiwan have an agriculture labor share lower than 0.5.

This wide variation between China and the rest of the world is mainly due to China's accounting method of mixed income of the rural household from agriculture. Most economies have adopted the U.N. system of National Accounts: report mixed income separately or treat mixed income as capital income. The self-employment rates in agriculture vary among countries, therefore resulting in variation in agriculture labor shares as shown in Fig. 7. China, however, does not follow these accounting methods. In China, income of the self-employed households in agriculture, the major source of the sector's value-added, is counted as labor compensation by the NBS (2003, 2007b, 2008a) instead of capital income. Consequently, China has a distinguishingly high labor share in agriculture. Since the inception of the National Economic Census, the NBS regulated that all income should be counted as labor compensation, except for production tax and depreciation of fixed assets of state-owned and collective-owned farms. Through these simplified accounting methods only depreciation of capital in agriculture has been counted as capital income in China and thus the NBS has overestimated the labor compensation in agriculture to a large degree.

[12] OECD publishes Input–Output tables for OECD countries after 1995 and expands the list to some non-OECD countries or regions since 2002. The labor share in agriculture sector is computed with OECD Input–Output tables for each economy, defined as labor compensation over value-added at factor cost. For each country, the Input–Output tables are available for selective years. We compute labor share with all possible years and do not find significant change for each country. In Fig. 7, we take the average of all years available in OECD Input–Output tables for each economy.

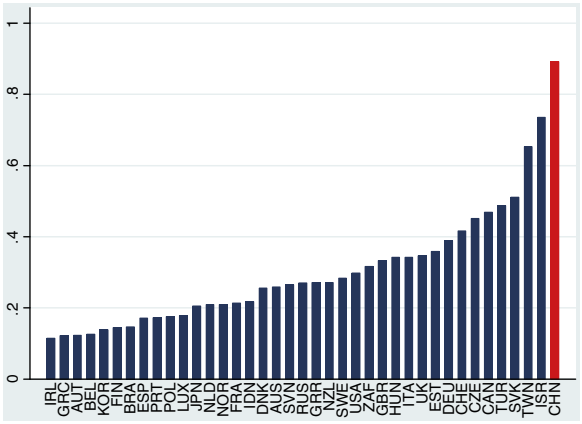


Fig. 7. Agriculture labor share in GDP net of indirect tax: international comparison.

5.2. The impact of accounting of rural household income on aggregate labor share

One way to avoid the artificial impact from the accounting method of mixed income of rural household is to obtain real agriculture factor shares. Johnson (1948) estimated the functional distribution in agriculture for the U.S. In his estimates, he used the product of the rate of return to capital and the net value of non-residential fixed assets as a proxy for capital income. He also assumed the wage of a farm owner was the same as the wage of hired labor. To estimate land rent, Johnson employed two approaches. One method is to proxy land rent as the product of average rental price of land and total land area. The other method is to proxy land rent as the product of the average rate of interest on farm mortgages and the estimated value of farm real estate.

However, estimation of the real factor income shares in agriculture is difficult particularly for China. In China, the lack of a nation-wide market for farm land implies that the rental price of land does not always reflect the real value of farm land.[13] For the same reason, it is not possible to obtain income from the non-residential fixed capital in agriculture. Therefore, under present conditions, it is difficult to estimate the real agriculture labor share in China.

Nevertheless, empirical test can show how the accounting method of household income in agriculture has affected the aggregate labor share and its impact on the structural change effect. The test was conducted as follows. We computed four synthetic series of aggregate labor share with weighted average of sectoral labor share. However, instead of using the actual labor share estimates for the agriculture sector, we chose a constant agriculture labor share through 1978 to 2004 in each of the four synthetic series.[14]

According to our estimates using OECD Input–Output Table, Israel and Taiwan respectively have the second and third highest agriculture labor share. We employed the agriculture labor shares of these two economies, 0.74 and 0.66, to compute the first two synthetic series in Fig. 8. We computed another synthetic series with an agriculture labor share of 0.28, the average agriculture labor share across the 40 economies in Fig. 7 except for China and also close to the average value of the U.S. The one with circle markers in Fig. 8 are computed with an agriculture labor share of 0.48, which is the average labor share in the service sector in China from 1978 to 2004. The purpose of this synthetic series is to show the movement in aggregate labor share when the economic structure change happens between agriculture and service sector with trivial differential in labor share.

Observing Fig. 8, we find three interesting facts. First, the synthetic ones with agriculture labor share of 0.74 and 0.65 exhibit increasing trends during the 1984–1995 period and their increasing and declining rates are more moderate during 1978–1984 and 1995–2003, though they take a similar pattern as the official one. This suggests that the structural change effect shrinks when the labor share differential between the agriculture and service sectors is reduced, noticing that 0.74 and 0.65 are much closer than the official one to the service labor share, while remain less than the latter.

Second, when the agriculture labor share equals or even less than that of the service sector, the synthetic series, denoted by 0.48 and 0.28, increases from 1978 to 1998 and declines insignificantly after 1998. The movements of the two synthetic series are significantly different from that of the official estimates since structural change effect varies with the agriculture labor share. For the series calculated using 0.48 as the agriculture labor share, a value close to that in the service sector, the structural change effect from agriculture to services almost disappears. For the series denoted by 0.28, the sign of the structural change effect is different from that of the official one because the 0.28 agriculture labor share is now the lowest among all major sectors. Therefore, when agriculture labor share is less than the service sector, the impact of structural transformation has a different sign from the official one and the moving direction of the aggregate labor share changes accordingly.

[13] According to the Ministry of Agriculture, the area of land in rural regions on the planting rights markets was 55 million acres in 2005, just 4.57% of the total arable land of rural households in China.

[14] For simplicity, we use a constant agriculture through years, which is supported by the fact that changes in the agriculture labor share are not significant in the past three decades and show no impact on aggregate labor share.

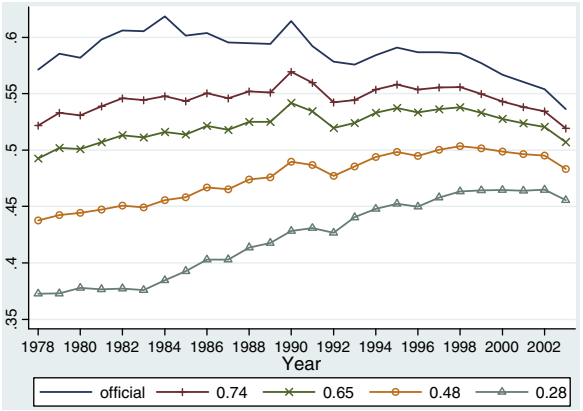


Fig. 8. Mixed income in agriculture and its implications.

Third, the decline of synthetic series since 1995 is more moderate than that of the official one, no matter which hypothetical agriculture labor share is employed. Actually, for the series calculated using agriculture labor shares of 0.74, 0.65 and 0.48, the negative effect from structural change is less than official estimates (and even zero in the case of 0.48) as the labor shares in agriculture and services converge. In the series calculated with 0.28, the structural change effect is positive, which even counterbalances the declining trend from the fall of labor share in industry sector since 1998. Therefore, from 1995 to 2007, we observe no decline in the synthetic aggregate labor share series denoted by 0.28 in Fig. 8.

The previously described analysis shows that the importance of the structural change effect depends on the GDP accounting method. Different accounting methods for the mixed income of the rural households produce different aggregate labor share. Though an agriculture labor share as low as 0.28 is commonly considered too low for China, certainly that the real labor share in agriculture is lower than the official estimate of 0.9, since the land rent and capital income has been counted as labor compensation in China's GDP by income approach.

Therefore, the structural change effect is exaggerated by this overestimated differential labor share between agriculture and service sector. As a result, we argue that the real decline in the aggregate labor share was even less than five percentage points for the 1995 to 2003 period. Following this analysis, we conclude that the change in the labor share in the industry sector has majorly caused the real decline in the aggregate labor share for the post 1995 years.

6. The labor share in industry: explanations

Of all sectors, labor share movement in the industry sector has proven to be the driving force behind the within sector effect. This relationship is not surprising since industry has been the most important sector in China's economic structure for the past three decades and the labor share in industry has shifted more dramatically than in other sectors.

To explain the changes of the labor share in industry, we first introduce determinants of China's labor share in industry and present econometric model in Section 6.1. We estimate this model with industrial survey data from 1998 to 2005 in Section 6.2 and calculate the contribution of each determinant on the labor share decline in industry from 1998 to 2005. In the final part of this section, we advance possible reasons for the increase of labor share in industry from 1978 and 1998 following what have been found for the 1998–2005 years.

6.1. Determinants of labor share in industry

Theoretically, determinants of factor income distribution fall under three categories: the relative price of labor to capital and factor input ratio, distortions in factor markets, and distortions in goods markets (Bentolila and Saint-Paul, 2003).

Following Bentolila and Saint-Paul (2003), we use the capital–output ratio to control for the impact of relative price of labor to capital and factor input. The estimated coefficient of capital–output ratio will be significantly negative (positive) if the elasticity of substitution between capital and labor is significantly more (less) than unity. But an insignificant capital–output ratio will imply a unitary elasticity of substitution between capital and labor. Besides, we use year dummies and industry dummies in our econometric model in order to control for the biased technological improvement and the difference in technologies among industries.

In most developed economies, researchers care about distortion in factor markets resulting from bargaining between firms and workers (Bentolila and Saint-Paul, 2003; Blanchard and Giavazzi, 2003; Giammarioli, Messina et al., 2002). In China, this kind of bargaining is rare. Instead distortions largely originate from regional protectionism (Bai et al., 2004) and also different behavior in employment and wage setting between the SOEs and non-SOEs (Bai, Lu and Tao, 2009). According to Bai, Li and Wang (1997), Brandt and Zhu (2000) and Brandt, Hsieh and Zhu (2007), the average wage level at the SOEs is higher than that at the non-SOEs and the SOEs are inclined to hire too many employees, therefore we expect that the labor share of the SOEs is higher than that of

the non-SOEs as well. We investigate the impact of these factors on the labor share with region dummies and equity share of each type of ownership.

The monopolistic competition is the main distortion in the goods markets. When there is a bargaining mechanism between labor and firms, monopolistic profit is distributed between the two groups according to their relative bargaining power. Since no such bargaining arrangement exists in China, our model presumes that labor does not share any of the monopolistic profit. To test the impact of market monopoly power on factor income shares, we employ the following proxies: the price markup (hereafter *mkup*), computed with the ratio of sales revenue to sales cost, Herfindal index at 4-digit level (hereafter *HHI*), and the ten-firm concentration ratio (hereafter *CR10*) at 4-digit level. We expect that the labor share declines in these variables, since they are proxy variables for market power and higher market power implies a higher capital share.

Specifically, we estimated the following econometric model for the industry sector:

$$\alpha_{l,jt} = a \cdot mkp_{jt} + b \cdot KtY_{jt} + \sum_{x=s,c,lp,f,hmt} \gamma_x \cdot eqsh\_x_{jt} + \gamma_{st} \cdot eqsh\_st_{jt} + \sum \theta_t Dt + \sum \theta_i Di_j + \sum \theta_p Dp_j + c + a_j + v_{jt} \quad (6.1)$$

where $\alpha_{l,jt}$ is the labor share of firm j at time t; *mkp* is the proxy for monopoly power, meaning *mkup*, *HHI* or *CR10*; *KtY* is the capital–output ratio, which is used to control for changes in the factor ratio and relative prices of labor to capital; *eqsh_x* is a set of relative shares of different ownership types in owners equity, including the state-owned equity share (denoted as *eqsh_s*), collective-owned equity share (denoted as *eqsh_c*), legal person-owned equity share (denoted as *eqsh_lp*), equity share held by foreign business (denoted as *eqsh_f*), and equity share held by Hong Kong, Macao and Taiwan (denoted as *eqsh_hmt*)[15]; *eqsh_st* is the product of *eqsh_s* and a time trend, which is included to control for changes in the differential labor share between the SOEs and non-SOEs; *Dt*, *Di* and *Dp* are year dummies, two-digit industry dummies, and province dummies respectively; *c* is a constant; a_j captures time-invariant firm-specific factors; and v_{jt} controls for stochastic terms.

6.2. Econometric model estimated with industrial survey data

The dataset used to estimate model (6.1) is industrial survey data from 1998 to 2005, collected by the NBS. This dataset covers all SOEs and non-SOEs with sales revenue higher than 5 million RMB and therefore captures the main characteristics of the industry sector. We employ (1) the sum of total profit, annual fixed asset depreciation, and payable wage and welfare fee as value added at factor cost; (2) payable wage and welfare fee to obtain labor share in value-added at factor cost; (3) annual sales revenue and annual sales cost to calculate *mkup*, *HHI* and *CR10*; (4) net fixed assets and value-added at factor cost to get *KtY*; (5) equity by ownership to calculate *eqsh_x* and *eqsh_st*; and (6) 2-digit region ID and 4-digit industry ID to generate region and industry dummies.

Given that *KtY* may be endogenous to the labor share in this model, model (6.1) is estimated using system GMM estimation. We included three years of *KtY* lags and two years of ΔKtY lags as GMM instruments in difference and level equations respectively in our estimation. Table 7 reports five estimations: in EST 1, 2 and 3, the proxy for monopoly power is *mkup*, *HHI* and *CR10* respectively; and EST 4 and EST 5 are estimations with samples excluding 2.5% and 5% tails of the labor share. As shown in Table 7, the five estimated models are comparable and have the same signs in all estimated parameters.

In the five estimation results, $\hat{a}$ is negative and significant, suggesting that the labor share is depressed by monopoly power in the goods market. $\hat{b}$ is insignificant in the five estimation results, meaning *KtY* is an insignificant factor and the elasticity of substitution in industry is not significantly different from one. The estimated $\hat{\gamma}_x$ reflect the difference in labor share between x type owned firms and private owned firms with other factors controlled. As Table 7 shows, $\hat{\gamma}_s$ is much higher than other $\hat{\gamma}_x$, therefore average labor share of the SOEs is much higher than that of the non-SOEs, with the ascending order of labor shares as follows: foreign enterprises, HMT enterprises, legal person funded enterprises, collectively owned enterprises, private owned enterprises, and the SOEs. *eqsh_st* is the product term of state-owned ownership and time trend and its coefficient is significantly positive in all five estimation results, suggesting the differential between the SOEs and non-SOEs in labor share is shrinking over time. $\hat{\theta}_t$ shows no definite trend in the five regressions and hence there is no trend in year dummies, which implies that there is no biased technological improvement. The estimated parameters of all region and industry dummies are generally significant.

6.3. Reasons for the decline of industry labor share from 1998 to 2005

Though we can infer what factors have determined labor share with these estimated results, we still need to investigate how changes in these factors has resulted in the movement of labor share and also their relative contributions. This can be done by forecasting labor share with the estimated econometric model. However, one shortcoming with the five estimations in Table 7 is that they assume that some of the parameters of technology are the same for all sub-industries; they estimate model (6.1) using all samples of the industrial survey and obtain similar estimated coefficients for *KtY*, *mkp*, *eqsh_x*, *eqsh_st* for each sub-industry. If we use them to compute the relative contributions of each explanatory variable to the shifts in labor share, we may obtain biased results.

[15] The benchmark case is equity privately held.

Table 7
Regression results.

Variables	EST1	EST2	EST3	EST4	EST5
CR10 ($\hat{a}$)		−0.0160***			
HHI ($\hat{a}$)			−0.0465***		
mkup ($\hat{a}$)	−0.1795***			−0.2788***	−0.2522***
KtY ($\hat{b}$)	0.0011	0.0012	0.0012	−0.0001	−0.0001
eqsh_c ($\hat{\gamma}_c$)	−0.0054***	−0.006***	−0.0060***	−0.0046***	−0.0042***
eqsh_lp ($\hat{\gamma}_{lp}$)	−0.0077***	−0.0094***	−0.0094***	−0.0059***	−0.0059***
eqsh_f ($\hat{\gamma}_f$)	−0.0637***	−0.0698***	−0.0699***	−0.0540***	−0.0493***
eqsh_hmt ($\hat{\gamma}_{hmt}$)	−0.0356***	−0.0385***	−0.0385***	−0.0300***	−0.0273***
eqsh_s ($\hat{\gamma}_s$)	0.1259***	0.1205***	−0.1205***	0.1200***	0.1080***
eqsh_t ($\hat{\gamma}_{st}$)	−0.0043***	−0.0042***	−0.0042***	−0.0043***	−0.0040***
D_1999 ($\hat{\theta}_t$)	0.0027***	0.0035***	0.0034***	0.0024***	0.0024***
D_2000 ($\hat{\theta}_t$)	0.0022*	0.0039***	0.0038***	0.0014	0.0011
D_2001 ($\hat{\theta}_t$)	−0.0013	0.0011	0.001	−0.0036***	−0.0044***
D_2002 ($\hat{\theta}_t$)	−0.0072***	−0.0044***	0.0044***	−0.0100***	−0.0111***
D_2003 ($\hat{\theta}_t$)	−0.0139***	−0.0108***	0.0109***	−0.0174***	−0.0190***
D_2004 ($\hat{\theta}_t$)	−0.0005	0.0031**	0.0034**	−0.0055***	−0.0072***
D_2005 ($\hat{\theta}_t$)	−0.0286***	−0.0257***	−0.0255***	−0.0352***	−0.0382***
Constant	0.6556***	0.6042***	0.6004***	0.6888***	0.6793***
D_p	Yes	Yes	Yes	Yes	Yes
D_i	Yes	Yes	Yes	Yes	Yes
Observations	982,245	982,245	982,245	933,144	884,030
Instruments	94	94	94	94	94
AB(4)-*p* value	0.382	0.384	0.397	0.43	0.244

Notes: * $p<0.1$; ** $p<0.05$; *** $p<0.01$; EST4 and EST5 are estimated excluding 2.5% and 5% tails of the labor share.

Table 8
Estimated movement in the labor share in industry.

	Actual [a]	Estimated	Simulated change from various sources [b]					
	Lsh	*Lsh*	*eqsh_x*	*mkup*	*KtY*	*D_t*	*D_i*	*D_p*
1998–1999	−0.038	−0.0180	−0.012	−0.006	0.000	0.001	−0.001	0.000
1998–2000	−0.075	−0.0620	−0.026	−0.032	0.000	−0.004	−0.002	0.003
1998–2001	−0.083	−0.0670	−0.031	−0.026	0.001	−0.008	−0.006	0.002
1998–2002	−0.074	−0.0550	−0.032	−0.016	0.001	−0.004	−0.002	−0.001
1998–2003	−0.098	−0.0650	−0.039	−0.019	0.000	−0.006	0.001	−0.001
1998–2004	−0.097	−0.0590	−0.040	−0.017	−0.001	0.002	0.001	−0.003
1998–2005	−0.115	−0.0930	−0.047	−0.021	−0.005	−0.019	0.004	−0.006

[a] Actual labor share change computed with National Accounts.
[b] Simulated result with econometric models by 2-digit industry.

To avoid this weakness, we next estimated model (6.1) for each 2-digit industry using *mkup* as a proxy for monopoly power and thus obtain 37 econometric models for all of the 2-digit sub-industries in industry sector. Using these models, we calculated how the labor share in industry was affected by the explanatory variables from 1998 to 2005. It was performed as follows. We first estimated the annual labor share of each firm for each year with the 37 estimated models. With these estimates we calculated the annual weighted average labor share for the whole industry and computed its change since 1998. For each firm, we multiplied the change of each explanatory variable by the estimated parameter to calculate the contribution of each explanatory variable to its labor share change. The explanatory power of each independent variable in the industry sector is the weighted average of the contribution of the variable through each firm. All the weighted averages in the above procedure are calculated using the value-added share of each firm as the weight. The results are reported in Table 8.

These 2-digit industry models predict a labor share decline of 9.3 percentage points, 81% of the actual change in industry sector from 1998 to 2005. Of all the independent variables, the change in *eqsh_x* has the most decisive influence, explaining 51% of the modeled change, around 4.7 percentage points. The decline of the SOEs, which have relatively high labor shares, explains the significance of *eqsh_x*. Increase in monopoly power is the next most important factor, which explains about 2.1 percentage points of decline, representing 23% of the simulated change in the industry labor share. The very small contributions from *KtY*, *D_t*, *D_i* and *D_p* indicate that there are negligible influences from the other factors considered, such as change in relative price and relative factor input ratio, biased technological improvement, and restructuring between industries and regions.[16]

This econometric analysis indicates that the main reasons for the decline of the labor share from 1998 to 2005 in the industry sector are the restructuring of the SOEs and the increase in monopoly power. Although economists generally view concentration of

[16] Except for the significance of the 2005-year dummy due to the change in sample size.

Table 9
Summary of the decline of aggregate labor share: 1995–2007 [a].

Reasons for the decline in labor share: 1995–2007	Points	Contribution [b]			
	−12.45	100%			
1995–2003	−5.48	44.00%	100%		
(1) Structural transformation	−3.52		61.31%		
(2) Sectoral labor share change	−1.96		38.69%	100%	
(2.1) Industry sector	−1.72			77.83%	100%
Of which:					40%
SOEs' restructure [c]	−0.68				40%
Increase in monopoly power [c]	−0.33				19%
Other [c, d]	−0.12				7%
Residuals [c]	−0.58				34%
(2.2)agriculture, construction and tertiary sector	−0.25			22.17%	
2003–2004	−5.25	42.16%	100%		
(1) Accounting method	−6.29		120%	100%	
(1.1) Individual owners' income	−7.09			113%	
(1.2) State or collective owned farms	0.81			−12.90%	
(2) Structural transformation [e]	0.08		−5.33%		
(3) Sectoral labor share change [e]	0.96		−14.70%	100%	
Of which:					
(3.1) Agriculture	0.07			14.29%	
(3.2) Industry	−0.86			−105%	
(3.3) construction	−0.34			−41.60%	
(3.4) tertiary sector	2.10			232%	
2004–2007 [f]	−1.72	13.84%	100%		
Sectoral labor share in 2004: official estimates					
(1) Structural transformation	−0.80		46.62%		
(2) Sectoral labor share change	−0.92		53.38%		
Sectoral Labor Share in 2004: Adjustment 3					
(1) structural transformation	−0.65		37.42%		
(2) Sectoral labor share change	−1.08		62.58%		

[a] The aggregate labor share is defined as the labor share in GDP net of indirect tax.
[b] We set the decline in the labor share caused by some reason as 100%, and the contribution of each factor of this reason is the percentage share in this decline explained by each factor.
[c] We compute the percentage contribution of each factor with the 1998–2003 row of the lower panel in Table 8 and further estimate the percentage points explained by each factor with their contribution and actual decline in the labor share in industry, 1.65. The residuals are factors unexplained in the econometric model.
[d] Other factors include economic restructuring across regions and industries, biased technological improvement, relative price change and relative factor input ratio.
[f] We report decomposition results employing the official and adjustment 3 estimates for aggregate and sectoral labor share in 2004 as shown in Table 2.
[e] We use aggregate and sectoral labor share in adjustment 3 to decompose the revised change in aggregate labor share from 2003 and 2004. Table 2.

market power as a negative change, they overwhelmingly support the liberalization of China's state controlled industries. Although the capital–output ratio has declined in industry since 1998, it proves to have little impact on the labor share in our models, suggesting that changes in relative prices have been counterbalanced by changes in the factor input ratio. This finding implies that the elasticity of substitution between labor and capital is not much different from one in industry, consistent with the insignificance of *KtY* in the five regressions in Table 7. Policy makers attempting to alter factor income shares by changing the relative prices between labor and capital will be unsuccessful, at least regarding the industry sector.

6.4. The increase of industry labor share during 1978 and 1995: discussion

Having focused thus far on explaining the decline in the labor share in industry since 1998, we now turn to discuss the increase from 1978 to 1995. According to Li (1992), a large part of workers' income used to be comprised of in kind payments, which were gradually replaced by wage income after *the Reform and Openness* and hence increased the statistical labor share. This argument might partly explain the rise of the industry labor share before the mid-1980s, however the continued increase between the mid-1980s and the mid-1990s requires further analysis.

Restricted by data, we cannot apply model (6.1) to the period 1978–1995, during which the labor share in industry continued to climb by over 10 percentage points. Nevertheless, we can still say something following what have been found in 1998–2005. From 1985 to 1995, the share of the SOEs in industry output has fallen steadily from 66% to 30% while the non-SOEs have experienced a corresponding increase (NBS, 2005). This fast expansion of the non-SOE sector increased the competition in industry, as reflected by the rapid decline in the SOEs' profit and tax payments during this period. However, the SOEs did not have right to lay off workers even though they have suffered serious losses during the first two decades of *the Reform and Openness*.

As a result, the labor share in the SOEs increased steadily from a much lower level in 1978 to a higher level in the mid-1990s than the non-SOEs. Specifically, the wage share in the SOEs is 0.21 in 1978, much lower than the 0.32 in the non-SOE sector, and it

kept on increasing and finally exceeded that of the non-SOEs in 1992.[17] In contrast, the wage share in the non-SOEs only fluctuated around 0.35 during 1978 and 1997. In addition, since the labor share in non-SOE sector is higher than the SOEs before 1992, average labor share increases with the expansion of non-SOE sector.

Therefore, in industry sector, the expansion of the non-SOE sector in the first two decades after 1978 has two effects on industry labor share. First, it reduced the capital share in the SOE sector directly by increasing market competition to squeeze the SOEs' profit. Second, it reduced the average labor share in industry by inviting a structural transformation effect between the SOE and non-SOE sectors.

7. Discussions and conclusions

This paper has analyzed the influence of structural transformation and sectoral labor share changes within sectors on the movement in the aggregate labor share since 1978 with a particular focus on the post 1995 decline. According to official data, the aggregate labor share, defined as the ratio of labor compensation to GDP net of indirect tax, increased by 3.68 percentage points during 1978–1984, fluctuated and declined slightly by 1.77 points from 1984 to 1995, and then experienced a significant drop of 12.45 percentage points from 1995 to 2007.

In Table 9, we summarize the reasons for the post 1995 decline of the aggregate labor share. As shown in Table 9, a change in statistical methodology explains a decline of 6.29 percentage points, over half of the total drop in the aggregate labor share from 1995 to 2007. From 1995 to 2003, the labor share declined by 5.48 percentage points, of which 61.31% of the decline originated from the structural transition from agriculture to services. The remaining 38.69% of the decline was due to labor share change within sectors, mainly in the industry sector. For the period 2004–2007, the aggregate labor share declined by 1.72 percentage points. Sectoral labor share changes explain 62.58% of this decline, as the adjustment 3 decomposition shows.

The dramatic post 1995 decline in the labor share has led many to assume that labor income has been seized by capital. However, our analysis does not support this view. Except for the increase in monopoly power, we find no connection between the significant explanatory variables and this common hypothesis. Aside from the accounting method changes, structural transformation and change in the sectoral (mainly industry) labor share were the two main forces driving the decline of the labor share since 1995.

More importantly, we find that these two forces have been the drivers of the movement of aggregate labor share since 1978. The directions of the two effects were the same during 1978–1984 and 1995–2004, positive and negative respectively, consequently driving the aggregate labor share up during 1978–1984 and down during 1995–2004. From 1985 to 1995, the directions of the two effects were opposite. The negative impact of structural change dominated the positive within-sector effect, so the aggregate labor share fluctuated and slightly declined during 1985 and 1995. According to decomposition analysis, the within-sector effect caused a further decline of the aggregate labor share by 1.08 percentage points from 2004 to 2007, with around 0.65 percentage points of decline from structural change.

It should also be noted that the importance of the structural change effect is closely related to the accounting method of mixed income of the rural household from agriculture production. For example, the structural change effect would not be significant if mixed income in agriculture were partly counted as capital and if the labor shares in agriculture were close to that of services.

The major reason for the within-sector effect was the change in the industry labor share, which rose between 1978 and 1995 and then began to decline in 1998. Contrary to common opinion that relative input factor price shifts or biased technological change caused the industry sector labor share to drop, our analysis attributes the decline to the fall of the SOEs and increased monopoly power.

In 2007, the aggregate labor share in GDP declined to as low as 0.45 in China according to the official statistics. Compared to other nations, this is a relatively low labor share, especially considering that the agriculture labor share is artificially overestimated in China. Since labor compensation is the main source for China's household income, it is not surprising that the sustained decline of the labor share has spurred a corresponding decline in the household share of national disposable income. Likely a result of the reduced disposable income share of households, the rate of private consumption in China has been much lower than the aggregate investment rate and has continued to decline over the past ten years or so. One possible solution to rebalance the structure of the aggregate demand is to increase household income by increasing the labor share. A method of doing so, as this paper suggests, would be to enhance the development of the service sector. The labor share in services is higher than that in industry so an increase in services income would result in a positive structural change effect on the labor share. Another policy would be to enhance market competition as much as possible, since our model shows that monopoly power is negatively related to the labor share and increased monopoly power has been one of the main reasons for labor share decline in industry sector. However, increasing wage levels by law or industry rules, as favored by some scholars and policy makers in China, will not be an effective policy. Our models indicate that this method will have insignificant influence on the labor share but will increase unemployment, since the elasticity of substitution between capital and labor is one.

[17] Wage share is defined by the wage over the sum of wage and profit before tax. Wage and profit before tax for the SOE and non-SOE sectors are obtained from main indicators of industrial enterprises with independent accounting system (NBS-CSY, various years).

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