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Job and Worker Reallocation in China¹

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Abstract: This study sheds light on the dynamic of China's urban labor market during the period 1991–2009, focusing on job creation, job destruction, worker inflows, and worker outflows. We use worker-related data for all industries, including both reallocations between firms and within firms. We found that job creation has been quite active during the two decades and coincides with the business cycle, as in most other countries. The result indicated that China's economic growth is accompanied by the active creation of efficient jobs and the large-scale destruction of inefficient jobs, which could help to explain the coexistence of high economic growth and low employment growth. A high level of between-sector reallocation was observed, which resulted from the economic revolution. Moreover, we found that the characteristics of worker flows differed greatly among ownership-based sectors.

Keywords: Job creation, Job destruction, Worker flows, Economic growth,
Between-sector reallocation

JEL: J63 J21 R23

¹ This paper is forthcoming in *The Chinese Economy*.

China has experienced dramatic economic growth and large-scale enterprise reform during the last two decades. Was the rapid economic growth accompanied by consequent high rates of job creation? What were the changes of job and worker reallocations during those two decades? In this study, we will examine the characteristics of job and worker reallocation during the period 1991–2009 by measuring job creation, job destruction, and worker inflows and outflows, based on worker-related data.

Previous studies in China often treated job creation as employment growth (Yang 2008, Wu and Yao 2007, Liang 2007). However, the real levels of job creation and job destruction are actually much larger than the absolute value of net employment growth (Cahuc and Zylberberg 2004). Deng et al. (2005) noticed this and examined real job reallocations in large and medium industrial enterprises in China, based on data of firm-level changes in employment.

In the measurements used by Deng et al. (2005), job creation takes place when a firm is formed or expands, and job destruction occurs when a firm is closed or sheds jobs. This measurement also has been used in many other studies (Davis et al. 1996). However, it should be noted that this method does not include job reallocations within the same individual firm, because in such cases the overall employment scale of the firm remains unchanged. For instance, there could be the destruction of a technical worker's job and, at the same time, the creation of a managerial job (Cahuc and Zylberberg 2004). Hamermesh et al. (1996) found that reorganizations within firms explain 11% of overall job reallocation in the Netherlands, and Lagarde et al. (1995) also showed that job reallocations within firms represent almost half of all job reallocations in France (Cahuc and Zylberberg 2004). Evidence shows that the jobs created within a firm are not negligible.

In order to capture both sides of the job reallocation process, in this study we employ worker-related data: when a firm hires a new worker, it means the creation of a job, and

when a firm gets rid of a worker, by firing, ending or terminating a contract, or layoff, it means the destruction of a job. Job reallocations within firms, for instance firing a technical worker and simultaneously hiring a managerial worker, are taken into account in this method.

Worker flows are usually larger than job flows, because there could be job-to-job worker transfers and new hires in order to continue a job held by a worker about to retire. Worker outflows include exits from employment, which lead to unemployment, nonparticipation, or new hires (Cahuc and Zylberberg 2004), and job-to-job transfers to other workplaces. Worker inflows represent entries into employment, corresponding to new hires (Cahuc and Zylberberg 2004); such inflows comprise flows from outside the local labor market, such as inflows from rural-urban immigration; inflows from the recruitment of fresh graduates; and inflows from inside the local labor market, such as job-to-job worker transfers and the hiring of unemployed workers.

Our dataset covers all industries in urban China, and includes small-scale enterprises as well as large. There are three ownership-based sectors: the state-owned sector, the collective sector, and the private sector. Note that in our study, the private sector is a widely defined category, including all the enterprises not owned or controlled by the state or the collective sector, such as joint-ownership enterprises, limited liability corporations, foreign enterprises, and small-scale enterprises in which only one person or a handful of people are employed.

We obtain the data on job and worker flows for our analysis mainly from datasets on the increase and decrease of employment in state-owned units, in collective-owned units, and in other ownership units, sourced from the NBS (National Bureau of Statistics of China) (1992–2010, a) and CEInet. Although there is a large amount of statistics on employment in China, no attempt has been made to classify and adjust the data based on labor economics. The datasets provide data on recruitment, firings, contract

terminations, and so on. Some adjustments are made on the data: since the dataset on decrease of employment for the period 1991–1997 does not include layoffs, we added the data on layoffs based on statistics from another dataset; we also added data on employment growth in small-scale individual enterprises, because the dataset on increase of employment does not cover it.

Our study is designed as follows. The next section examines trends in job creation and destruction during the two decades, focusing on the time-changes of job reallocation and the distinction of between- or within -sector reallocations. Following this, we examine the characteristics of worker flows for the nation and each of the three ownership sectors. The last section concludes.

Job Reallocation

We examine the annual job reallocations for the period 1991–2009 on both the national and ownership-sector levels. Job reallocations could be influenced by two remarkable changes during that period: the decline in the state-owned sector during the late 1990s and the continuous expansion of the private sector through both decades. In addition, job reallocations could take place either within a single sector or between sectors. In most countries, job reallocations between sectors are small, even when the number of job reallocations is large (Cahuc and Zylberberg 2004). We will measure the reallocations both within and between sectors in China.

Job Creation and Destruction at the National Level

Job creation in period t is defined as the sum of all new positions created by firms and

filled by workers² between the end of periods t and $t-1$. It is measured by the following equation:

$$JC_{it} = TR_{it} - RE_{it} + EI_{it} + OC_{it}, \quad (1)$$

where TR_{it} stands for total recruitments, RE_{it} represents the recruitments that compensate retirements, EI_{it} is the excess of transfer inflows over transfer outflows of all firms, and OC_{it} represents other job creations, such as through self-employment.

Job destruction at period t is defined as the sum of all existing positions lost in all firms between the end of periods t and $t-1$; this is measured by

$$JD_{it} = FI_{it} + CE_{it} + LA_{it} + EO_{it} + OD_{it}, \quad (2)$$

where FI_{it} represents firings for cause, CE_{it} contract endings, LA_{it} layoffs, EO_{it} the excess of transfer outflows over transfer inflows, and OD_{it} other kinds of job destruction, such as death of an employed worker.

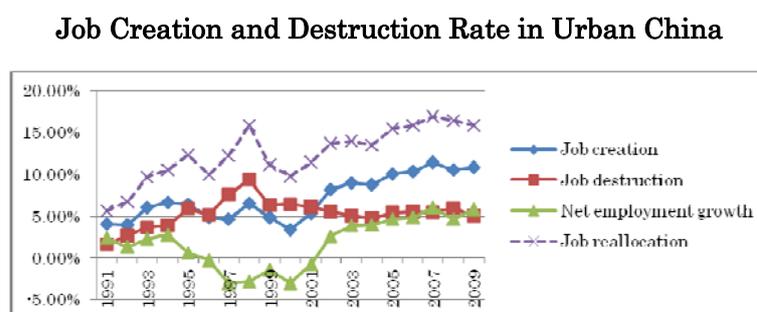
The values of net employment growth, job reallocations, and excess job reallocations are obtained as follows. According to common concepts (Cahuc and Zylberberg 2004; Davis et al. 1996), the net employment growth in period t is the difference between the employment levels at the end of periods t and $t-1$. The net employment growth rate equals the job creation rate minus the job destruction rate. Job reallocation is measured as the sum of job creation and job destruction, and excess job reallocation as the difference between job reallocation and the absolute value of net employment change in period t .

The results are shown in Figure 1, and the values are reported in Table 1. The rates

² In our study, job creation exclude vacancies that have not been filled.

of job creation and destruction are annual rates as a percentage to total employment.³

Figure 1



Source: Author's calculation from NBS (1992–2010, a)

Table 1

Job Reallocation in Urban China

	JC	JD	Net Employment Growth	Job Reallocation	Excess Job Reallocation	Fraction of Job Reallocation between Sectors	
						Industrial Sector	Ownership Sector
1991	4.02%	1.60%	2.42%	5.61%	3.20%	0.00	0.00
1992	4.00%	2.69%	1.30%	6.69%	5.39%	0.02	0.00
1993	5.97%	3.65%	2.32%	9.62%	7.30%	0.38	0.00
1994	6.62%	3.87%	2.75%	10.50%	7.75%	0.18	0.12
1995	6.44%	5.87%	0.57%	12.31%	11.74%	0.04	0.44
1996	4.81%	5.12%	-0.31%	9.93%	9.62%	0.22	0.37
1997	4.63%	7.63%	-3.00%	12.26%	9.26%	0.14	0.66
1998	6.54%	9.35%	-2.81%	15.88%	13.07%	0.30	0.69
1999	4.84%	6.30%	-1.46%	11.14%	9.67%	0.06	0.47
2000	3.36%	6.40%	-3.04%	9.75%	6.71%	0.05	0.51
2001	5.32%	6.09%	-0.77%	11.42%	10.65%	0.07	0.43
2002	8.16%	5.56%	2.60%	13.72%	11.12%	0.10	0.36
2003	8.93%	5.08%	3.85%	14.02%	10.17%	—	0.23
2004	8.75%	4.78%	3.97%	13.53%	9.55%	0.05	0.14
2005	10.06%	5.42%	4.64%	15.49%	10.85%	0.05	0.11
2006	10.35%	5.53%	4.82%	15.88%	11.06%	0.02	0.05
2007	11.47%	5.43%	6.04%	16.90%	10.86%	0.01	0.00
2008	10.52%	5.89%	4.63%	16.41%	11.78%	0.02	0.00
2009	10.87%	5.02%	5.84%	15.89%	10.04%	0.00	0.00

Source: Author's calculation from NBS (1992–2010, a)

³ Data of 1991 and 1992 are limited to state-owned enterprises and collective enterprises because data of private enterprises are not reported for these two years.

Some previous studies claimed that China's rapid economic growth did not contribute to employment (Yang 2008). Indeed, as shown in Figure 1, employment grows only slightly, even though real GDP maintained a growth rate of over 8% during this period; during 1997–2000 in particular, employment experienced negative growth. However, the changes in gross employment do not to represent the real contribution of economic growth to employment. The reason is that what economic growth directly affects is job creation, the definition of which differs from changes in employment growth. As shown in Figure 1, job creation maintained a positive growth rate during this period, consistent with the positive economic growth.

Figure 1 shows that, like most other countries, rates of job creation and job destruction are much larger than the absolute value of the net employment growth rate. For instance, in 1998, the absolute value of the net employment growth rate is 2.8%, while the job destruction rate is 9.4% and job creation rate is 6.5%, resulting in an annual job reallocation rate as high as 15.9%.

Furthermore, the job creation rate fluctuated around 5% during the 1990s but began to rise rapidly around the turn of the century and surpassed 10% by the late 2000s. This rising trend in the second half of the study period occurred because of the comparatively high level of productivity, which increased expected profits for firms (also called the capitalization effect) and lowered the rate of job destruction, which led to a longer lifetime for jobs so that firms could expect more returns when creating jobs. Furthermore, this trend of job creation also could be related to the business cycle, which we will discuss in the last part of this session.

Job destruction showed a different trend. It increased greatly from 1991 and peaked in 1998, then decreased gradually. Compared to endogenous factors, the enterprise-reform shocks are large and could be the main reason for China's job destruction rate, which we will discuss in the next part by distinguishing between the

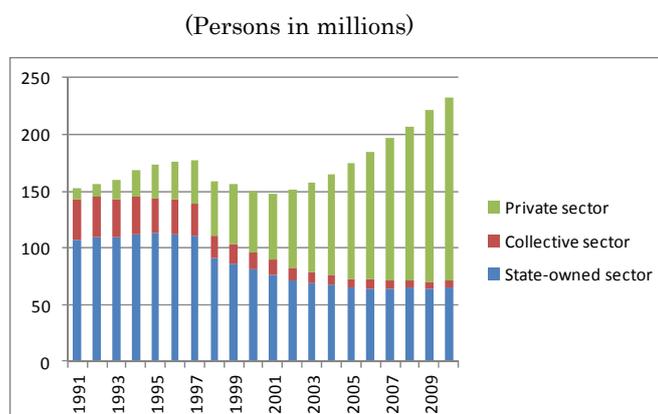
state-owned sector, the collective sector, and the private sector.

Job Creation and Destruction in Each Ownership Group

Job reallocation could differ among the three ownership groups because of the expansion of the private sector and the shrinkage in the state-owned and collective sectors, as shown in Figure 2, which resulted from economic restructuring in China. In this section, we examine job reallocation in each ownership sector.

Figure 2

Employment Scales of State-owned, Collective, and Private Sectors



Source: NBS (1992–2010, a)

Figure 3 and Figure 4 show the results of job creation, job destruction, job reallocations, and the net employment growth in the three ownership groups based on the concepts discussed earlier. The rates shown are percentages of employment in each ownership sector.

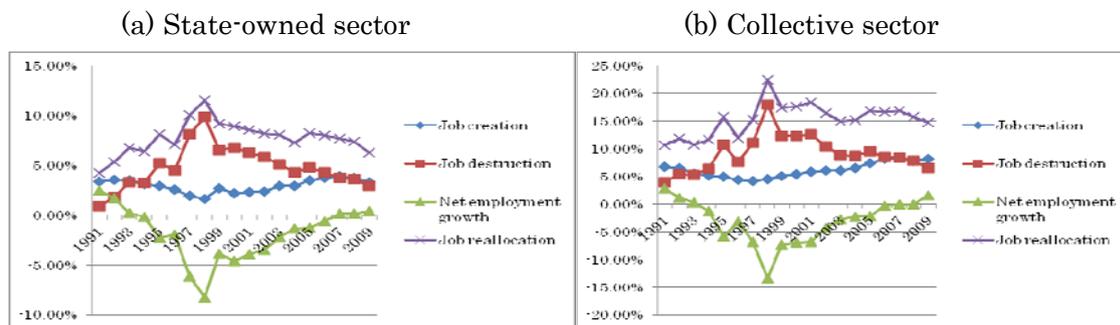
In Figure 3, the job destruction rates in the state-owned and collective sectors increase in the 1990s, peak in 1998, and then drop back almost to the original level in

the 2000s. These shocks are consistent with the worker retrenchment program in China, which significantly reduced the surplus employment that resulted from the previous planned economy. Job destruction in the private sector shown in Figure 4 is completely different, however: it maintained a slight increase over the two decades. The reason is that the objective of worker retrenchment was limited to the state-owned and collective sectors, and almost all the job destruction in the private sector could be the result of endogenous factors resulting from firms' profit maximization.

Figure 3

Job Reallocations in State-owned and Collective Sectors

(as a percentage of employment)



Source: The author's calculation from NBS (1992–2010, a).

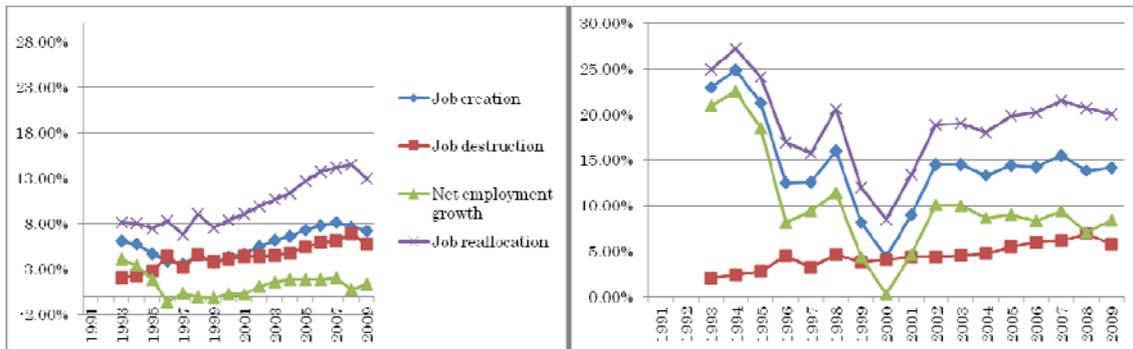
Figure 4

Job Reallocation in the Private Sector

(as a percentage of employment)

(a) Private sector without small-scale individual firms

(b) Private sector with small-scale individual firms



Source: The author's calculation from NBS (1992–2010, a).

The trends of job-creation rates are similar in the three sectors: they decrease slightly during the 1990s and then tend to increase in the 2000s. Job creation is active especially in the private sector in the 2000s. For instance, in 2005, the job-creation rate is 7.3% even if we ignore small-scale individual firms; if we include them, the job creation rate in the private sector is at least 14.4%. Because the statistical system for small-scale individual firms has not been completed in China, and our calculated result of job creation in small-scale firms represents only the net employment growth, the annual changes shown in Figure 4(b) are unregulated, and the values represent the lower bounds of job creation.

Within-Sector and Between-Sector Reallocations by Ownership and Industrial Sectors

Job reallocation can take place within or between sectors. In China sectors are classified

both according to ownership, such as the state-owned sector and the private sector, and according to industry, such as the sectors in manufacturing, construction, information, education and health services, financial activities, and so on. Job reallocation between ownership sectors is mainly due to enterprise reform in China that destroyed inefficient jobs in state-owned enterprises, and job reallocation between industrial sectors reflects the industrial restructuring process.

Note that some job reallocations could simply arise from net employment changes. To separate this portion of reallocations from those that take place within or between sectors, we introduce the definition of excess job reallocation, which represents that portion of job reallocations over and above the amount required to accommodate net employment changes, and which can occur within or between sectors (Davis et al. 1996). Thus, excess job reallocation, denoted by T^E , is calculated as $T^E = T - |V_n|$, where T denotes total job reallocation and V_n is the net employment growth in the economy as a whole.

We examine this issue following Cahuc and Zylberberg (2004) and Davis and Haltiwanger (1992). Let V_n^s denote the net employment growth in a given sector s . The indicator assessing the extent of between-sector movements of job reallocation, denoted by R_E , is defined by the following equation:

$$R_E = \sum_{s=1}^S |V_n^s| - |V_n|. \quad (3)$$

Job reallocations in sector s are denoted by T_s . The indicator measuring the sum of excess job reallocations within each sector, denoted by R_I , is given by

$$R_I = \sum_{s=1}^S (T_s - |V_n^s|). \quad (4)$$

Note that the term $\sum_{s=1}^S T_s$ in the above equation is actually the total job reallocation in the economy, which we denote by T . Hence, equation (4) can be rewritten as

$$R_I = T - \sum_{s=1}^S |V_n^s|. \quad (5)$$

Finally, the fraction of reallocation between sectors is measured by the ratio $R_E / (R_I + R_E)$.

We calculate the annual ratio of reallocation between sectors for industry-based and ownership-based sectors separately. The results are shown in Table 2.

Like most other countries, the average annual ratio of reallocation between sectors is a minor part of the total excess job reallocation in China, which is 0.10 for industry-based sectors and 0.21 for ownership-based sectors. Reallocation between ownership sectors is a little high in China, following the country's enterprise reforms. However, the upper levels of all annual rates are extremely high, which are 0.38 for industry-based sectors and 0.56 for ownership-based sectors. It is indicative of a period when reallocations between sectors are particularly active. We list the annual ratios of reallocation between sectors to total excess reallocation, denoted by $R_E / (R_I + R_E)$, for each year, in Figure 5 (the values are reported in Table 1).

Figure 5 shows that the fraction of reallocations between ownership sectors (to total excess reallocation) was high in the period 1994–2002, which is due to the norm of enterprise reform. Further, it is shown that job reallocation between the 15 main industrial sectors was high in 1990s, which could reflect the fact that industry restructuring is especially high in this period. After around 2002, although the total job reallocation rate kept growing, the fraction of reallocations between sectors dropped significantly, indicating that the excess job reallocations in the 2000s were mainly due to reallocations within sectors.

Table 2

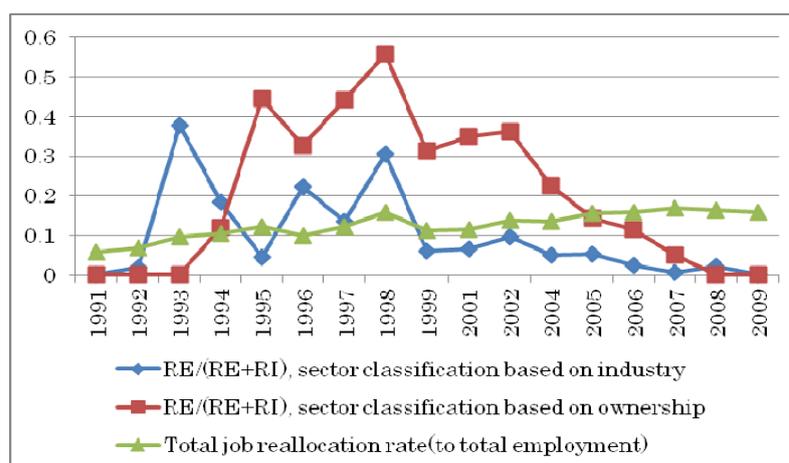
Fraction of Reallocations between Sectors

Country	Period	Number of sectors	$R_E / (R_I + R_E)$		
China	1991–2009	15	Aver.	Max.	Min.
	(annual rate)	(industry based)	0.10	0.38	0.00
China	1991–2009	3	Aver.	Max.	Min.
	(annual rate)	(ownership based)	0.21	0.56	0.00
Germany	1989–1990	24	0.03		
United States	1972–1988	980	0.14		
France	1984–1988	15	0.06		
France	1984–1991	28	0.17		
Italy	1986–1991	28	0.02		

Source: The values for China are calculated by the author. The values for other countries are taken from Cahuc and Zylberberg (2004) and Davis and Haltiwanger (1999, Table 5).

Figure 5

Annual Ratio of Reallocation between Sectors to Total Excess Reallocation



Source: The author's calculation from NBS (1992–2010, a)

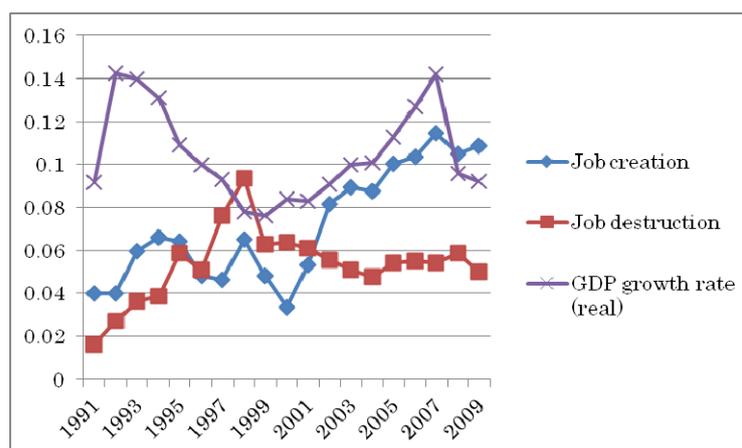
Movements in Job Creation, Job Destruction, and GDP Growth Rate

In most developed countries, job creation and destruction are related to business cycles. It is reported that in all OECD countries, job destruction is generally countercyclical and job creation procyclical (see OECD 1996; Cahuc and Zylberberg 2004). However, in the United States, although job destruction is highly countercyclical, job destruction is weakly procyclical, or even acyclical (Davis and Haltiwanger 1996).

In this section, as a rough analysis of the relationship between job reallocation and business cycles in China, we examine the annual changes in the real GDP growth rate. The annual changes in job creation, job destruction, and real GDP growth are shown in Figure 6.

Figure 6

Job Creation, Job Destruction, and GDP Growth



Sources: Data on job creation and destruction are from the author's own calculation and real GDP growth from NBS (2010b) and CEInet.

Figure 6 shows that changes in job creation generally coincide with changes in the GDP growth rate, and changes in job destruction generally run counter to changes in the GDP growth rate; these relationships are similar to those between job creation, job destruction, and business cycles in developed countries.

Note that there is an exception for job creation in 1998; job creation increased even though the GDP growth rate had reached a low. The reason for the jump in job creation could be the sharp increase of unemployed workers in 1998, loosening the labor market and encouraging firms, especially those in the private sector, which maximizes profits without government control, to create more jobs.

Worker Reallocation

Large-scale job reallocations, discussed in the previous section, lead to high worker mobility. Furthermore, worker reallocation numbers are usually larger than job reallocations because they include retirements and job-to-job worker transfers.

Categories of Worker Inflows

Worker inflows in period t are measured as follows:

$$WI_{it} = NH_{it} + TI_{it} + OI_{it} \quad (6)$$

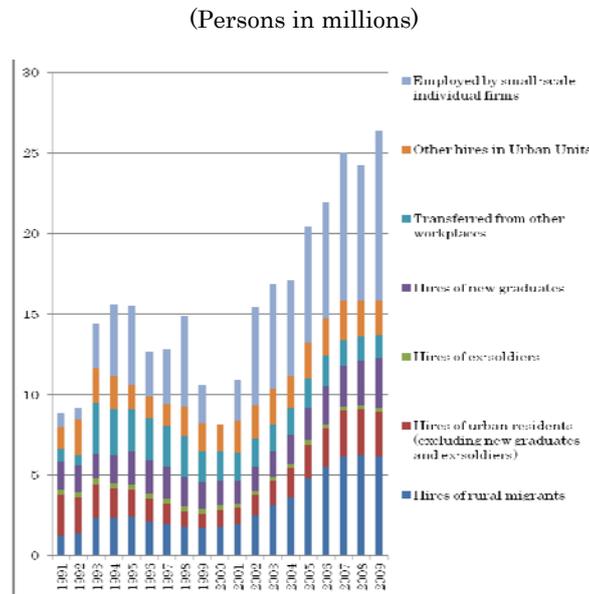
where NH_{it} is the total new hires in *urban units* and includes the following groups: new hires of rural migrants, urban residents (excluding new graduates and ex-soldiers), new graduates, and ex-soldiers; TI_{it} represents the workers transferred from other workplaces; and OI_{it} represents the inflow of other workers, including other new hires

in *urban units* and small firms.⁴

The annual changes of total worker inflows in each category are shown in Figure 7. It shows that there was a short period of increase in total worker inflow in the early 1990s, followed by a decrease through 1993–2000; after 2000, the total worker inflow grew rapidly.

Figure 7

Worker Inflows in Urban China



Source: The author's calculation from NBS (1992–2010, a)

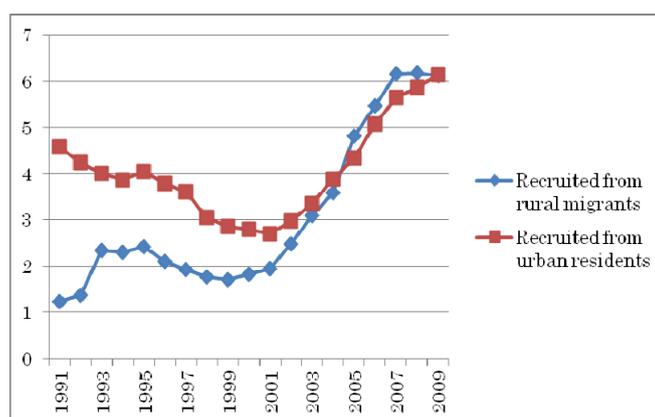
During those periods, especially after 2000, there was large-scale rural–urban

⁴ Since the details of worker sources in small-scale individual firms are not reported, we list them as a separate group, that is, workers hired by small-scale individual firms (the scale is the same as OC_{it} in job-creation analysis). While the number shown in Figure 5.7 is large, the actual number could be even larger, because the data include only the net increase of employment in small-scale individual firms.

immigration in China, and the inflow of new hires from rural migrants increased; the flow of migrant workers played a considerable part in this. For a clearer graph, the changes in new hires from migrants and residents are shown in Figure 8. The new hires from urban residents include migrants, new graduates, ex-soldiers, and other urban residents; employment in small-scale individual firms is excluded.

Figure 8

Annual Changes of New Hires from Rural Migrants and Urban Residents



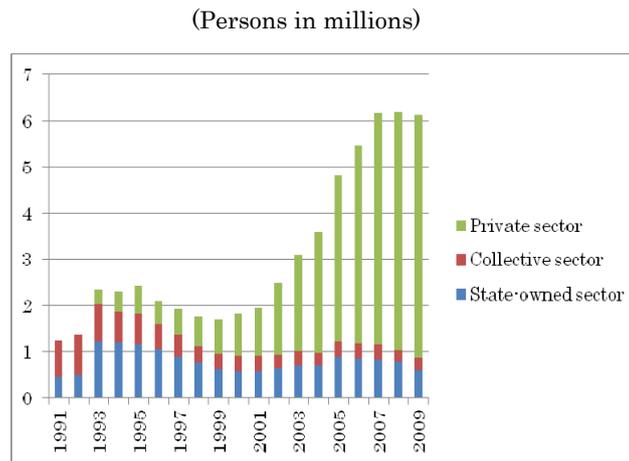
Source: The author's calculation from NBS (1992–2010, a)

Figure 8 shows that during 1991–1993, there was an increase in new hires of rural migrants and a decrease in new hires of urban residents. However, after 1993, the two labor groups moved in the same direction. Especially after 2001, there is a significant increase in both migrant and resident workers.

Furthermore, increases in migrant and resident worker numbers are mainly due to the employment expansion in the private sector, as shown in Figures 9 and 10, in which the new hires of migrant and resident workers in the state-owned and collective sectors remain at the same level while those in the private sector increase significantly.

Figure 9

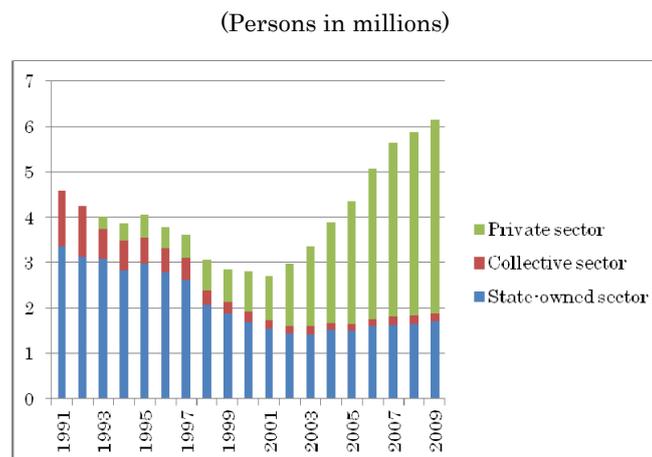
New Hires of Rural Migrants in Each Sector



Source: The author's calculation from NBS (1992–2010, a)

Figure 10

New Hires of Urban Residents in Each Sector



Source: The author's calculation from NBS (1992–2010, a)

Categories of Worker Outflows

As a general definition, the exit of workers from employment comprises the ending of short-term contracts, resignations, firings for cause, retirements, and displacements (job loss through no fault of the employee) (Cahuc and Zylberberg 2004). Hence, our measurement of worker outflow in period t is given as follows:

$$WO_{it} = CE_{it} + FI_{it} + LA_{it} + TO_{it} + RE_{it} + OO_{it}, \quad (7)$$

where CE_{it} represents the endings and terminations of contracts at the initiative of either the firms or the workers, FI_{it} represents firings for cause, LA_{it} stands for layoffs, TO_{it} represents transfers to other workplaces, RE_{it} represents retirements, and OO_{it} denotes other worker outflows, such as the death of an employed worker.

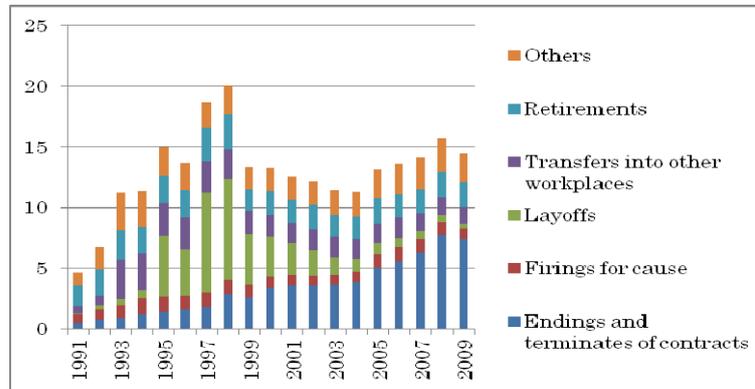
The fractions of each category are shown in Figure 11. In the late 1990s, the largest portion of worker outflow came from layoffs, but from around 2000, the layoffs decreased and endings or terminations of contracts increased significantly; as a result, in the 2000s, the main stream of worker outflow came from endings or terminations of contracts.

The difference between layoffs and endings or terminations of contracts is that layoffs are caused by politics, leading to worker retrenchment in state-owned and collective sectors, whereas contracts are ended or terminated as a result of actions taken by firms or workers, which could happen in any firm. The categories of worker outflow in state-owned, collective, and private sectors are shown in Figure 12.

Figure 11

Categories of Worker Outflow in Urban China

(Persons in millions)



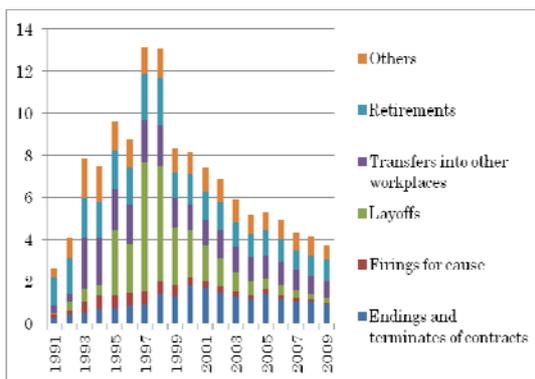
Source: The author's calculation from NBS (1992–2010, a)

Figure 12

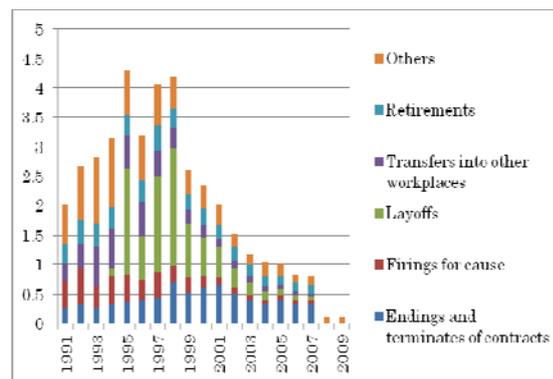
Categories of Worker Outflow in State-owned, Collective, and Private Sectors

(Persons in millions)

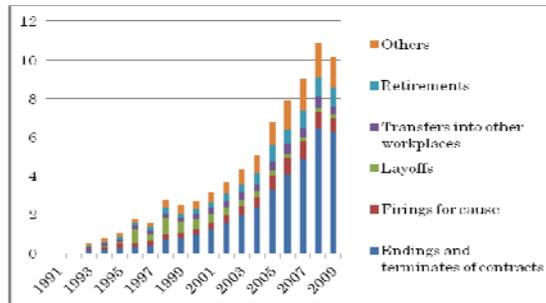
(a) State-owned sector



(b) Collective sector



(c) Private sector



Source: The author's calculation from NBS (1992–2010, a)

Figure 12 shows that contract terminations occur extremely frequently in the private sector. When a job becomes profitless, firms terminate the contract or refuse to renew expired agreements. In particular, private-sector firms often enter into short-term contracts with workers to take advantage of their lower costs of employment (Han 2008). For instance, many private firms enter into one-year contracts with migrant workers so that once a job is no longer profitable, they can easily terminate the employee at the end of the year at little cost.⁵ Contracts can also end or be terminated when workers quit. On-the-job employment searches have therefore increased in China for many reasons, including unstable employment because of short-term contracts and slower wage growth in the same firm compared with earnings after changing jobs.

Conclusions

Job and worker reallocations represent the dynamics of the labor market (Cahuc and Zylberberg 2004). We found high rates of job creation and destruction in the late 1990s and the 2000s, which resulted in enormous job reallocations during that period. Job

⁵ The firm has to convert the contract into a permanent one only when the firm has employed a worker repeatedly for over ten years, according to the labor law prior to 2007. A new labor law came into effect from 2008, stipulating that a firm that renews a contract more than twice should convert the contract into a permanent one.

reallocations are higher than the net employment growth because the state-owned sector witnessed a decreased growth rate accompanied by active job creation, and millions of jobs were destroyed in the expanded private sector. The economic reforms in China not only destroyed a great number of jobs but were also accompanied by active job creations, resulting in large-scale job reallocations both within and between sectors.

Worker reallocations are even larger than job reallocations because of job-to-job worker transfers and recruitments to compensate for retirements. Furthermore, there was a remarkable change in inflow into employment due to rural–urban migration, which increased almost fivefold from 1991 to 2009. The inflow of urban residents into employment increased too. Although there was a decline during the retrenchment program (inflows into the state-owned sector decreased, but those into the private sector did not), the inflow of residents into employment recovered from 2001 and passed the 1991 level in the year 2005. On the other hand, the outflow from employment was mainly due to layoffs and contract endings (or terminations); layoffs were due to the politics of enterprise reforms, and contract endings (or terminations) were based on profit-maximizing activities of firms.

High job and labor reallocations usually cause frictions in the labor market (Cahuc and Zylberberg 2004), meaning that it takes longer for employed workers to find suitable jobs and for a job vacancy to be matched to a worker. Further work remains to be done to find out the relationships between these high rates of job and worker reallocation and the outcomes of the labor market.

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