

**The Changing Wage-Structures in the 1990s:
A Comparison between Rural and Urban Enterprises in China**

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1. Introduction

Income inequality in China has increased significantly since the introduction of market oriented reforms in 1978.¹ The dramatic, continuous rise of income inequality has drawn growing attention to wage differentials. However, much of the literature on wage inequality in post-reform China has relied on household surveys and focused primarily on worker characteristics, i.e., long-run labor supply factors, such as education, experience, and gender.² While these studies have generated valuable insights into China's emerging industrial labor markets, their explanations of the trends of wage inequality are obstructed by the fact that a large part of wage variations cannot be explained by changes in returns to worker attributes. For instance, Park *et al.* (2003) find that much of the rise in wage inequality in urban China in the 1990s was associated with regression residuals, i.e., part of wage variations that were not attributable to regional disparities and observable individual attributes. Focusing on the influence of the supply-side factors, the authors accredit the residual variation to increased rewards to unobserved skills and overlook the possibility that the existence of substantial wage differentials for workers with homogenous human capital characteristics may be a symptom of market distortions that characterize transition economies.

In this paper we examine wage structures and wage inequality in China's manufacturing sector using a worker-firm matched dataset compiled for the period from 1994 to 2001. This dataset, derived from the surveys undertaken in Nanjing municipality in 2002, consists of about 3,200 workers selected from 162 urban state-owned enterprises (SOEs) and rural township and village enterprises (TVEs) that underwent ownership restructuring in the late 1990s. Using this specifically designed data set, we investigate the role of the firm and demand-side factors in wage inequality and evaluate how the recent radical institutional reforms have changed the relative importance of worker and firm attributes as sources of wage variation through a comparison of the trends of wage variations in urban SOEs and rural TVEs.

¹ For an overview of inequality issues in rural China see, for example, Benjamin and Brandt (1999); for urban China see Khan, Griffin and Riskin (1999).

² For example, see studies from the China Income Project based on household surveys in 1988 and 1995 (Riskin, et al., 2000) and studies from annual urban household survey data (Park, et al., 2003).

Bringing together worker and firm characteristics in the analysis of wage inequality helps to differentiate the causes of wage inequality, as different types of wage disparities may have different efficiency implications. For instance, the rise of returns to education may be regarded as a reflection of scarcity values of skilled labor and hence a necessary accompaniment of transition to a market economy, whereas increased wage dispersion between firms as a result of rent seeking and enterprise capturing is undesirable from both economic and social standpoints. Using the Swedish data, Hibbs and Locking (2000) show that reduction of between-industry and between-firm wage variation contributed positively to output and productivity growth; whereas compression of wage dispersion within the firm may have the opposite effect. By analyzing the role of firms in wage inequality, we seek to identify institutional obstacles to the development of well-functioned factor and product markets in post-reform China and evaluate the effectiveness of the recent industrial restructuring in removing these obstacles.

We study the determination of wage structures from a comparative perspective. As well recognized in the literature, the allocation and rewards of labor differ widely between urban SOEs and rural TVEs with the latter being more market-oriented than the former.³ The two types of firms are also observed to have pursued different reform strategies in the late-1990s, as the transfer of property rights to private investors were more gradual and more limited in the SOEs than in the TVEs (Dong et al., 2004). These institutional differences are likely to affect wage outcomes; hence, a comparative analysis of wage determination in the two types of firms sheds important light on the complex relationship between transition and wage inequality.

The remainder of the paper is organized as follows. Section 2 provides a review of the literature on demand-related wage differentials and the labor market and broader economic changes that may affect the wage-setting behavior of SOEs and TVEs. Section 3 described the data used in the empirical analysis and provides some summary statistics of our sample. The results of the regression analysis are discussed in Section 4 and the conclusions are presented in Section 5.

³ See Dong and Bowles (2002) for an overview of the differences between SOEs and TVEs in wage and employment policies.

2. Wage Dispersion between Firms and Economic Transition

The importance of research on demand-related wage differentials is recognized in the literature for market economies (Freeman, 1989; Hamermesh, 1993), as numerous studies have detected that wage dispersion between firms accounts for a major share of the wage inequality (see Groshen, 1986; Davis and Haltiwanger, 1991). Several theories have been developed to explain why wages for workers with identical observable characteristics vary among firms.⁴ One theory associates between-firm wage variations with technological heterogeneity that induces sorting by ability across firms. It is argued that firms with ability-sensitive technologies tend to hire disproportionately more productive worker and, therefore, pay higher wages (Dickens, 1987). Another explanation for wage dispersion between firms is compensating differentials. Firms offering undesirable jobs have to pay wage premium for equally skilled workers in order to fill their demand for labor.

While the theses of sorting and compensating differentials offer competitive explanations, other theories ascribe wage differentials between firms to noncompetitive and institutional factors. One noncompetitive explanation is efficiency wage theory. Paying a wage premium may be profitable for firms because high wages can reduce monitoring costs, discourage turnover, attract a higher quality pool of applicants, and foster employee loyalty. Wage dispersion across firms is observed when firms differ in their ability to monitor or motivate their workers, to bear the cost of turnover, or to measure labor quality. The theory of insider controls offers another institutional explanation for demand-related wage variation. In view of this theory, if firms have product market power and their workers could bargain for a share of the rents, then cross-firm differences in rents or in worker ability to extract rents would generate wage differentials between firms. While the efficiency wage and insider/outsider theories both aim to explain why wages may be set above their market-clearing levels, their predictions for the impact of wage premium on firm performance are different. Rent payments stemming from efficiency wage are compatible with profits maximization as they are intended to raise labor productivity, whereas rents-

⁴ See Katz and Summers (1989) for the list of potential explanations and the related literature.

seeking activities of the insiders undermine financial performance of the enterprise since these activities have no effect on worker performance. The competing theories of between-firm wage dispersion have been tested empirically; however, the extent to which this wage dispersion is attributable to competitive versus noncompetitive factors remains controversial.⁵

Introducing demand-side factors into a study of wage inequality is likely to be particularly fruitful for assessing the extent to which wage structures in post-reform China diverge from their centrally planned predecessors. Under central planning, worker unites occupied center stage in the economic and social lives of state workers by providing them with a job for life, as well as subsidized housing, education, healthcare and retirement pensions. However, because wages and employment of state enterprises were determined by the central government, wage structures of state enterprises were compressed, both within and between enterprises (Korzec, 1992). In the late 1970s China embarked on its transition to a market-oriented economy with a gradual approach. In the early years of reform efforts to reform SOEs were largely focused on restructuring the incentives given to workers and managers and enhancing the role of markets. To improve the labor flexibility of enterprises, state enterprises were allowed to hire workers on short-term contracts instead of providing permanent employment; and reforms in the areas of pension, healthcare, housing, and social assistance were also implemented in an attempt to transfer the responsibility of social services and protection from enterprises to the state, community, and individuals (Fan, Lunati, and O'Connor, 1998). However, these reform measures had met limited success in fostering a competitive industrial labor market, as indicated by the patterns of changing wage structures in the first reform decade.

Much of the economic literature on the early reform episode points to rising wage variations between industries and across firms in the post-reform state sector. Using a firm-based worker survey,

⁵ For instance, Abowd, et al. (1999) present evidence supportive for the sorting thesis showing that about 90% of inter-industry wage differentials and about 75% of the firm-size wage effect among French manufacturing firms are attributable to unobserved employee characteristics. In contrast, using the same dataset as by Abowd, *et al.*, Postel-vinay and Robin (2002) find that search frictions contributed significantly to wage variations between workers with identical observable characteristics and that the

Meng and Kidd (1997) find that increased industrial wage differentials dominated the changes in wage-setting behavior of state enterprises in the 1980s, because rewards for worker heterogeneity remained compressed. Studies based on firm-level data also reveal that wages of post-reform SOEs had become increasingly sensitive to performance of the enterprises, confirming rent-sharing behavior in firms. However, there are different views regarding which theory may offer a plausible explanation for the rent-sharing behavior. Several authors argue that decentralization reforms increased the influence of insider forces and the rise of insider power in the context of a soft budget constraint or a setting of state “coddling” of SOEs led to excessive rent-seeking in the transition process (Hussain and Zhuang, 1994; Lee, 1999). Other researchers present evidence that is consistent with the efficiency wage hypothesis (Groves et al., 1994; Xu and Zhuang, 1996; Dong and Putterman, 2002; 2003; Bodmer, 2003). Despite the empirical evidence, demand-related wage differentials have not been integrated into the analysis of wage inequality in post-reform China.

In this paper we investigate the role of the firm and demand-side factors in wage determination in the 1990s, an episode marked by acceleration of market reforms and rapid economic growth. In late 1992, the central government formally endorsed private property rights and initiated ownership reforms in public enterprises at the 14th Congress of the Chinese Communist Party. While the government decided to radically reduce state ownership of small- and medium-size enterprises in competitive sectors, the approach to reforming large SOEs, described by the so called “modern enterprise system” program, remain cautious and gradual. Under this program, the government maintains its ownership over large SOEs in chief strategic sectors and reforms these enterprises by converting them into shareholding companies. These policies, described as “grasp the large and let go of the small” (*zhudafangxiao*), were reaffirmed during the 15th Congress of the Chinese Communist Party in late 1997. The policy encouragement from the central government led to an enormous wave of ownership restructuring in the state industry in the late 1990s, with a large number of SOEs being converted into joint-stock companies,

share of unobservable worker attributes in total wage dispersion is rather small, especially for those unskilled workers.

bankrupt, merged with other enterprises, or sold to private individuals. Accompanied with the radical changes in property rights was the acceleration of labor market reforms. In 1994, a new Labor Law was passed, which sanctioned the right of the employers to dismiss workers. To give enterprises more latitudes in restructuring the workforce, a system of so called “labor contract for all employees” (intended to eliminate the distinction between permanent and contract workers) was introduced in 1996. In 1997, labor reforms entered the most radical phase when the Chinese leadership moved ahead with large-scale public sector downsizing; the era of “cradle-to-grave” socialism and lifetime employment for state workers came to an end.

A priori, the changes in labor markets and property rights in the past decade are expected to reduce wage dispersion between firms by removing barriers to labor mobility across firms and making the enterprises more profits oriented. However, the prediction of wage outcomes can be complicated by several factors. First of all, the property rights reform in SOEs had been carried out cautiously with many state enterprises being converted into corporations without any substantive change in ownership composition (e.g., state versus private ownership). This change may further weaken the government’s control over employment and wage policies of these enterprises but fail to subject them to market discipline effectively. Moreover, under the guideline of “grasp the large”, the restructuring had been associated with increased state efforts to assist large enterprises by improving their access to new technologies and capital markets. These policies may enhance the ability of large enterprises to extract rents, thereby widening the wage gaps between small and large firms. Lastly, market reforms have changed the role of the official trade union (the All China Federation of Trade Unions, ACFTU). Prior to the early 1990s, the ACFTU, as a ‘transmission belt’, had played a passive role in the decision-making of state enterprises. The new Labor Law encourages the ACFTU to actively engage in collective bargaining to protect the interests of workers while giving employers the authority to dismiss workers. However, the wage bargaining process in China is enterprise-based; the experience of market economies suggests that the involvement of trade union in decentralized collective bargaining may contribute to rising wage

dispersion between enterprises (Hibbs and Locking, 2000). Thus, how the property rights and labor reforms of the last decade may affect wage structures of reformed state enterprises is not clear.

We examine the changes in enterprise wage structures following the aforementioned institutional reforms in SOEs by comparing them with the trends in TVEs. As public enterprises, TVEs had characteristics in common with SOEs in terms of enterprise objectives and budgetary regimes. The empirical literature shows that TVEs placed weight on the objective of local employment maximization and shared rents with workers (Svejnar, 1990; Dong, 1998). However, there were important institutional differences between SOEs and TVEs. TVEs were never incorporated into the central planning system; they were typically subject to harder budget constraints than SOEs, and were more market oriented. Most importantly, compared to SOEs, TVEs had greater autonomy to adjust their workforce in response to changes in demand and technology and their workers were more mobile between enterprises. Due to these institutional differences, wage differentials between firms are likely to be smaller among TVEs than among SOEs.

As with SOEs, TVEs also underwent ownership rights reforms in the 1990s. However, there were important differences in the privatization process between the two types of enterprises. The changes in the TVE sector were more sweeping with a majority of TVEs transforming their ownership rights from local governments to private individuals, mostly enterprise managers, over a short period of two or three years (Ho, et al., 2003). Moreover, the privatization of TVEs was carried out in an environment where rural enterprises experienced great difficulty to compete with state enterprises for loans from financial institutions (Park and Shen, 2003). Thus, the ownership reforms were more likely to curtail rather than exacerbate rent-seeking activities in TVEs than in SOEs. In consequence, in contrast to the ambiguous wage outcomes predicted for post-reform state enterprises, between-firm wage dispersion is expected to fall following the privatization of TVEs.

In the next two sections, we take a close look at the organizational differences between the SOEs and the TVEs in our sample and examine how these differences may shape the changes in enterprises wage structures in the late 1990s.

3. Data and Summary Statistics of the Sample

The data used in this paper are derived from a survey undertaken in Nanjing Metropolitan area and 7 counties within the jurisdiction of the Nanjing municipal government in the summer of 2002. As the capital of Jiangsu, a fast growing coastal province that was the heartland of China's rural collective sector from the 1970s to the 1990s, Nanjing provides a desirable sample site for comparing the reform experiences of urban and rural public enterprises in China. The dataset consists of 3,200 employees selected from 162 enterprises, with approximately 20 employees per enterprise, for the period from 1994 to 2001. The data on wages and individual characteristics such as age, education, and gender for employees are obtained from the enterprise's administrative records.

The sample of 162 enterprises were selected randomly from the 634 public enterprises in Nanjing city with a "designated size" of 5 million *yuan* or more in annual sales that had undergone enterprise restructuring (*gaizhi*) by 2002. Of the 162 enterprises there are 69 enterprises that were affiliated with the central, provincial, and municipal governments and 93 by township governments. In the analysis of this paper, the former group is called the urban enterprises and the latter the rural enterprises. The data on firm characteristics are collected through an enterprise survey, which provides us with information on ownership, sales revenue, capital assets, equity, employment, labor compensation, intermediate inputs, investment expenditures on new technologies, and weekly working hours, and a manager survey, through which we obtained information on the privatization process, reform methods, and characteristics of internal labor markets.

Table 1 presents descriptive statistics of the sample workers and enterprises. In terms of worker characteristics, 67.2 percent of the workers in our sample were male; 43.4 percent of the workers had education attainment at the levels of junior high or lower, 39.9 percent at the level of senior high, and 16.7 percent graduated from technical schools and universities; and a typical worker had about 19 years of potential work experience.⁶ Comparing the two types of enterprises, we notice that the workers in

⁶ Experience is derived by subtracting age by 6 and years of schooling. The years of schooling are calculated from six categories of education attainment with the assumption that the average number of

rural enterprises had higher male representation and were, on average, less educated, while the age compositions of the two types of firms were fairly similar.

With respect to firm attributes,⁷ there are several striking differences between the urban and the rural enterprises (see the second part of Table 1). Specifically, a typical urban enterprise was substantially larger than a rural enterprise, as indicated by the fact that an average urban enterprise had nine times the number of workers and thirty-five times the capital assets of an average rural enterprise. Moreover, the urban enterprises had more market power than their rural counterparts with their average share of three major products in the national markets being more than twice as large as that of the rural enterprises. The urban enterprises also had better access to bank credits, were able to spend more on new technologies, and had lower degree of private equity ownership relative to the rural enterprises. These differences were consistent with the stylized fact that TVEs were typically subject to harder budget constraints than SOEs as we mentioned in the previous section. The two types of firms were also different from each other in the areas of union representation and workers' influence over decision making; more urban enterprises were affiliated with the official trade union and urban workers were perceived to have more say over the enterprise's policies on welfare benefits. Furthermore, the urban firms were less likely to use piece-rate wages but more likely to reward workers by team-performance based schemes, compared to the rural

years it would take a student to achieve by the given level of education is 3 for below elementary school, 6 for elementary school, 9 for junior high, 12 for senior high, 14 for technical vocational school, and 16 for university. Based on this assumption, the mean number of years of schooling of the workers in the survey is about 11. Wages are the real annual wage of a worker deflated by the urban consumer index with 1994 as base year.

⁷ The variables of firm attributes are defined as follows. Sales revenue, capital assets, material inputs, R & D expenditures, bank loan, and welfare benefit payments are all measured in 1994 constant RMB. The ex-factory price index is used as the deflator for sales revenue, material inputs, R & D expenditures, and bank loan; capital assets are deflated by the price index of investment in fixed assets; welfare payments are by the urban consumer price index. All the price deflators are obtained from *China's Statistical Yearbook*. Market share is the sum of sales shares of three major products of the enterprise in national markets. Worker voice is derived from the manager's response to the question of how the firm's decisions with respect to welfare benefits to employees on a 5-point scale with 1 indicating "made by the management or by superior department", 2 "primarily made by the management, but the employees are consulted", 3 "shared by the management and the employees", 4 "primarily made by the employees, but the management is consulted", and 5 "made by the employees". Compensation methods are derived based on the manager's assessment on how much the enterprise rely on a particular method to provide work incentives on a 3-point scale with 1 indicating "not much", 2 "some", and 3 "a lot".

firms. In addition, the urban workers worked fewer hours each week and enjoyed more welfare benefits provided by their enterprises than did the rural workers. Given these organization differences, the urban enterprises were more likely to pay wages above the market-clearing levels than the rural enterprises, and consequently had larger between-firm wage variations.

The summary statistics presented in Table 2 shed light on the changes in ownership, employment, labor productivity, and wages between in 1994 and 2001. As can be seen, the enterprises in the sample had undergone labor retrenchment and privatization, with the mean employment falling from 1,409 in 1994 to 914 in 2001 and the average share of private equity ownership rising from less than two percent to 50 percent. According to the manager survey, the labor adjustment and ownership reforms in most sample enterprises were carried out in the period from 1997 and onwards. As with most East and Central European countries, both the urban and rural enterprises in the sample were privatized primarily to enterprise insiders, i.e., managers and employees. The enterprise restructuring apparently reduced the variation across the sample enterprises in firm size and ownership structures. However, the labor adjustment was more dramatic in the urban sector than the rural sector, indicated by the fact that the mean level of employment fell by about 39 percent in the former sector and by only 5 percent in the latter sector. By contrast, the scope of privatization in the urban enterprises was more limited, compared with the changes in the rural enterprise. Evidently, by 2001 on average only 25.6 percent of the equity of the urban enterprises was owned by private investors, and the firms that became privately controlled only accounted for 16.7 percent of these enterprises. In contrast, private investors owned 68.3 percent of the equity and controlled 72.9 percent of the rural firms in the sample. The information gathered from the manager survey also reveals that the distribution of equity ownership among private investors was more skewed towards managers in the privatized rural enterprises than in their urban counterparts.

The labor and ownership restructuring were apparently associated with a significant improvement in labor productivity and an increase in wages for both types of firms. From 1994 to 2001, the average sales revenue per worker of the sample enterprises rose by 1.48 fold and the real annual wages rose by 55.8 percent. In comparison, higher rates of growth in labor productivity and lower rates of growth in

real wages were observed in the rural enterprises than in the urban enterprises. Specifically, the mean labor productivity of the urban workers increased by 96.7 percent and their real wages rose by 64 percent during the period of investigation. By contrast, the labor productivity of the rural workers increased by 2.08 fold but their wages rose only by 47 percent. The urban workers apparently benefited more from the rising productivity than did the rural workers. Having reviewed the summary statistics of workers and firm attributes, we now turn to investigate how these attributes have affected wage inequality in the next section.

4. Empirical Results

4.1 Wage Inequality Measures

Before investigating the role of workers and firms in wage dispersion, we first compute two inequality measures, i.e., the Gini coefficients and the Theil-T index, to have a general picture of the magnitudes and changes of wage inequality during the period of investigation (see Table 3 and Figure 1). As can be seen, the inequality in real wages for the entire sample went up by an appreciable amount after 1997; the Gini coefficient rose from 0.234 to 0.292 and the Theil index from 0.099 to 0.177 with the changes between 1997 and 2001 being significant at the 5 percent level. Moreover, there are striking differences in the trends of wage inequality between the two types of firms. The urban enterprises endured higher wage inequality in general and a larger increase in wage inequality than did the rural enterprises in the late 1990s. From 1997 to 2001, the Gini coefficient rose sharply, by 9 percentage point (from 0.207 to 0.297) in the urban sector but only 1.4 percentage point (from 0.219 to 0.233) in the rural sector, with the change being highly significant in the former sector but insignificant in the latter sector. The magnitude of increase in wage inequality observed in the urban enterprises is alarming, given that our sample is concentrated in one area, which removes regional variations, an important source of income inequality in China, from the calculation, and that the worker sample was truncated at the lower limit in that the least productive workers had most likely been laid off during the labor retrenchment. It is also noteworthy that the wage inequality of the urban enterprise at the end of period of investigation is high, compared with industrialized market economies; for instance, the Gini coefficient for male workers is

0.298 in the United States, 0.253 in Canada, 0.212 in Australia, and 0.204 in West Germany (Green, et al., 1992). Have reviewed the trends in wage inequality, we now turn our attention to examining the underlying causes of the wage inequality and its changes.

4.2 Workers' Attributes and Firm Fixed Effects

As a first look at the role of worker and firm attributes in wage inequality, we regressed log wages on worker characteristics, such as gender, education attainment, experience and squared experience, and firm dummies, separately and together, for each type of firms in each year of the period from 1994 to 2001. We find that the explanatory power of worker observable attributes is much lower than firm-fixed effects; the R^2 s of the wage regression on the former alone were well below 20 percent, whereas firm dummies alone explained about 64 to 76 percent of the wage variation for the urban sector and 48 to 70 percent for the rural sector (see by Figure 2). The contrast in firm-fixed effects between the two types of firms offers evidence supportive for the conjecture that between-firm wage differentials are larger in the urban sector than in the rural sector. From Figure 2, we also notice that the proportion of the wage dispersion explained by firm fixed-effects of the urban firms fell initially, and then went up sharply after 1996, from 64.3 percent to 76 percent; whereas the rural enterprises saw a steady decline in the influence of firm-fixed effects from 0.701 in 1994 to 0.526 in 2001. In line with the trends in firm fixed effects, we observe a decrease in the proportion of the wage variation explained by observable worker heterogeneity alone and in the proportion that cannot be explained by observable worker attributes and firm dummies, part of wage variation attributable to workers' unobservable characteristics, after 1996 in the urban firms and an increase in the contributions by both workers' observable and non-observable attributes in the rural firms over the entire period of investigation. These trends indicate that the wages of urban workers became more depending upon which firms they were affiliated with relative to what they were as workers; whereas individual characteristics, both observable and unobservable, became increasingly more important in the wage determination of rural workers.

We now take a close look at the estimates of the wage regressions on workers' observable characteristics and firm dummies presented in Table 4. As can be seen, wages between workers were , in

general, more compressed in the urban firms than in the rural firms in that wage premium for being a male worker and returns to education were lower for the urban workers than for the rural workers, but returns to experience were higher for young and middle-age workers and lower for older workers in the urban firms than in the rural firms.⁸ Despite the differences, the changes in wage structures in the two types of firms display some commonalities. In particular, the gender wage differentials were on the rise, from 3.8 percent in 1994 to 8.7 percent in 2001 among the urban workers and from 11.2 percent to 13.8 percent among the rural workers. The returns to education also increased substantially; for instance, the gap between those with university degrees and those not finishing primary schools went up from 0.253 to 0.511 in the urban firms and from 0.327 to 0.695 in the rural firms. Moreover, the rate of returns to an additional year of experience decreased for younger workers (those with 21 years of experience or less for the urban firms and 13 years for the rural firms) but increased for older ones in both sectors.

Using the aforementioned regression estimates, we decomposed log wage into three components, namely, a part explained by worker attributes, a part by firm-fixed effects, and the residuals, and then computed the correlation coefficient of log wage with each component (see the bottom of Table 4). The correlation coefficient of log wage with each of the three components provides an estimate of the relative importance of the component as a source of wage inequality. Consistent with the Gini coefficients and Theil indexes presented in Table 3, the standard deviations of log wage increased over the period of investigation in both sectors, but the change was smaller in the rural firms than in the urban firms. While the standard deviations of the components associated with observable and non-observable worker attributes (regression residuals) were all on the rise in both types of firms, the variation of the part explained by firm dummies increased in the urban firms but decreased in the rural firms. With respect to the relative importance of firm and worker attributes, we find that the correlation of log wage with firm-fixed effects was higher than that with workers attributes in both types of firms. However, we find a trend

⁸ With the assumption that a worker entered the labor force at the age of 16, the returns to experience were higher for workers younger than 53 and lower for those older than 52 in the urban firms than in the rural firms worker, according to the estimates of the 1994 regressions, and the turning point was 45 based on the estimates of 2001.

of decreasing wage correlation with worker characteristics and a trend of rising correlation with firm-fixed effects in the urban sector and an opposite pattern of changes in the rural firms. In accord with the regression R^2 s displayed by Figure 2, these correlation coefficients provide further evidence that wage dispersion between firms to between workers became more important as a source of rising wage inequality in the urban firms but less important in the rural firms.

The analysis of worker attributes and firm fixed effects provides an explanation as to why overall wage inequality increased more sharply in the late 1990s and early 2000s in the urban firms than in the rural firms. Although wage differentials between different gender and education groups were increased in both urban and rural sectors, their de-equalizing effects were reinforced by increased wage dispersion between firms in the former sector but dampened by decreased between-firm variation in the latter sector. Thus, the change in wage dispersion between firms had apparently played a leading role in shaping the trends of wage inequality in China's manufacturing sector in the 1990s. In the remaining section, we investigate the factors underlying the changes in wage differentials across firms.

4.3 Sources of Between-Firm Wage Dispersion

We analyze the sources of wage variations across firms by examining the role of observable firm characteristics. As reviewed in Section 2, the economics literature explains wage differentials across firms by a list of theories including ability sorting, compensating differentials, efficiency wage, and insider controls. Given the nature of China's emerging industrial labor market, our analysis focuses on non-competitive theories while controlling for factors that may be associated with ability sorting or compensating differentials as data permit. We first take a look at the summary statistics of wage differentials between firms over several indicators and then apply a multivariate regression analysis to test whether rent-sharing had played a part in explaining the changes in enterprise wage structures in the late 1990s.

Table 5 reports changes in wages dispersion between firms over labor productivity, profitability, size, market power, and union representation between firms in 1994 and 2001. The wage differentials are calculated as the ratio of the mean wages of the firms above the third quartile to the firms below the first

quartile in two performance indicators and size, the ratio between firms with positive shares in the national markets and firms with negligible market shares, and the ratio between firms with and without union affiliation. As can be seen, the patterns of between-firm dispersion were noticeably different between the urban and the rural sector. For the urban sector, the wage ratios for all five indicators were greater than unity and went up substantially between 1994 and 2001. The average wage of the firms above the 3rd quartile relative to that of the firms below the 1st quartile was 35.3% higher for sales per worker, 15.6% higher for profits per unit of assets, and 38.8% for employment in 1994, and the respective wage disparity rose to 98.9%, 54.8%, and 66.5% in 2001. In addition, the wage gap between firms with positive and with negligible market shares increased from 13.2% to 57.7%; and the wage disparity associated with union representation went up from 21.7% to 57.2%. By contrast, the patterns of the wage responses to firm characteristics in the rural sector were not as clear. For instance, the between-quartile wage gap was positive in sales per worker (8.3%) but negative in profits per unit of assets (-13.2%) and firm size (-11.1%) in 1994, indicating that workers received more pay for working in the firms that were more productive but less for being affiliated with the firms that were more profitable and bigger. While the wage differentials associated with the two performance indicators and size all went up in 2001 (with a change of sign from negative to positive in profits and size), the changes were noticeably moderate relative to the changes observed in the urban firms. Moreover, wages of rural workers appear to respond positively to market shares and union representation in general, but the wage differentials related to market share fell from 14.1% to 7.5%, and the disparity between firms with and without union affiliation rose only marginally from 17.3% to 23.5%. Evidently, between-firm wage variations associated with firms' performance, size, and institutional factors and the changes in these wage differentials were more pronounced in the urban sector than in the rural sector.

To examine the role of firm and demand-side factors more systematically, we estimate extended human-capital equations where log wages are treated as a function of education, years of potential experience (and its square), gender, and a set of observable firm characteristics. The analysis is intended to shed light on two main issues: a) what impacts the factors associated with rent sharing may have on

enterprise wage structures; b) how the wage effects of these noncompetitive factors may change following enterprise restructuring of the late 1990s. As with the regressions presented previously, the wage equations in the remaining section are estimated, separately, for the urban and the rural firms. To streamline the exposition, the regressions are fitted with pooling cross-section and time-series observations. We first pool all eight cross-sections to discern the general patterns of wage determination and then split the sample into two periods with one from 1994 to 1996 and one from 1999 to 2001 to assess the impacts of the enterprise restructuring that was introduced on a large scale in 1997 and 1998.

The choice of variables on firm attributes for the regressions focuses on those measuring the ability or the need of a firm to pay rents and the bargaining power of workers while controlling for other factors that may also affect wages. Chief among these variables are share of three major products in national markets, loan per worker, the presence of union, perceived influence over policies on welfare benefits by employees, proportion of equity owned by private investors, methods for labor compensation, sales revenue per worker in log form, employment in log form, R & D expenditures per workers, welfare benefits per worker, and number of working hours per week. The variables on market share and access to bank loans measure a firm's ability to exact rents, and the variables on union representation and workers' policy influence are proxies for strength of insider controls. These variables are expected to have positive effects on wages, and wage response to these institutional factors may increase or decrease depending upon whether the labor and ownership reforms strengthened or weakened rent seeking behavior. The variable on private ownership is introduced to assess the direct effect of privatization, which cannot be determined a priori, dependent on whether or not the firm pursued the objective of income generation prior to privatization and on how privatization may affect the power of insider forces. Methods of labor compensations may affect wages in that some compensation schemes provide workers with better incentives than others. In other words, if piece rates elicit more effort supplies than team-based schemes, wages are expected to be higher in a firm that relies more on the former scheme and less on the latter.⁹

⁹ Arguments can also be made that firms where piece rates cannot be easily implemented are more likely to pay efficiency wage, and hence their wages are higher.

Sales revenue per worker, measuring average labor productivity, is a variable commonly used in the analysis of rent-sharing behavior in transition economies (Sevjar, 1999). In this paper this variable is introduced to account for the fact that firms that motivate workers better or attract more skilled workers are likely to pay high wages, given that the possibility of rent seeking is taken into account by other variables. The restructuring may reduce wage sensitivity to this variable by enabling the firm to rely more on the threat of layoff rather than high wage premium to elicit effort supplies. Firm size is considered as a determinant of wages in part because the fact that large firms pay higher wages than small firms has long been recognized as an important component of the variation in worker wages in (see Moore (1911)). The firm-size wage premium may stem from the fact that larger firms are managed by more-competent managers or attract more skilled workers or the fact that larger firms may choose to pay higher wages rather than spend more on monitoring or are more likely to share rents with their workers (Troske, 1999). The introduction of this variable permits us to the impact of the state policy of “grasp the large” on firm-size wage premium. A firm’s R & D expenditures may have positive effect on wages as a result of complementarities between worker skill and new technologies or due to a positive correlation between investment in new technologies and rents. The variables of welfare benefits per worker and weekly working hours are introduced to control for the effect of compensating differentials. In a competitive labor market, other things being equal, wages will be lower if workers receive higher welfare benefits from the firm or if the job requires workers work fewer hours. Year and industry dummies are also introduced to control for changing macro-economic environments and differences in pay structures and technologies across industries.

The wage equations described above cannot be estimated by OLS methods due to the possible reverse causality between wages and sales revenue per worker in the presence of efficiency wage considerations. To control for simultaneous bias, the wage regressions are estimated by two-stage least squares techniques (2SLS) with log capital assets and log material inputs used as the instruments. Capital assets and material inputs are selected as the instruments under the assumptions that these variables are correlated with sales revenue per worker but have no effect on wages when their impacts on labor

productivity is controlled for. The simultaneity bias and the validity of instruments are tested empirically. While using panel data, we do not seek to control for unobservable individual-fixed effects nor for firm-fixed effects, because the removal of these effects would make it impossible to estimate the impacts of such essential time-invariant factors as gender, education, market share, union presence, workers' policy influence, and compensation methods, etc.¹⁰

The regression results are presented in Table 6. The hypothesis that sales revenue per worker is exogenous to wages is rejected in all six regressions (see the Hausman tests reported at the bottom of the table), indicating that efficiency wage considerations may play a role in wage determination for both urban and rural firms. The IV estimates presented in Table 6 are consistent in that the selection of instrumental variables passed the IV validity test in all runs. As indicated by F statistics reported at the end of the table, all the regressions are highly significant with p-value approaching to zero.

We first look at the wage regressions for the entire sample period. The chosen independent variables explain 54.8% of the wage variation for the urban firms and 34.5 percent for the rural firms. It is noteworthy that, compared with the wage regressions on observable worker attributes and year dummies (which are not reported), introducing the variables on firm attributes has increased the R^2 of the wage regression by 27 percentage points for the urban firms but only 6.4 percentage point for the rural firms. Consistent with the findings from the analysis of firm-fixed effects, this result is indicative of the fact that firm heterogeneity played a bigger role in wage determination for the urban firms than for the rural firms. With respect to the estimates of worker attributes, we find once again that urban workers received less wage premium for being a male, lower returns to education (at categories of post-secondary education), and more for seniority relative to rural workers.

Regarding firm characteristics, which are the primary interest of the analysis of this section, the estimates provide further evidence supportive for the conjecture that efficiency wage and rent sharing factors are among the major sources of between-firm wage differentials in both urban and rural firms. We

¹⁰ The information on these firm attributes was obtained from the manager survey and analyzed under an admittedly strong assumption that these attributes were constant over the period of investigation.

find a positive relationship between wages and labor productivity with a one-percent increase in sales per worker raising wages by 0.064 percent for the urban firms and 0.053 percent for the rural firms. Wages appear to be higher in the firms with more power in product markets, given that if a firm's market share increased by one percent, the wages would rise by 0.3 percent in the urban firms and by 0.1 percent in the rural firms. Moreover, workers in both types of firms would receive higher pay if their firm was affiliated with trade union or the employees were perceived having more voice in the firm's decision-making process. Furthermore, on the contrary to the hypothesis of compensating differentials, workers in both urban and rural sectors are found to have received higher wages while receiving more welfare benefits provided by their firms. Except for union and welfare effects, all the aforementioned factors are found having stronger wage effects for the urban firms than for the rural firms. Larger union and welfare effects are observed in the rural sector, perhaps because fewer rural firms had union representation and offered workers welfare benefits.

The contrast between the urban and rural firms is also found in several other aspects. While a firm's ability to invest on new technology or to access bank credits has a positive effect on the wages of urban workers, it had no effect or negative effect on the rural wages. In addition, private ownership does not appear to have any effect on wages for urban workers but significant negative effect for rural workers. These findings suggest that wage-setting behavior of the rural firms were more subject to market discipline than that of the urban firms. Moreover, a positive relationship between wages and firm size is observed in the urban sector with an employment elasticity estimated as high as 0.145, whereas firm size has no significant impact on rural wages. The difference in wage response to labor compensation methods is also noteworthy. In the urban sector, the way by which workers were rewarded had significant impacts on wages: wages were higher in the firm that was more likely to use piece rates and less likely to rely on group-based schemes. In contrast, the degree of a firm's reliance on piece rates had no significant impact on rural wages, whereas team-based incentive schemes had positive wage effect when the scheme was linked to performance but negative effect when the scheme was related to profitability of a firm. It is not surprising that the insignificant estimate of piece rates was obtained in the

rural sector where the scheme was universally adapted. The rural firms seem to be more successful in eliciting effort supplies by connecting rewards to group performance than the urban firms. Despite the differences, the negative estimates of profit sharing schemes obtained from both sectors suggest that this compensation method may have been used as a means to pass financial losses to workers given their ability to bargain with management is controlled for.

The findings of the wage regression discussed above show that noncompetitive and institutional factors, such as efficiency wages, market power, and union influence, had significant influence on wage policies in both urban and rural firms. However, market distortions, measured by wage variations associated with firm attributes, were greater in the urban firms than in the rural firms as the former were more under the influence of soft budget constraints and insider forces and have more monopoly power in product markets.

We next turn to look at the changes of wage structures between the before- and post-restructuring (1997/1998) periods and examine how the restructuring may have affected labor market distortions. We first compare the two periods for the urban sector. Overall, the explanatory power of the wage regression increased from 0.473 to 0.620. As with the estimates of cross-sectional regressions reported in Table 4, we find a moderate rise in gender wage gaps, sizeable upsurge in returns to education by all categories, and a fall in the rate of returns to experience for younger workers and an increase for older ones. In addition to the rise of returns to education, another piece of evidence that may be indicative of growing competitiveness in the urban labor market is the fall in wage premium associated with labor productivity, that is, the wage elasticity with respect to sales revenue per worker dropped from 0.070 to 0.045. This result is consistent with the economic intuition that the autonomy to lay off workers obtained by urban enterprises in the late 1990s reduced the wage premium required to extract optimal effort supplies.

In spite of these findings, the estimates on other firm attributes show that the influence of institutional factors on urban wages may have been heightened rather than weakened. Evidently, the estimates of firm size, market power, and union representation were bigger in the post-restructuring period than in the pre-restructuring period. While the change in firm-size wage premium was moderate,

from 0.140 to 0.163, this result is indicative of the de-equalizing effect of state's preferential policies for large state enterprise on industrial wages. The adjustments in wage sensitivity to other institutional factors are more noticeable; the wage response to market share was doubled, from 0.2 percent to 0.4 percent for a one-percent increase in market share, and the wage disparity between the firms with and without union affiliation rose from 5.4 percent to 15.6 percent. Moreover, the estimates of R & D expenditures, private ownership, loans, and welfare benefits are statistically significant in both periods but change the sign from negative prior to 1997 to positive after 1998, indicating that the wage structures of urban firms became more lack of market discipline in the post-restructuring period. The growing influence of firm attributes is also evident by the estimates of labor compensation method variables, which show that wages responded significantly only to the extent the firm relied on piece rates in the before-restructuring period but to all three variables on compensation methods in the post-restructuring period. The increase of wage variations across firms insinuates that the reform packages contributed to exacerbating rather than reducing distortions in the urban labor markets.

Turning to the rural firms, we find that the R^2 of the wage regression declined from 0.303 to 0.267, for the most part, due to a diminishing influence of firm heterogeneity. Indeed, the changes in rewards to worker characteristics were fairly similar to those observed in the urban firms, with a slightly wider gender wage, sharply increased returns to education across all categories, and falling seniority premium. As with the urban firms, the wage response of the rural firms to firm size and welfare benefits increased in the post-restructuring period, perhaps because, as their urban counterparts, large rural enterprises, which were more likely to provide welfare benefits to workers, also received more supports from the local government in the post-restructuring period, and the government's preferential treatment had the same de-equalizing effect as it did on urban wages. Nevertheless, in contrast to the growing susceptibility of urban wages, the rural wages became decisively less sensitive to other institutional variables, with the estimate falling from 0.049 to 0.039 for sales per worker, 0.002 to 0.0006 for market share, 0.150 to 0.104 for union affiliation, and 0.055 to 0.020 for perceived workers' influence. Moreover, the estimate of private ownership changed from not significantly different from zero to

significantly negative with a value of -0.043 , and the wage response to bank loans was negative and significant in both before- and after-restructuring periods. Evidently, the privatization of TVEs brought about wage restraint, and access to credit markets also acted as disciplinary devices for rural wages. The declined influence of institutional factors on wage structures in the rural firms is also revealed by the results that the significant estimates of compensation methods fell from two to one. The rise of returns to education and the decrease in wage variations across firms unveil growing competitiveness of rural labor markets.

To discern the changes in relative importance of worker and firm characteristics, Table 7 present summary statistics of the components of real wage implied by the estimated parameters discussed above and the correlations between wage and its components of worker and firm heterogeneity. Once again, we find that the correlation coefficient is higher for firm effects than for worker attributes (0.505 versus 0.438) in the urban sector, whereas the opposite pattern is observed (0.262 versus 0.414) in the rural sector. Over the two periods, the correlation with the component predicted by worker characteristic fell from 0.437 to 0.414 for the urban firms, and the correlation with firm effects rose from 0.483 to 0.598. By contrast, the estimates for the rural firm disclose rising influence of worker attributes (from 0.381 to 0.397) and declining firm effects (from 0.316 to 0.288) on wage determination. Consistent with economic intuitions, these estimates indicate that market distortions were more pervasive in the urban sector than in the rural sector, and that the recent ownership reforms increased the influence of non-competitive forces in the former sector but decreased their effect in the latter sector.

5. Conclusions

In this paper we have examined the changes in wage inequality and wage structures brought about by the industrial restructuring and privatization in the late 1990s using a worker-firm matched sample that consists of both urban and rural enterprises in China. Our results unveil a conspicuous contrast in the pattern of changes between the urban and the rural enterprises. While the ownership reforms in the urban sector were more gradual and involved limited transfer of property rights to private investors relative to the rural sector, the rise of wage inequality was more pronounced in the former sector

than in the latter sector. We then investigated the underlying causes of the changes by considering both worker and firm characteristics. We find similar patterns of changes in rewards to worker characteristics between the two sectors, that is, a mild increase in gender wage gap, sharp increases in returns to education, and a decrease in wage premium for experience for the young and mid-aged worker. However, the wage response to firm characteristics was strikingly different between the two sectors, with increased between-firm wage differentials observed in the urban sector and an opposite trend found in the rural sector. Analyzing the sources of wage variations across firms, we discover that the change in wage sensitivity to institutional factors such as market power, access to credit markets, union representation, and workers' influence played a major role in explaining the contrast in changing wage structures between the urban and the rural firms. The labor and ownership reforms appear to have heightened the influence of insider forces in the urban firms but weakened the effects of rent-sharing behavior in the rural sector. The rise in wage dispersion between firms, associated with increased wage differentials between workers, contributed to the large increase in wage inequality in the urban sector, whereas the decreased wage variations across firms helped to dampen the de-equalizing effects of privatization stemming from increased wage sensitivity to worker characteristics.

While the results of this paper are based on a limited sample drawn from only one locality in a country with wide regional variations, they shed important light on the complex relationship between transition and wage inequality. As demonstrated by the experience of East and Central European countries, the privatization process may generate different efficiency and distributive outcomes, depending on the factors such as institutional initial conditions, policy environments, privatization methods, and the function of factor and product markets (Eale et al., 1993). Using the same dataset as used by this study, Dong, et al. (2004) find that the privatization had stronger positive effects on firm performance for the urban firms than for the rural firms. However, this paper finds that the wage outcomes of privatization were less favorable in the urban firms than in the rural firms. The restrained transfer of ownership to private investors, state preferential treatments to large state enterprises, and the involvement of trade union in enterprise-based collective bargaining, together with the legacy of

enterprise-based welfare and protection systems, played a major role in driving up wage inequality in the post-restructuring urban enterprises.

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Table 1. Summary Statistics of the Sample Workers and Enterprises

	All enterprises	Urban enterprises	Rural enterprises
<u>Worker characteristics</u>			
Wage (yuan/year)	5,486.2 (1.60)	6,768.3 (1.60)	4,722.1 (1.51)
Male (%)	67.2 (46.9)	0.56 (7.44)	68.7 (46.4)
Experience (years)	19.39 (8.31)	19.04 (8.43)	19.63 (8.22)
Below primary school (%)	1.80 (13.30)	0.56 (7.44)	2.67 (16.13)
Primary school (%)	5.09 (21.98)	2.47 (15.51)	6.92 (25.40)
Junior high (%)	36.50 (48.14)	23.29 (42.27)	45.75 (49.82)
Senior high (%)	39.95 (48.98)	40.78 (49.14)	39.37 (48.86)
Technical school (%)	2.76 (16.38)	3.64 (18.73)	2.14 (14.46)
University & above (%)	13.89 (34.59)	29.26 (45.50)	3.14 (17.44)
No. of workers	3,212	1,324	1,888
<u>Enterprise characteristics:</u>			
Sales revenue (million yuan)	235.52 (1,100.77)	534.26 (1,654.83)	19.87 (28.88)
Employment (workers)	1,202 (3,313)	2,521 (4,767)	226 (214)
Revenue/worker (1,000 yuan)	111.50 (136.08)	111.39 (143.03)	111.59 (130.85)
Capital assets (million yuan)	115.97 (652.69)	271.35 (988.31)	4.04 (6.92)
Materials (million yuan)	156.98 (724.06)	348.30 (1,089.90)	18.87 (25.77)
Share in national Markets (%)	9.69 (20.54)	15.12 (22.38)	6.21 (18.59)
R&D expenditures 1000 yuan/ worker	0.79 (2.66)	1.83 (3.84)	0.03 (0.38)
Loan per worker (1,000 yuan)	9.97 (31.91)	18.46 (46.47)	3.74 (9.55)

Table 1. Summary Statistics of the Sample Workers and Enterprises

	All enterprises	Urban enterprises	Rural enterprises
% of equity owned by private individuals	21.10 (35.87)	12.96 (25.11)	27.12 (41.08)
Union (%)	83.55 (37.19)	93.22 (25.36)	77.42 (42.04)
Worker voice	1.91 (0.85)	2.17 (0.72)	1.74 (0.88)
Degree of compensations made by			
i. Piece rates	2.64 (0.62)	2.42 (0.67)	2.78 (0.55)
ii. Group performance	2.20 (0.67)	2.31 (0.68)	2.13 (0.66)
iii. Profitability	2.16 (0.74)	2.20 (0.78)	2.13 (0.73)
Welfare benefits 1,000 <i>yuan</i> /worker	1.49 (1.70)	2.46 (0.25)	0.77 (0.68)
Work hours Per week	47.07 (8.04)	42.83 (6.00)	50.21 (7.92)
Distribution over industries: (%)			
Food & beverage	3.95	8.47	1.08
Textile	7.89	8.47	7.53
Garments	3.95	1.69	5.34
Leather products	0.66	0.0	1.07
Paper and printing	7.89	6.78	8.59
Petroleum & chemical Products	18.41	22.03	16.12
Metallurgy	19.08	11.86	23.66
Machinery	34.87	35.59	34.41
Others	3.30	5.11	2.20
No. of enterprises	162	69	93

Table 2: Summary Statistics of Real Wages and Selected Firm Attributes in 1994 and 2001

	All enterprises	Urban enterprises	Rural enterprises
Employment			
1994: Mean	1,408.78	2,977.45	236.79
Std. Dev.	3,750.50	5,363.66	197.50
CV	2.66	1.80	0.84
2001: Mean	913.67	1,826.41	224.25
Std. Dev.	2,254.77	3,218.34	229.71
CV	2.47	1.76	1.02
% of equity owned by private individuals			
1994: Mean	1.96	3.76	0.65
Std. Dev.	5.77	8.06	2.58
CV	2.94	2.14	3.97
2001: Mean	49.91	25.64	68.25
Std. Dev.	44.01	34.45	41.62
CV	0.88	1.34	0.61
Revenues/worker (1,000 yuan)			
1994: Mean	73.24	92.01	59.22
Std. Dev.	82.58	112.43	45.83
CV	1.13	1.22	0.77
2001: Mean	181.82	181.07	182.38
Std. Dev.	215.93	233.69	203.00
CV	1.19	1.29	1.11
Wages (yuan/year)			
1994: Mean	5,143.84	6,228.94	4,396.96
Std. Dev.	2,544.99	3,024.38	1,821.44
CV	0.50	0.49	0.41
2001: Mean	8,012.74	10,197.38	6,470.70
Std. Dev.	5,535.18	6,892.67	3,736.97
CV	0.691	0.676	0.578
No. of enterprises	162	69	93

Table 3: Inequality Indicators

	1994	1995	1996	1997	1998	1999	2000	2001
<u>All workers</u>								
Gini coefficient	0.243	0.231	0.230	0.234	0.243	0.253	0.275	0.292
Standard error	0.004	0.005	0.004	0.005	0.005	0.005	0.007	0.007
95% C.I.	0.235	0.223	0.221	0.224	0.233	0.242	0.262	0.278
	0.251	0.240	0.238	0.244	0.253	0.264	0.289	0.306
Theil index	0.102	0.092	0.093	0.099	0.111	0.130	0.157	0.177
Standard error	0.005	0.005	0.004	0.008	0.006	0.012	0.011	0.015
95% C.I.	0.093	0.083	0.084	0.084	0.098	0.105	0.135	0.147
	0.111	0.102	0.102	0.114	0.122	0.154	0.178	0.207
<u>Urban workers</u>								
Gini coefficient	0.232	0.216	0.213	0.207	0.232	0.248	0.288	0.297
Standard error	0.007	0.007	0.007	0.006	0.007	0.008	0.010	0.008
95% C.I.	0.217	0.203	0.200	0.196	0.217	0.233	0.269	0.282
	0.246	0.229	0.226	0.218	0.246	0.263	0.307	0.313
Theil index	0.096	0.084	0.081	0.076	0.100	0.127	0.166	0.185
Standard error	0.008	0.006	0.005	0.005	0.007	0.015	0.015	0.025
95% C.I.	0.082	0.072	0.072	0.066	0.086	0.096	0.137	0.136
	0.112	0.095	0.090	0.085	0.113	0.157	0.195	0.234
<u>Rural workers</u>								
Gini coefficient	0.216	0.203	0.203	0.219	0.211	0.213	0.212	0.233
Standard error	0.004	0.005	0.005	0.007	0.007	0.008	0.007	0.008
95% C.I.	0.208	0.194	0.194	0.206	0.197	0.198	0.198	0.218
	0.225	0.212	0.212	0.232	0.224	0.228	0.225	0.249
Theil index	0.077	0.070	0.076	0.096	0.088	0.095	0.094	0.111
Standard error	0.004	0.004	0.007	0.015	0.010	0.012	0.012	0.012
95% C.I.	0.069	0.062	0.062	0.066	0.068	0.071	0.069	0.086
	0.085	0.078	0.089	0.125	0.109	0.119	0.118	0.136

Table 4: OLS Estimates of the Wage regressions with Firm Fixed Effects

	1994	1995	1996	1997	1998	1999	2000	2001
<u>Urban workers</u>								
Regression estimates:								
Male	0.038 (2.84)*	0.032 (2.27)**	0.047 (3.23)*	0.062 (5.40)*	0.054 (4.45)*	0.072 (6.38)*	0.079 (5.82)*	0.087 (6.14)*
Experience	0.026 (8.60)*	0.026 (8.28)*	0.030 (9.02)*	0.023 (8.37)*	0.019 (6.47)*	0.021 (7.50)*	0.019 (5.44)*	0.019 (5.02)*
Experience ² x100	-0.031 (-3.66)*	-0.031 (-3.54)*	-0.043 (-4.85)*	-0.026 (-3.75)*	-0.018 (-2.45)**	-0.020 (-3.05)*	-0.014 (-1.74)***	-0.015 (-2.05)**
Primary school	-0.015 (-0.18)	0.011 (0.13)	0.039 (0.42)	0.020 (0.27)	0.008 (0.10)	0.053 (0.69)	0.087 (0.94)	0.114 (1.18)
Junior high	0.031 (0.40)	0.054 (0.66)	0.064 (0.73)	0.072 (1.00)	0.062 (0.81)	0.134 (1.87)***	0.177 (2.05)**	0.179 (1.99)**
Senior high	0.109 (1.41)	0.151 (1.84)***	0.139 (1.57)	0.157 (2.17)**	0.138 (1.79)***	0.216 (2.98)*	0.281 (3.23)*	0.289 (3.17)*
Technical school	0.130 (1.54)	0.195 (2.18)**	0.198 (2.07)**	0.215 (2.76)*	0.207 (2.48)**	0.288 (3.69)*	0.368 (3.93)*	0.372 (3.81)*
University & above	0.253 (3.24)*	0.292 (3.52)*	0.283 (3.16)*	0.289 (3.97)*	0.296 (3.80)*	0.394 (5.39)*	0.496 (5.65)*	0.511 (5.58)*
Firm dummies	yes	yes	yes	yes	yes	yes	yes	yes
Constant	8.219 (89.76)*	8.206 (84.21)*	8.239 (79.12)*	8.284 (97.04)*	8.399 (91.79)*	8.401 (97.55)*	8.421 (81.17)*	8.505 (78.05)*
Adjusted R ²	0.791	0.744	0.723	0.765	0.775	0.822	0.807	0.810
Mean and standard deviation:								
Log wage	8.645 (0.423)	8.648 (0.405)	8.645 (0.409)	8.711 (0.371)	8.835 (0.405)	8.922 (0.434)	9.011 (0.492)	9.084 (0.523)
Worker attributes	0.459 (0.129)	0.516 (0.131)	0.562 (0.128)	0.533 (0.117)	0.492 (0.116)	0.625 (0.128)	0.694 (0.143)	0.703 (0.143)
Firm fixed effects	8.189 (0.332)	8.135 (0.313)	8.085 (0.306)	8.178 (0.292)	8.341 (0.331)	8.296 (0.360)	8.316 (0.410)	8.379 (0.434)
Residuals	-0.004 (0.195)	-0.003 (0.201)	-0.002 (0.218)	-0.000 (0.174)	0.000 (0.186)	0.001 (0.186)	0.000 (0.210)	0.001 (0.229)
Correlation of low wage with								
Worker attributes	0.402	0.408	0.402	0.405	0.348	0.349	0.354	0.347
Firm fixed effects	0.827	0.803	0.781	0.824	0.841	0.853	0.856	0.857
Residuals	0.463	0.496	0.539	0.471	0.461	0.441	0.427	0.445
Observations	1,110	1,142	1,214	1,265	1,309	1,335	1,341	1,338

Table 4: OLS Estimates of the Wage Equations with Firm Fixed Effects (continued)

	1994	1995	1996	1997	1998	1999	2000	2001
Rural workers								
Regression estimates:								
Male	0.112 (8.32)*	0.120 (9.68)*	0.115 (8.86)*	0.118 (7.75)*	0.114 (8.23)*	0.127 (8.89)*	0.136 (9.32)*	0.138 (8.92)*
Experience	0.011 (3.65)*	0.010 (3.61)*	0.011 (3.87)*	0.014 (4.07)*	0.012 (4.06)*	0.010 (3.40)*	0.010 (3.07)*	0.009 (2.45)**
Experience ² x100	-0.012 (-1.66)***	-0.008 (-1.20)	-0.009 (-1.31)	-0.013 (-1.73)***	-0.009 (-1.34)	-0.009 (-1.27)	-0.007 (-1.05)	-0.004 (-0.52)
Primary school	0.020 (0.48)	0.039 (1.02)	0.0536 (1.31)	0.034 (0.72)	0.094 (2.23)**	0.106 (2.46)**	0.128 (2.93)*	0.161 (3.44)*
Junior high	0.121 (2.99)*	0.135 (3.57)*	0.147 (3.70)*	0.134 (2.87)*	0.194 (4.74)*	0.195 (4.69)*	0.218 (5.12)*	0.263 (5.76)*
Senior high	0.196 (4.65)*	0.229 (5.83)*	0.246 (5.99)*	0.279 (5.77)*	0.342 (8.04)*	0.349 (8.06)*	0.365 (8.26)*	0.422 (8.91)*
Technical school	0.356 (5.95)*	0.382 (7.02)*	0.406 (7.23)*	0.455 (6.81)*	0.508 (8.51)*	0.505 (8.23)*	0.541 (8.69)*	0.582 (8.72)*
University & above	0.327 (6.18)*	0.383 (7.79)*	0.415 (8.14)*	0.479 (7.91)*	0.541 (10.21)*	0.596 (11.02)*	0.638 (11.64)*	0.695 (11.84)*
Firm dummies	yes	yes	yes	yes	yes	yes	yes	yes
Constant	7.925 (74.66)*	7.860 (78.87)*	7.933 (74.64)*	8.230 (70.41)*	8.283 (104.29)*	7.907 (99.86)*	7.776 (95.45)*	7.820 (88.37)*
Adjusted R ²	0.722	0.724	0.666	0.586	0.586	0.578	0.554	0.589
Mean and standard deviation:								
Log wage	8.310 (0.400)	8.303 (0.377)	8.311 (0.366)	8.373 (0.395)	8.485 (0.366)	8.562 (0.375)	8.624 (0.375)	8.679 (0.416)
Worker attributes	0.361 (0.092)	0.400 (0.101)	0.430 (0.102)	0.483 (0.122)	0.540 (0.123)	0.530 (0.129)	0.564 (0.134)	0.609 (0.141)
Firm fixed effects	7.949 (0.319)	7.903 (0.294)	7.879 (0.271)	7.889 (0.270)	7.945 (0.245)	8.031 (0.250)	8.060 (0.239)	8.070 (0.281)
Residuals	0.000 (0.204)	0.000 (0.191)	0.000 (0.205)	-0.000 (0.247)	0.000 (0.229)	0.001 (0.237)	0.000 (0.244)	0.000 (0.259)
Correlation of low wage with								
Worker attributes	0.338	0.381	0.390	0.388	0.403	0.396	0.420	0.398
Firm fixed effects	0.830	0.819	0.781	0.719	0.705	0.695	0.671	0.706
Residuals	0.509	0.507	0.559	0.625	0.625	0.631	0.649	0.623
Observations	1,622	1,622	1,743	1,792	1,859	1,883	1,895	1,895

Notes: T statistics reported in parentheses are derived from heteroskedasticity-robust standard errors. *, **, *** indicates the level of significance at 1%, 5%, and 10%, respectively.

Table 5: Between-Firm Variation in the Wage Structure

Wage ratio	Both sectors combined		Urban sector		Rural sector	
	1994	2001	1994	2001	1994	2001
<u>Labor productivity¹</u>						
Sales per worker						
≥ 3 rd quartile/ ≤ 1 st quartile	1.135	1.477	1.353	1.989	1.083	1.138
<u>Profits per unit of assets</u>						
≥ 3 rd quartile/ ≤ 1 st quartile	0.849	1.268	1.156	1.548	0.868	1.041
<u>Size</u>						
Employment ²						
≥ 3 rd quartile/ ≤ 1 st quartile	1.414	1.933	1.388	1.665	0.889	1.323
<u>Market share</u>						
Share >0 /share →0	1.291	1.459	1.132	1.577	1.141	1.075
<u>Union representation</u>						
With /without	1.259	1.483	1.217	1.572	1.173	1.235

Notes: 1. The quartiles of sales per worker among enterprises are 30.5, 46.0 and 72.7 in 1994, and 54.6, 94.6, and 200.8 in 2001 for all firms; 31.4, 46.4, and 73.8 in 1994, and 43.5, 77.6, and 200.8 in 2001 for urban firms; 28.9, 45.3, and 70.7 in 1994 and 58.03, 98.9, and 202.57 in 2001 for rural firms.

2. The quartiles of firm size are 121, 277, 811 in 1994 and 115, 234, 532 in 2001 for all enterprises, 365, 1,131, 2,437 in 1994 and 300, 641, 1,675 in 2001 for urban enterprises, and 100, 160, 321 in 1994 and 75, 152, 236 in 2001 for rural enterprises.

Table 6: IV Estimates of the Wage Equations with Firm Observable Characteristics

	Urban sector			Rural sector		
	1994-2001	1994-1996	1999-2001	1994-2001	1994-1996	1999-2001
Worker characteristics:						
Male	0.064 (7.88)*	0.056 (2.78)*	0.067 (4.97)*	0.160 (24.11)*	0.161 (14.79)*	0.164 (15.26)*
Experience	0.027 (11.98)*	0.027 (7.46)*	0.020 (5.40)*	0.010 (6.99)*	0.015 (5.70)*	0.004 (2.00)**
Expereince ² x 100	-0.037 (-7.13)*	-0.034 (-3.49)*	-0.027 (-3.23)*	-0.003 (-0.99)	-0.019 (-2.76)*	0.010 (1.90)**
Primary school	0.106 (2.59)*	0.095 (1.42)	0.121 (1.64)***	0.101 (5.30)*	0.037 (1.12)	0.119 (4.09)*
Junior high	0.129 (3.46)*	0.120 (1.95)**	0.168 (2.47)**	0.148 (7.89)*	0.065 (2.02)**	0.182 (6.39)*
Senior high	0.267 (7.07)*	0.245 (3.92)*	0.338 (4.90)*	0.204 (15.79)*	0.190 (5.69)*	0.363 (12.21)*
Technical school	0.279 (6.62)*	0.260 (3.85)*	0.333 (4.36)*	0.312 (10.35)*	0.205 (3.90)*	0.377 (8.12)*
College & above	0.421 (11.01)*	0.375 (5.96)*	0.525 (7.53)*	0.495 (19.89)*	0.349 (7.99)*	0.585 (15.60)*
Log employment	0.145 (32.17)*	0.140 (18.23)*	0.163 (20.76)*	0.002 (1.37)	-0.034 (-5.48)*	0.037 (4.63)*
Log sales/worker	0.064 (8.88)*	0.070 (7.21)*	0.045 (3.50)*	0.053 (10.86)*	0.049 (4.81)*	0.039 (5.27)*
R&D expenditures	0.014 (7.30)*	-0.041 (-10.80)*	0.021 (6.22)*	-0.001 (-0.35)	-0.008 (-1.82)***	0.049 (0.89)
Private share	-0.003 (-0.22)	-0.120 (-2.99)*	0.092 (4.27)*	-0.044 (-4.67)*	0.006 (0.19)	-0.043 (-3.30)*
Loan	0.0004 (4.17)*	-0.002 (-3.53)*	0.0003 (2.89)*	-0.002 (-5.67)*	-0.003 (-3.81)*	-0.001 (-2.37)*
Share in national Markets	0.003 (12.82)*	0.002 (5.91)*	0.004 (11.67)*	0.001 (5.95)*	0.002 (7.43)*	0.0006 (1.85)***
Union	0.052 (3.84)*	0.054 (3.04)*	0.159 (6.06)*	0.132 (17.03)*	0.150 (11.11)*	0.104 (8.05)*
Worker voice	0.055 (9.54)*	0.072 (6.45)*	0.065 (6.72)*	0.034 (9.23)*	0.055 (8.60)*	0.020 (3.49)*
Compensations by						
Piece rates	0.056 (7.15)*	0.039 (3.08)*	0.029 (2.39)*	-0.006 (-1.05)	0.005 (0.59)	-0.007 (-0.72)
Group performance	-0.041 (-5.15)*	0.026 (1.78)	-0.079 (-6.67)*	0.018 (2.84)*	0.045 (4.70)*	0.008 (0.72)
Profits sharing	-0.052 (-7.86)*	0.009 (0.74)	-0.081 (-8.53)*	-0.021 (-3.86)*	-0.041 (-4.57)*	-0.027 (-3.07)*
Welfare benefits	0.008 (3.38)*	-0.024 (-3.17)*	0.015 (4.85)*	0.057 (13.82)*	0.057 (10.66)*	0.090 (8.53)*

Table 6: IV Estimates of the Wage Equations with Firm Observable Characteristics (continued)

	Urban sector			Rural sector		
	1994-2001	1994-1996	1999-2001	1994-2001	1994-1996	1999-2001
Log hours	0.009 (1.68)***	0.023 (2.78)*	-0.010 (-1.03)	0.114 (5.89)*	-0.04 (-1.45)	0.162 (5.31)*
Industry dummies	yes	yes	yes	yes	yes	yes
Year dummies	yes	yes	yes	yes	yes	yes
Constant	7.066 (104.21)*	6.808 (69.25)*	7.362 (59.25)*	7.161 (79.02)*	8.112 (58.21)*	7.110 (50.81)*
Huasman Test:						
T statistic	7.23	0.24	11.85	-10.06	-8.08	-2.01
P value	0.00	0.809	0.00	0.00	0.00	0.00
IV validity test:						
χ^2	0.672	1.608	0.481	0.89	0.616	2.553
P value	0.421	0.204	0.487	0.345	0.432	0.110
F statistic	235.53	74.00	138.34	182.29	59.09	66.26
P value	0.00	0.00	0.00	0.00	0.00	0.00
R ²	0.548	0.473	0.620	0.329	0.303	0.267
Root SME	0.320	0.299	0.316	0.329	0.316	0.329
Observations	7,542	2,664	2,937	13,279	4,618	5,238

Notes: T statistics reported in parentheses are derived from heteroskedasticity-robust standard errors. *, **, *** indicates the level of significance at 1%, 5%, and 10%, respectively.

Table 7: Correlation of Log Wage with Its Components

	1994-2001			1994-1996			1999-2001		
<u>Urban workers</u>									
	Mean	Std. Dev.	Cor.	Mean	Std. Dev.	Cor.	Mean	Std. Dev.	Cor.
Log wage	8.817	0.471	1.000	8.651	0.412	1.00	8.999	0.502	1.00
<u>Individual</u>									
Characteristics	0.657	0.134	0.438	0.633	0.282	0.437	0.676	0.140	0.414
Firm effect	1.420	0.266	0.505	1.521	0.208	0.483	1.439	0.329	0.589
Industry	-0.432	0.140	0.113	-0.345	0.122	0.213	-0.519	0.190	0.183
Ind.& firm	0.987	0.253	0.594	1.176	0.219	0.576	0.920	0.329	0.694
Other effect	7.162	0.130	0.337	6.835	0.043	0.028	7.394	0.052	0.122
Residual	0.000	0.324	0.672	0.000	0.305	0.728	0.000	0.331	0.631
<u>Rural workers</u>									
	Mean	Std. Dev.	Cor.	Mean	Std. Dev.	Cor.	Mean	Std. Dev.	Cor.
Log wage	8.459	0.404	1.000	8.302	0.378	1.00	8.618	0.385	1.00
<u>Individual</u>									
Characteristics	0.507	0.135	0.414	0.429	0.120	0.381	0.515	0.145	0.397
Firm effect	0.435	0.097	0.263	0.297	0.114	0.316	0.483	0.094	0.288
Industry	-0.214	0.070	0.155	0.044	-0.354	0.272	-0.162	0.066	0.173
Ind.& firm	0.221	0.119	0.325	0.116	-0.058	0.432	0.321	0.121	0.320
Other effect	7.731	0.120	0.344	0.123	7.930	0.125	7.783	0.048	0.100
Residual	0.000	0.331	0.810	-0.003	0.00	0.841	0.00	0.330	0.857

Figure 1A: Overall Gini Coefficient (95% Confidence Interval)

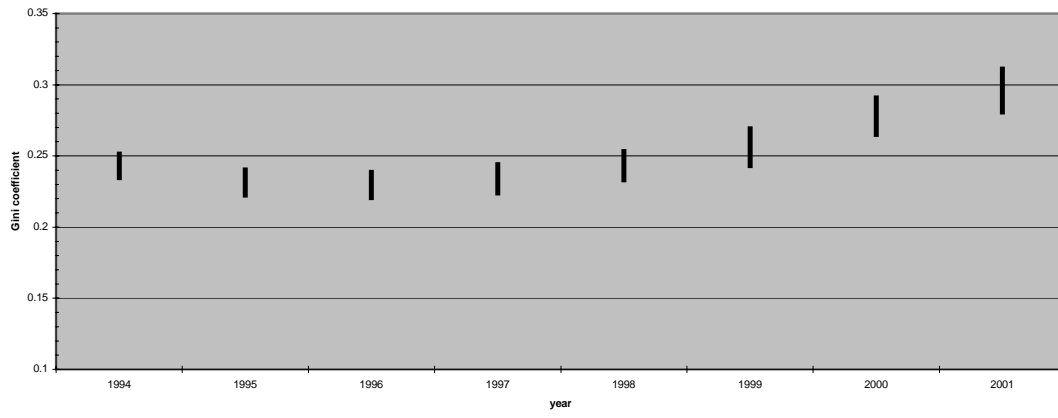


Figure 1B: Urban Gini Coefficient (95% Confidence Interval)

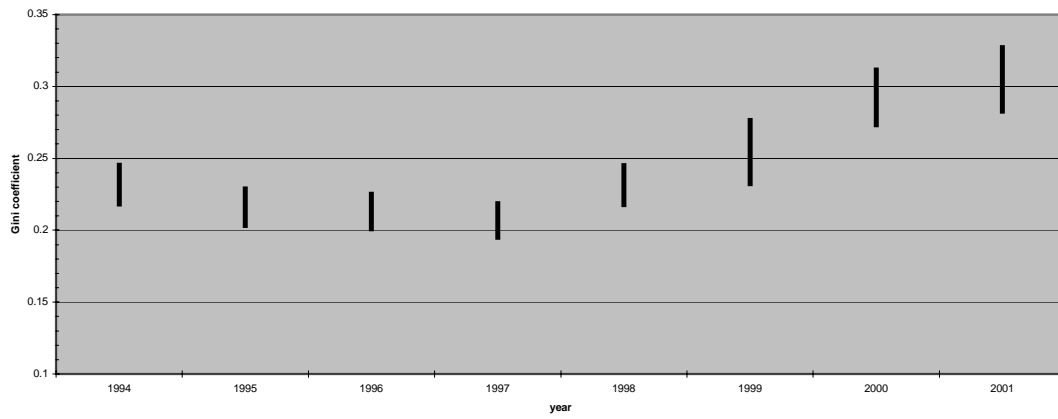


Figure 1C: Rural Gini Coefficient (95% Confidence Interval)

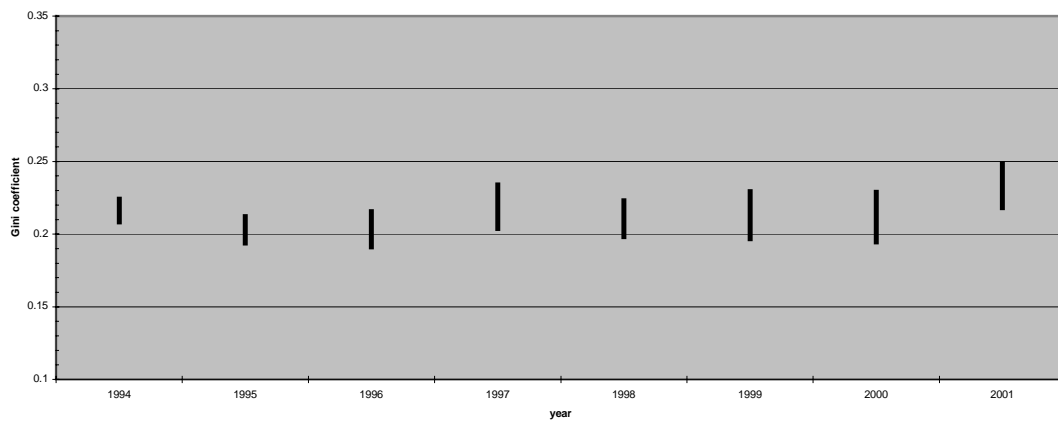


Figure 2A: Fraction of Urban Wage Variation Explained by

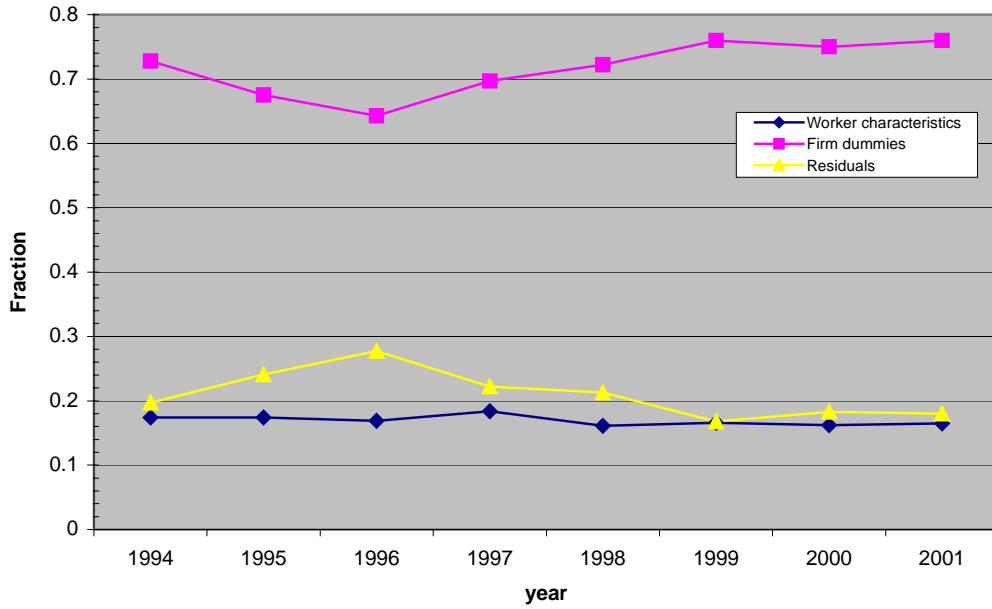
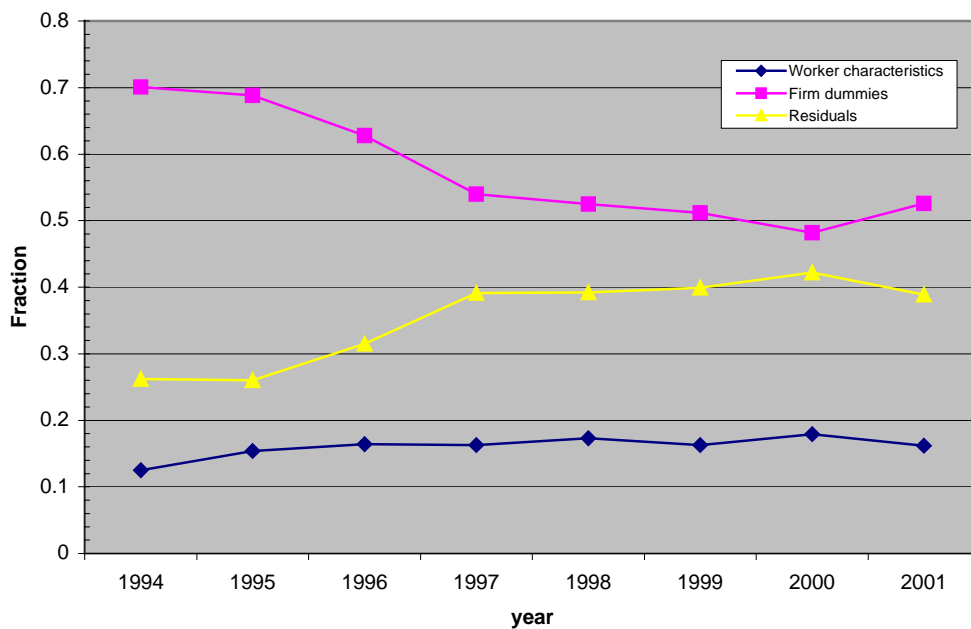


Figure 2B: Fraction of Rural Wage Variation Explained by



Note: Residuals are the wage variation not explained by worker observable characteristics and firm fixed effects.