What Do Unions in China Do?
Provincial-Level Evidence on Wages, Employment, Productivity, and Economic Output

John W. Budd
Carlson School of Management
University of Minnesota
Minneapolis, Minnesota 55455 USA
jbudd@umn.edu

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

Yijiang Wang
Cheung Kong Graduate School of Business
Guangzhou 510623, China
yjwang@ckgsb.edu.cn

Qianyun Xie
Carlson School of Management
University of Minnesota
Minneapolis, Minnesota 55455 USA
xiexx197@umn.edu

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Abstract: Utilizing provincial-level data from the period of 1994-2008, this paper studies the relationship between union density and wages, employment, productivity, and economic output in China. The findings indicate that union density does not affect average wage levels, but is positively associated with aggregate productivity and output. We discuss if and to what extent these findings are consistent with the familiar two faces of unions model and alternative explanations relevant in the context of Chinese labor and union institutions.

Given the importance of labor unions in modern labor markets, many scholars have studied the effects of labor unions on wages, employment, and other important economic variables, such as labor productivity and economic growth. While the findings are extensive and insightful, little is known about these effects in China. This incomplete understanding of what unions do in China is a significant issue because after three decades of fast growth, China has become one of the world's largest economies, and arguably has the world's largest labor movement.

Data availability may be one reason that the large union literature has overlooked China. Another is the view that unions in China are not independent organizations like Western labor unions. With workers' interests officially represented directly by the Communist Party of China (the Party), labor unions in China have traditionally been seen as a "transmission belt" for delivering the Party's voice and policies to workers. While this view is helpful in reminding us that unions in China may be very different from their counterparts in other countries, it remains an empirical task to study their roles in the Chinese economy.

Such studies are particularly important in light of the fact that the economic reforms started in 1978 have dramatically changed the economic landscape of China. For example, in 1978 over 80 percent of China's industrial employment was in state-owned enterprises, but by 2008 nearly 75 percent of industrial employment was in the non-state sector comprised of private and multinational corporations.[1] This rise in market-oriented organizations has the potential for sharpening conflicts of interests between employers and employees, which gives rise to greater roles played by unions. Indeed, along with the dramatic increase in non-state employment, union representation has also grown significantly in non-state enterprises. For instance, in 1981 only 16

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[1] These data are from China Statistics Yearbooks.

percent of China's union members were in the non-state sector.[2] In 2008, 73 percent of China's union members were in the non-state sector; and 57 percent of non-state workers were union members.[3]

Against this backdrop, the purpose of this study is to analyze whether unions in China are associated with cross-provincial variation in economic outcomes. Specifically, we empirically test whether provincial union density is related to provincial-level measures of workers' wages, total employment, labor productivity, and aggregate economic output. The provincial-level data used span 15 years from 1994 through 2008. The study finds that unions have a positive and significant relationship with provincial GDP and productivity in the secondary sector (mining, manufacturing, utilities, and construction), but no significant effect on average wage levels. These findings suggest that unions in China might be similar to unions in other countries in some respects, but not in other ways. We will interpret these findings looking at familiar mechanism such as bargaining power and voice. We will also consider alternative explanations suitable to the Chinese context. Ge (2007) and Lu, Tao, and Wang (2010), and Yao and Zhong (2013) recently also studied union effects on wages and labor productivity in China. All three studies use firm-level survey data, whereas our study uses provincial-level aggregate data and thus provides a macro-perspective on the dynamics between Chinese labor unions and the economy. Notably, Ge (2007), Lu, Tao, and Wang (2010), and our study all find that unions in China are positively associated with labor productivity. As to the union wage effect, we find a positive but insignificant effect of unions on wages, similar to Lu et al. (2010), while Ge (2007) and Yao and Zhong (2013) document a positive and significant effect. Given the emerging nature of this

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[2] The data are from the article "Reform and opening up: trade unions in China continue to forge ahead", 2008. The article is available on the website:
http://acftu.people.com.cn/GB/67580/134642/135082/8600509.html.

[3] These data are from China Trade Union Yearbook (2009).

literature, it is important to continue to add new studies so that we can develop an understanding of the consistencies and inconsistencies in the findings across different data sets, levels of aggregation, and methodologies. We will then be in a better position to understand what unions in China do.

Literature Review

Economists and others have long been very interested in the effects of labor unions on various aspects of economy, and there is a large literature on what unions do within many countries. Arguably the dominant theory that underlies much of this literature is Freeman and Medoff's (1984) two faces of unionism model. In the monopoly face, labor unions use their monopoly power, derived from the threat of imposing costs on the organization through strikes and other means, to increase wages and benefits above what the nonunion labor market would provide. This could (suboptimally) increase productivity if higher wages provide additional motivation or attract higher-quality workers, or could reduce productivity if unions use their monopoly power to extract more favorable working conditions and other form of rents for workers. In the collective voice face, unions convey workers' preferences to managers who are then better able to develop employment conditions that employees prefer, including the additional provision of workplace public goods, without distorting competitive labor market outcomes. Productivity can improve via improved employee satisfaction and also via a direct channel of employee voice that identifies process improvements and resolves problems. The two-faces theory therefore predicts that unions will have significant effects on workers' wages, employment, and productivity, though the welfare evaluation of these effects are different in the two faces.

Theoretically, unions should also affect aggregate economic output if they impact the

performance of individual enterprises. But there is less evidence on the effect of unions on economic growth than on wages, employment, and firm or industry productivity. Pantuosco, Parker, and Stone (2001) examined how unions affect various economic barometers, including unemployment rates and the growth rates of gross product and productivity. They used panel data of 48 U.S. states from 1978 to 1994, and found that unions adversely affected the growth rates of gross state product and productivity. More generally, research has shown that labor market institutions and regulations including unions have a significant effect on aggregate economic performance (Besley and Burgess 2004; Nickell and Layard 1999; Freeman and Nickell 1988). Whether these effects, on net, are positive or negative involves a variety of factors, and there are ongoing debates over the optimal level of unionization in the aggregate (Freeman 2005).

The literature analyzing the effects of labor unions in Western and advanced industrial countries is extensive (for example, Bennett and Kaufman 2007; Blanchflower and Bryson 2010; Cai and Waddoups 2011; Morikawa 2010; Walsworth 2010). In China, however, empirical research on union effects is relatively rare. Using the enterprise data from the First National Economic Census in 2004, Ge (2007) found that unions had a positive effect on the average wage and benefit levels of workers, and on the productivity, research and development and human capital investment of firms. The Census was conducted by the National Bureau of Statistics of China (NBSC) and provided cross-section data on Chinese enterprises. The enterprise sample that Ge (2007) used was collected from the mining, manufacturing, electrical power, gas, and water supply industries.

A study by Lu, Tao and Wang (2010) used corporate data collected by the Private Enterprise Survey in China to study union effects on the performance and employment relations in private enterprises. The Private Enterprise Survey was conducted in 2006, jointly by the

United Front Work Department of the Central Committee of the Communist Party of China, the All China Industry and Commerce Federation, and the China Society of Private Economy at the Chinese Academy of Social Sciences. Using a sample covering nearly 3,250 private enterprises, Lu, Tao and Wang found that unions significantly increased labor productivity, but had an insignificant effect on profitability and wages.

Lastly, Yao and Zhong (2013) also conducted a firm-level cross-sectional analysis of union effects in China. Their data were collected from 1,268 firms that were selected via stratified random sampling of firms with annual sales exceeding 5 million yuan from 12 cities in China in 2006. They found that unionized firms were associated with a significantly higher average wage and a larger fraction of employees covered by a pension. Note, however, that these data are derived from a limited number of medium to large cities and exclude small establishments.

Our study differs from the aforementioned three studies in that our study uses provincial panel data to test union effects while the previous three studies used firm-level data. In terms of the level of the analysis, our paper therefore most closely resembles Pantuosco, Parker, and Stone's (2001) analysis of U.S. states, Besley and Burgess's (2004) analysis of Indian states, and follows the pattern of the early Western literature of using aggregate data in the absence of widespread micro data sources (e.g., Lewis 1963; Brown and Medoff 1978). A major advantage of our provincial-level analysis is that the provincial data are panel data and thus allow us to control for unobserved provincial fixed effects. Our analysis relies on provincial variation in union-related policies and outcomes to identify the effect of unions on wages and productivity. In contrast, previous firm-level studies are all cross-sectional studies that must rely on across rather than within variation because they are limited to a single time period. Our provincial approach

also captures a much broader spectrum of the geography and economy of China than some of the previous studies. The use of provincial data also allows for a fuller capturing of the overall effects of unions if there are externalities, spillovers, or aggregate-level effects that might be under-estimated by firm-level or individual-level data.

However, provincial-level analyses have disadvantages rooted in the greater level of aggregation compared to enterprise- or individual-level studies. We are only able to measure unionization, wages, and other key measures at the provincial level. The provincial-level union coverage rate, therefore, indicates the average level of union density across establishments in a province rather than the density in a specific establishment. The results, therefore, can have multiple interpretations. One, the results might be seen as an average of micro-level direct effects of unionization in a particular enterprise. In the aggregate, this average might be hard to observe if the micro effects are not sufficiently strong which can lead to different results based on a specific methodology. Two, the results might also include externalities or spillovers of a union effect, such as if unionization in a sector draws better workers or other economic resources away from other sectors. Three, the results might be seen as an aggregate level effect in which the aggregate rate of unionization affects economic activity at a macroeconomic rather than microeconomic level, for example through affecting the overall business climate. Or the results might reflect some combination of these mechanisms, which could also include differential effects within industries or other groupings. While our aggregate measurement is arguably better able to capture the overall result of these mechanisms, it unfortunately does not allow us to distinguish among the specific mechanism of how unions affect wages or productivity. Nevertheless, we believe that the literature on Chinese union effects would benefit from multi-level analyses that include aggregate studies to complement the existing

establishment-level research and future individual-level research.

Institutional Background

History and Status of Unions in China

Before 1978, China had a centrally planned economy. Unions existed in all of the state-owned enterprises, wages were set by the government, and workers were guaranteed lifetime employment. According to official ideology, there were no conflicts of interests between an employer and employees. Unions therefore served as a workers' club and were not engaged in collective bargaining. Unions were led by the Communist Party and the leaders of unions were appointed by the Party rather than elected by union members (Ng and Warner 1998).

After 1978, China moved toward "a socialist market economy." Organizations now run the gamut from completely state-owned to private, with various degrees in between. This is because in the state sector, some firms have changed from being completely owned by the state to being jointly-owned by the state and private or foreign companies. If the state holds a majority of shares, the firm is "state-controlled." The State Assets Supervision and Administration Committee (SASAC) estimated that in 2012, the number of state-controlled listed companies had reached 953, accounting for 38.5% of all listed companies in China's two mainland stock exchanges (A-shares).[4]

As organizations and employment relationships become more market-oriented, albeit in complicated, non-uniform ways, unions in China are acquiring new roles. In the most market-oriented cases, it is expected that unions will be most likely to step into some of the roles that their counterparts play in the Western market-economy countries, representing workers in contract bargaining and administration. The uneven nature of increases in market pressures and

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[4] Source: http://www.sasac.gov.cn/n1180/n15066072/n15066091/index.html.

differential local and provincial government responses, however, mean that the transition to these new roles has been uneven, and empirical analyses are needed to test the extent to which Chinese unions have similar impacts on economic activity as in the West. Along with these changing roles, unions have also been expanding their membership since 1978. In 1994, there were 581,000 grass-root union organizations and 114 million union members in China nationwide.[5] In 2010, there were nearly 2 million grass-root unions in 3.7 million companies and organizations across the country and a total of 240 million union members.[6] In fact, China's sole union federation, the All-China Federation of Trade Unions (ACFTU), now proclaims itself as the largest union organization in the world.[7] Therefore, it is important to analyze the effects of unions on the Chinese economy. We can do this at a provincial level because the intensity of unions and the trends in union growth are different across provinces, as will be demonstrated when we turn to the data.

Chinese Union Law

The first Union Law of the People's Republic of China was enacted in 1950 and specifies the rights and obligations of unions. As China's political, economic, and social situation has undergone profound changes since the shift toward a socialist market economy in 1978, unions have been required to confront new roles. A revised Chinese Union Law was therefore enacted on April 3, 1992, and again amended on October 27, 2001.[8] This law and related provincial

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[5] These data are from China Trade Union Yearbooks.

[6] These data are from "Statistical Communiqué of the People's Republic of China on 2008 Developments of Union Organizations and Union Work."

[7] This was announced in the press conference of the 15th National Congress of Chinese Trade Unions, October 17, 2008.

[8] An English version of the law can be found at http://english.gov.cn/laws/2005-10/11/content_75948.htm.

policies on unionization apply to all sectors, including state-owned and private-sector organizations.

According to the Union Law, Chinese unions have the right to represent employees in negotiation and collective bargaining with the employer (Chapter 1, Article 6), and the right to assist and provide guidance to employees in signing labor contracts with an enterprise (Chapter 3, Article 20). If an enterprise violates labor law or a collective contract and infringes upon the rights and interests of the employees, unions can file a dispute against the enterprise or submit an arbitration and mediation request (Chapter 3, Article 20). But there is no provision in the Union Law that specifies the right to strike for unions or workers in China. Chinese unions are formally democratic in that union representatives at all levels must be elected by members (Chapter 2, Article 9).

At a local level, Chinese unions are enterprise unions. Employees in the same enterprise have the option to voluntarily join one designated union for that enterprise. Under the Union Law, all of these unions are affiliated with the ACFTU. Under the ACFTU's umbrella, there are 31 provincial, regional, and municipal federations and 10 national industrial unions. The highest decision-making bodies for Chinese unions are the National Congress and the ACFTU Executive Committee. The National Congress meets every five years.

There are two major funding sources for unions in China: membership dues and mandatory employer payments. For the latter, an employer must make monthly payments to its union amounting to two percent of its total wage bill. Smaller levels of funding are obtained through subsidies from the government. Despite being affiliated with the ACFTU and receiving funds from employers, unions in China are exhibiting signs of increasing independence. For example, unions can request that labor dispute mediation committees be formed within an

organization, and the number of such committees has increased from 165,000 in 2001 to 660,000 in 2011.[9]

The Union Law grants all wage and salary workers the right to organize and join unions (Chapter 1, Article 3) and specifies that a local union committee shall be set up when there are at least 25 union members in an organization (when there are fewer than 25, a local union committee can be also be formed, or it can be combined with another, or an organizer elected) (Chapter 2, Article 10). Once a local union committee is formed, it must report to the ACFTU to get approval and operate under the guidance of the upper-branch union. Within this national framework, individual provinces have different policies pertaining to specific aspects of the formation of and operation of local unions. For example, a majority of provinces require that a firm must form a local branch union within 12 months after the firm starts operation, but the application of these laws is uneven and six provinces do not have such a requirement.[10] There is variation in provincial policies pertaining to electing a union committee and appointing a full-time union official in a company. The extent to which provincial actions support unionization can also vary by whether a provincial union president is in the province's highest-powered organization, the provincial standing committee of the Party. Unlike U.S. labor law, however, the Chinese Union Law is silent as to the specific process through which a local union is formed.

China Union Organizing

Since the ACFTU is the only recognized official union in China, the traditional model of union organizing has been a top-down process in which the ACFTU seeks to establish branch unions in non-unionized firms (Liu 2010). This does not mean, however, that unions are

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[9] http://acftu.people.com.cn/GB/n/2012/1031/c67502-19445931.html
[10] The six provinces are Liaoning, Jilin, Anhui, Guangxi, Yunnan, and Qinghai.

uniformly established without worker support. When an employer is approached solely by the upper-branch union or local government, it often refuses to recognize a union by using the excuse that local workers have no such an interest.[11] In at least some cases, then, worker demand plays an important role in determining whether a new branch union is formed. The ACFTU, therefore, has an interest in demonstrating some effectiveness to the workers.

Nevertheless, this top-down process has received wide criticism because organizing was not seen as being done for the sake of worker interests (Friedman and Lee 2010; Liu 2010). The leadership of ACFTU has also been criticized for being "bureaucratic" and "out of touch" (Zhu, Warner, and Feng 2011). In recent years, as the result of the shift of the Party's focus to creating a "harmonious society", and also because of increasing insurgence among workers, the ACFTU has started being more active in supporting grass-root unions (Liu 2010).

By itself, however, worker demand is often insufficiently strong to drive union organizing. Many workers are migrants from rural areas and their lower or temporary attachment to their urban job means that their interest in joining a union is weaker (Lee 2007). In spite of the rhetoric of the Union Law, some workers are afraid to engage in union activities out of fear of employer retaliation. Therefore, a typical approach to forming a grass-roots union in China involves a combination of worker support and ACFTU upper-branch or local government pressure on the company to recognize the local union. Liu (2010) documented that even in the more independent union organizing drives, union officials go to local government officials for support. Some local governments support workers in wage negotiation with the employer and help workers successfully raise wages and benefits (Liu 2010). But some local governments lend

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[11] For example, when Walmart China was approached by the ACFTU Beijing office, it refused the union organization effort with the excuse of "workers do not have such an interest." *Beijing Wanbao*, 2004/10/24, available at
http://finance.sina.com.cn/money/x/20041124/18301178422.shtml

little support to workers. Amid economic downturns, worries over losing investment have caused some provincial officials to overlook legal violations or delay the investigations against them whereas other political dynamics can cause officials to support workers.

Consequently, unions are formed in China in various ways and for diverse reasons that result in differences in union density across provinces and within provinces across time. The reasons for workers to support a union in China might not be as strong as when unions are independent, but there are cases when Chinese unions can deliver some gains to workers. What Chinese unions do in practice, then, is an empirical question. We address this empirical question by analyzing provincial variation in union density.

Implications

To highlight the implications of the institutional context of Chinese unions for our study, it is useful to briefly recap a few significant differences between unions in China and those in Western countries. First, while unions have various organizational structures in Western countries, the Chinese labor movement is legally mandated to have a single hierarchical structure. All unions are affiliated with the ACFTU and there is no competition between unions. Second, Chinese unions are not as independent as their Western counterparts. Chinese unions are led by the Chinese Communist Party, and partly funded by the company and the government. Third, the Chinese Union Law does not provide for a right to strike or protect workers from discrimination or retaliation by their employer if they go on strike.

These institutional differences lead to three implications for the union effects on wages, employment, labor productivity and economic growth in China. First, Chinese unions may not significantly increase wages because they are not independent from the enterprises and governments and because they lack the right to strike. Furthermore, the period covered by this

study is one of huge surplus labor supply in China, with millions of workers migrating from the primary to the secondary and tertiary industries.[12] And until the Labor Contract Law became effective on January 1, 2008, employers in China were largely free to lay off workers any time. These labor market and legal factors likely further undermine union bargaining power. Second, Chinese unions may help increase labor productivity. While lacking strong power for collective bargaining, weaker forms of unions' collective voice are firmly cemented in the enterprise. These voice mechanisms might increase productivity. Alternatively, unions may increase productivity by acting as agents of the enterprise and government, for example, by maintaining labor discipline or agreeing to productivity-enhancing work rules. Third, if Chinese unions do not raise wages but increase productivity, then they may be associated with higher levels of employment and economic growth. Alternatively, if unions increase productivity as agents of the enterprise or government in ways that require workers to work harder or if unions are complicit in layoffs, then unions might be associated with reduced employment levels.

Data and Variables

The data used in this study are primarily compiled from *China Statistics Yearbooks*, *China Labor Statistical Yearbooks*, *Provincial Statistics Yearbooks*, and *China Trade Union Yearbooks* from 1994 to 2008. The first three of these yearbooks are published annually by the National Statistical Bureau of China and report economic statistics based upon official surveys and data collection efforts. The *China Trade Union Yearbook* is published by the ACFTU based on a complete survey of local unions. All local unions need to respond to the survey and report

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[12] In China, economic activities are categorized into the following three general industries: primary industry refers to agriculture, forestry, animal husbandry and fishery and services in support of these industries; secondary industry includes mining and quarrying, manufacturing, production and supply of electricity, water and gas, and construction; tertiary industry refers to all other economic activities not included in the primary or secondary industries, mainly the service sector.

their data regarding their activities and membership. These survey responses are then aggregated by the ACFTU and published in the *China Trade Union Yearbook*. Compared to the survey data collected by researchers independently, the data collected by the ACFTU have the advantage of being based on all local unions, and thus providing a more complete picture of unionization in China. On the other hand, these data may be biased if local unions over-report their achievement in organizing workers and protecting their interests in order to please the higher-level authorities in the ACFTU.[13]

We chose to start with 1994 because provincial unionization statistics have been reported only since 1994. Thus, our data consist of a 15-year panel of the 29 provinces of China during this period, excepting Tibet because complete data are not available. Technically, three of these provinces are municipal cities directly under the central government (Beijing, Tianjin, and Shanghai), but for convenience we will refer to them as "provinces" in the text.[14] Table 1 provides the definition and summary statistics of the variables used in the study.

We start with the information from the *China Trade Union Yearbooks* on the number of "employees in the unionized workplace" and the number of "union members in the unionized workplace" reported annually by province. The former measures union coverage while the latter measures union membership. We then use annual data on the total number of employees by province reported in *China Labor Statistical Yearbooks* to construct each province's annual union coverage and membership density. Specifically, the union coverage (membership) density is the

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[13] Less aggregate data sources might also include similar biases. For example, Yao and Zhong's (2013) organizational-level data set was collected by surveying managers about their organization's corporate social responsibility practices and managers might want their organizations to look good by overstating how well they treat their workers.

[14] In 1997 Chongqing became the fourth municipal city directly under the central government, but because separate data for Chongqing are not available prior to this time, we continue to treat Chongqing and Sichuan as one province by combining the reported figures.

fraction of employees (union members) in unionized workplaces relative to all the employees in a province.

Between 1994 and 2008 the provincial coverage density ranges from 0.078 to 0.844, with an overall mean of 0.253. In each province, nearly 90 percent of employees in the unionized workplaces are union members, and the average membership density across all provinces is 0.237 with a range from 0.072 to 0.782. In micro-level analyses, the distinction between union coverage and union membership can be significant (Andrews et al. 1998; Budd and Na 2000), but in our provincial-level data, the correlation between these two measures of union density is 0.99. Since the regression results are the same using either measure, we will present and discuss the results using the union coverage density measure. This is the primary independent variable of interest.

For dependent variables, we need measures of wages, employment, productivity, and aggregate economic output. We obtain data on the provincial average wage and the number of employees in each province from *China Labor Statistical Yearbooks*, and convert each to logarithms for analysis. Annual data on provincial gross domestic product (GDP) and population are obtained from *China Statistics Yearbooks*, and GDP is then converted to a per capita measure using the population series, and then converted to a logarithmic scale. As a measure of productivity, we use data on "output value added in the secondary industry" drawn from the MacroChina database. This measure is only available for the secondary industry (mining, manufacturing, utilities, and construction), and we convert it to a logarithmic per employee scale.

We also use these same sources to construct additional control variables. The percentage of workers employed in the private sector is obtained by using series on the number of persons employed in the private sector and total employment from *China Labor Statistical Yearbooks*.

Fixed assets investment and government expenditure are obtained from *China Statistics Yearbooks* and converted to logarithmic per capita scales. The provincial population series from *China Statistics Yearbooks* is also converted to a logarithmic scale and used as another control variable. Finally, we use year and province fixed effects to control for time-specific and province-specific factors, including differences in the real price level over time and across provinces.

<div align="center">**Union Density Trends**</div>

The solid line in Figure 1 shows that in the aggregate, union density in China generally increased between 1994 and 2008 from around 19 percent to 31 percent. But from 1994 to 1999, union density in many provinces decreased. The main cause for the decline in union density during this period was seemingly the reform and restructuring of state-owned enterprises. State-owned enterprises have a stronger union presence than private companies. Since 1992, as the reform of state-owned enterprises deepened, the number of employees in state-owned companies decreased, so did union members. Since 1998, to reverse the declining trend of union membership, the ACFTU has taken great effort to expand unions in private companies, especially after the ACFTU's National Congress in 2003.[15] Figure 1 confirms the increasing union density from 1999 to 2002 and again from 2003 to 2005 in the aggregate.

Despite the overall increase in union density in China, there exists a large variation across the country. The three areas which have the highest union densities are Beijing, Tianjin and Shanghai. Liaoning, Jilin and Heilongjiang also had a relatively high union density; while Sichuan, Guizhou and Yunnan had the lowest union density among all provinces. For instance, in

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[15] This is from the article "*Reform and opening up: trade unions in China continue to forge ahead*", 2008. The article is available on the website:
http://acftu.people.com.cn/GB/67580/134642/135082/8600509.html.

2005, Shanghai had the highest union density (68.1 percent), while Yunnan had the lowest (10.3 percent). This is important because the analyses in this paper rely on variation in union density.

But even more important is variation within these provinces between 1994 and 2008. Unique within-province variation in unionization can result from distinct trends in organizational ownership. When a province has more newly-established companies and more private, foreign, or joint-venture companies, the unionization rate can change because these organizations are often not unionized and are more likely to prevent unions from being formed. Changes in the relative fraction of migrant workers—who may be less receptive to unionization—as well as differential changes in their attitudes towards unions can also cause within-province variation as can provincial-level policies and local government attitudes towards unionization that vary over time.

Figure 1 therefore also shows the provincial union density for four of the 29 provinces. Guandong is a southern province that is home to much of China's contract manufacturing operations, and therefore has the highest GDP per capita of the provinces. It is also the largest province in terms of population. Xinjiang is a province in the far western region of China. It is the largest in terms of area, but is one of the smallest in terms of population. Liaoning is an average-sized northeastern province with above average levels of GDP, and Yunnan is an average-sized southwestern province with one of the lowest levels of GDP.

These provinces were selected for inclusion in Figure 1 to reveal the differences in provincial union density trends. Three key results emerge. First, note the significant variation in provincial union density across these selected provinces. Union density in Liaoning and Xinjiang is consistently above the national average whereas Yunnan is always below average. Moreover, density in Liaoning is consistently 4-5 times greater than in Yunnan. Second, the trends in union

density are not uniform across provinces. Union density in Liaoning is variable over time, union density in Guandong has a positive trend, and union density in Xinjiang has a negative trend for much of the time period covered.

Third, there is significant within-province variation in at least some of the provinces. In Liaoning, union density begins at a level higher than 50 percent in 1994, declines to less than 36 percent in 1999, increases to 48 percent in 2002, and then dips slightly before trending upwards to 56 percent. In Guandong, union density decreases between 1994 and 1997, and then trends upwards for much of the rest of the time period, but not uniformly. It is this type of variation that we will exploit in multivariate analyses of the relationship between provincial union density and wages, employment, productivity, and economic output.

Method and Results

Regression Model

We estimate the following panel data regression:[16]

$$y_{it} = \alpha_i + \beta_t + \gamma Union_{it-1} + \delta x_{it} + \varepsilon_{it} \ .$$

In the model, y_{it} is the dependent variable in province *i* in year *t*, and we use four different dependent variables: the logarithm of average wage, the logarithm of employment, the logarithm of value added per employees in the secondary industry, and the logarithm of GDP per capita. $Union_{it-1}$ is the one-year lagged union density rate, measured by the fraction of all employees in province *i* in year *t-1* who are in unionized workplaces. Using a two-year lagged value instead of one-year lag for union density in the estimation does not change the results.

x_{it} are control variables in province *i* in year *t*, including the logarithm of provincial

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[16] We use a fixed effects rather than first difference model of panel data to estimate because there is not a strong correlation across years and the number of years (15) is less than the number of provinces (29).

population, the logarithm of fixed assets investment per capita, the logarithm of government expenditure per capita and the percentage of workers employed in the private sector in a province. α_i is the province fixed effect, which captures other unexplained province-specific factors. β_t is the year fixed effect, which captures year-specific effects. Robust standard errors are calculated and reported for all of the models.

Regression Results

We use the empirical model introduced above to estimate the association between union density and wages, employment, productivity, and economic output. Column 1 of Table 2 reports the results for this regression specification using the (log) average provincial wage as the dependent variable. There is not sufficient evidence to conclude that union density has a significant correlation with average wage levels. While this result differs from estimates of the wage effects of Western unions and Yao and Zhong (2013), it is consistent with the weak bargaining power of Chinese unions and with the empirical results of Lu, Tao and Wang's (2010) analysis of firm-level Chinese data. Our results might differ from Yao and Zhong's (2013) because their data is limited to medium to large enterprises in 12 medium to large cities for one specific year.

The results reported in the column 2 of Table 3 reveal a significantly negative relationship between union coverage and provincial employment. Indeed, the point estimate indicates that a one standard deviation increase in union density (0.14) is associated with a 3.6 percent decrease in employment. This might reflect some mechanism in which unions dampen employment growth, either through their own activities or because entrepreneurs and investors direct their job creation efforts toward provinces where unions are less frequent or toward a more capital-intensive technology where unions are more frequent. For example, Western foreign

direct investment might seek to avoid unions based on conceptions of Western unions with significant bargaining power. Alternatively, one might be tempted to speculate that this result reflects a situation of reverse causality in which unions are more successful in smaller provinces. But note that the regression controls for population size, so the result more precisely indicates that holding population size constant, provinces with higher union densities have lower employment levels. This would be consistent with a scenario in which unions are more successful when a smaller fraction of the population is engaged in formal employment. A third alternative is measurement error because the union density independent variable is constructed with provincial employment in the denominator. This would require persistent measurement error across years because the regression models include lagged rather than contemporaneous union density. We will return to these issues below when we discuss the instrumental variable results.

Column 3 of Table 2 reports the regression results for the measure of productivity we were able to construct—specifically, log value added per employee in the secondary sector. Recall that the secondary sector includes mining and quarrying, manufacturing, production and supply of electricity, water and gas, and construction. The estimated coefficient for the union density variable is positive and precisely estimated suggesting that Chinese unions are positively associated with productivity levels. To put the estimate into context, a one standard deviation increase in union density (0.14) is associated with ten percent increase in productivity. This is consistent with three alternatives. It might reflect a situation in which Chinese unions have weak monopoly power, but a stronger collective voice role. Alternatively, this result is also consistent with unions increasing productivity as agents of the enterprise and government rather than as collective voice agents of the workers. Or, this result could stem from reverse causality in which

Chinese unions are more successful in establishing branches when a province is above its productivity trend. This suggests a need for an instrumental variables approach which will be pursued later in this paper.

Table 3 reports the results for (log) GDP per capita as the dependent variable. As shown in column 1, union density has a significant and positive association with overall economic output (GDP per capita). The estimate in column 1 implies that a one percentage point increase in union density is associated with 0.43 percent higher GDP per capita, or a one standard deviation increase in union density (0.14) is associated with a six percent increase in GDP per capita. If one interprets this literally, it implies that a greater presence of labor unions in a province increases economic output on a per capita basis. But such a strong conclusion is not warranted at this time because there are other possible explanations for the estimated statistical result. There might be an omitted variables problem, though recall that the model controls for other variables as well as year and province effects. Additionally, the result might stem from a simultaneity issue or from reverse causation, which is why we estimate an instrumental variables model in the next subsection. In the meantime, even though the precise mechanisms are unknown, the positive association between union density and GDP per capita, even after controlling for other factors, is a useful result in indicating an area for additional inquiry.

By themselves, these results might imply that unions have a positive effect on aggregate economic activity in Chinese provinces. To explain these results, one could first recall the two faces of unions and note that they are consistent with the weak monopoly power of Chinese unions not curtailing economic activity (recall the lack of a significant wage effect in Table 2), and with a collective voice face promoting economic activity (recall the positive productivity estimate in Table 2).

The positive productivity effect of Chinese unions, however might be the result of an alternative scenario in unions as serving as agents of the employers and government in delivering greater productivity. For example, unions might enforce labor discipline or help employers downsize by laying off less productive workers. Without specific case studies, it is difficult to disentangle the underlying mechanisms at work. Indeed, the period covered by this study was marked by drastically increased numbers of labor strikes and disputes. For example, as noted earlier, the number of local arbitration and mediation committees formed to handle labor disputes increased from 165,000 in 2001 to 660,000 in 2011. This heightened level of dispute activity could indicate a stronger voice of unions over time and a weakening of unions' roles as agents of employers, or this trend could reflect worker frustration not only with employers but also with their unions. We believe our results are therefore valuable in highlighting the need for future studies to obtain more credible conclusions on these competing explanations.

Finally, our empirical results might also reflect a reverse causality situation in which unions are more successful when a province is doing well. For example, provinces with higher GDP per capita likely have smaller agriculture, forestry, animal husbandry, and fishery sectors, and these are sectors with little union presence. If the ACFTU concentrates its organizing efforts in manufacturing which also has a higher GDP, then the positive estimate in Table 3 is more suggestive of a reverse causality relationship in which unions are more frequently found when a province has a higher level of industrial activity than its average. This further suggests a need for an instrumental variables estimation strategy.

Instrumental Variables Results

As noted in our discussion of the results from Tables 2 and 3, it is difficult to make causal inferences from the OLS regressions. For example, unionization might be endogenous such that

the dependent variables are causing shifts in union density rather than vice versa. For the various reasons described in the previous section, then, the OLS results might be biased toward finding a statistically significant effect of unions. To explore this further, we pursued an instrumental variables estimation strategy. This requires finding instruments that are correlated with provincial unionization variation, but not the dependent variables.

For this, we identified three potential types of instruments.[17] First, if there are shared attitudinal characteristics towards labor unions within a certain geographical area, then a province's unionization rate might be correlated with the density rates in neighboring provinces, but not a direct predictor of economic outcomes in that province. So neighboring provincial union density might be a valid instrument for a province's union density. Second, provincial laws pertaining to union organizing might be correlated with union density, but not economic outcomes. Such laws include requiring organizations to set up unions within 12 months of the organization starting up, to set up a union committee when there are more than 25 union members in the organization, or to have full-time union officials when there are at least 250 workers. So indicators for these types of polices constitute a second category of potential instruments for a province's union density. Third, whether a provincial union president is in the provincial standing committee of the Party could indicate attitudes toward unions, and thus be correlated with union density, without affecting economic outcomes. So an indicator for the inclusion of a provincial union president in the provincial standing committee is a third possible instrument for a province's union density.

With five potential instruments (neighboring union density, three policy variables, and a

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[17] We also estimated instrumental variables models using the Arellano-Bond estimator that relies on lagged values, but in most cases the Sargan test of overidentifying restrictions had very small p-values casting doubt on the validity of the instruments.

union official on the standing committee indicator), there are numerous combinations. We estimated models with many combinations, and we present the results using the average union density rate in neighboring provinces and an indicator for whether the province has a policy requiring organizations to set up unions within 12 months as instruments for union density. The pattern of results for other combinations of the instruments outlined above is generally similar to those presented here. Table 4 reports the first-stage results in which provincial union density is regressed on the instruments and other control variables. The two instruments are individually and jointly significant at conventional levels of significance which indicate that they are correlated with provincial union density as required for valid instruments.

Tables 5 and 6 report the key results of the instrumental variables estimation. Note that these tables only report the coefficient and robust standard error for the main independent variable of interest (union density), but each regression model includes the same control variables as in Tables 2 and 3. Tables 5 and 6 also report the p-values of a Hausman endogeneity test and an overidentification test. A small p-value for the endogeneity test is consistent with union density being endogenous, and thus the need for an instrumental variables approach. A large p-value for the overidentification test supports the validity of the instruments.

As shown in column 1 of Table 5, the large p-value for the endogeneity test for the wage model indicates that there is not enough evidence to conclude that unionization is endogenous with respect to wages. And even setting this aside, the insignificant coefficient repeats the insignificant result from the OLS estimation in Table 2. This is consistently the case when we try other combinations of possible instruments (neighboring union density, three policy variables, and a union official on the standing committee indicator) in the wage model. With respect to employment levels (column 2), the OLS results suggested a significant negative relationship with

union density. The results in Table 5 cast doubt on this negative relationship, but we should emphasize that the results for the employment model are very sensitive to the combination of instruments used. So endogeneity is seemingly more of a concern for the relationship between employment and union density, but a lack of robust results leaves us unable to draw stronger conclusions. With respect to productivity, the results in column 3 of Table 5 indicate that endogeneity is not a concern. Moreover, the estimate is similar in magnitude to the OLS coefficient, albeit with a much larger standard error which can be common when using instruments.

Turning to the economic output result in Table 6, the results for per capita GDP indicate that endogeneity is a concern and that we have valid instruments. The estimated union density coefficient is positive and statistically significant, as in the OLS case. Other combinations of our instruments also yield a positive, statistically significant estimate for union density. This result implies that the positive relationship between union density and per capita GDP is not best explained by reverse causality or simultaneity. This highlights the need for additional research to more carefully analyze the roles of Chinese labor unions in affecting provincial economic outcomes.

Summary and Conclusion

This paper analyzes the important question of the relationship between unionization and important economic outcomes—average wage levels, employment, productivity, and economic output—using panel data from 29 Chinese provinces between 1994 and 2008. Using both OLS and instrumental variable regression models, we do not find a significant union effect on wages. This is consistent with the institutional reality of Chinese labor unions—unlike Western unions, unions in China are not as independent and cannot organize labor strikes as easily as their

counterparts in western market economies. During the time period studied, Chinese labor unions also faced unfavorable labor market conditions, especially large amounts of surplus labor supply, and weak legal job security protections. A lack of power to negotiate wage contracts different from what the market or managers impose in other Chinese enterprises is therefore the leading explanation of our finding of the lack of a positive and significant union effect on wages. Compared to the two enterprise-level studies, this result is consistent with Lu, Tao and Wang's (2010) failure to uncover a significant relationship between unions and wages, though it conflicts with Yao and Zhong's (2013) finding that Chinese unions raise wages. These differences might reflect different sampling frames, measurement, data accuracy and measurement error, and levels of aggregation. In particular, the data analyzed by Yao and Zhong (2013) are drawn from a limited number of medium to large cities, exclude small establishments, are limited to a single year, and might overstate how well an organization treats its workers because the focus of the survey was corporate social responsibility practices.

With respect to productivity and output, our results indicate a positive relationship between productivity or aggregate economic output and union density. Specifically, provinces with higher levels of union density, on average, are also provinces with higher levels of productivity and aggregate economic output. While finding good instruments is commonly difficult, the instrumental variable results generally stay the same, or the union coefficient gets larger. So these results seem to reinforce a positive relationship. The employment results, however, are more sensitive to the regression specification, and endogeneity seems to be a significant concern.

So in conclusion, by analyzing 15 years of provincial-level data, we have obtained the following results: a) Chinese unions do not appear to be associated with higher wages, b) unions

do appear to be associated with higher GDP and productivity, and c) the relationship between unions and provincial employment is complex and needs further study. The results are consistent with a weak monopoly face and strong collective voice face of Chinese labor unions. However, under the unique institutional conditions of China, these results are also consistent with an alternative explanation in which Chinese labor unions act as agents of the enterprise and the state in delivering productivity enhancements at the expense of, rather than through the cooperation of, workers. As such, our findings cannot indicate who actually benefits from a positive productivity effect of Chinese labor unions. These are important questions for future research.

Given the limited empirical analyses of Chinese unions and the lack of consistency among the few studies that have been undertaken, we believe these results using provincial-level data are important, but future research efforts should use microdata and case studies to better uncover the specific mechanisms that underlie the relationship between unions and wages, employment, and productivity in China. This could include comparative research that analyzes different types of organizations including state-owned enterprises, private enterprises, and foreign-owned enterprises in China. Future research should also explore the union effects on workers' non-wage benefits in China. There is still much to be learned about the roles of labor unions in determining individual and macroeconomic outcomes in China using a variety of data sources and methodologies.

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Table 1: Variable Definition and Summary Statistics

Variable	Definition	Mean (Std Dev)	Min./ Max.
Union coverage density	The fraction of employees in a province who are in unionized workplaces, 1994-2008	0.253 (0.140)	0.078 0.844
Union membership density	The fraction of employees in a province who are union members, 1994-2008	0.237 (0.136)	0.072 0.782
Log wage	The logarithm of the average wage of workers in a province, 1994-2008	9.277 (0.605)	8.124 10.943
Log employment	The logarithm of the number of employees in a province (in 10,000s), 1994-2008	7.408 (0.869)	5.407 8.812
Log value added per employee	The logarithm of value added per employee in the secondary industry in a province, 1994-2008	8.945 (0.845)	6.973 11.238
Log GDP per capita	The logarithm of GDP per capita in a province, 1994-2008	9.078 (0.737)	7.318 11.192
Log population	The logarithm of the number of population in a province, 1994-2008	8.107 (0.813)	6.161 9.380
Log fixed assets investment per capita	The logarithm of fixed assets investment per capita in a province, 1994-2008	8.163 (0.921)	5.801 10.269
Log government expenditure per capita	The logarithm of government expenditure per capita in a province, 1994-2008	7.028 (0.873)	5.054 9.528
Private sector employment share	The percentage of workers employed in the private sector in a province, 1994-2008	0.063 (0.080)	0.003 0.572

Table 1 (continued)

Average union density rate in neighboring provinces	Average union density rate in the provinces that share a border with the observation's province (lagged one year)	0.247 (0.091)	0.082 0.511
Provincial policy requiring unions within 12 months	1 if the province has a policy requiring organizations to set up unions within 12 months (lagged one year)	0.507 (0.501)	0 1

Source: See text.

Table 2: Unionization, Wages, Employment, and Productivity in China, 1994-2008

	Dependent Variable		
	Log wage (1)	Log employment (2)	Log value added per employee (secondary industry) (3)
Union coverage density (lagged one year)	0.068 (0.085)	-0.259*** (0.078)	0.727*** (0.171)
Log population	-0.063 (0.149)	0.838*** (0.118)	0.272 (0.234)
Log fixed assets investment per capita	0.030 (0.019)	-0.010 (0.010)	0.177*** (0.042)
Log government expenditure per capita	0.321*** (0.053)	0.043 (0.028)	0.374*** (0.070)
Private sector employment share	0.477*** (0.088)	0.100 (0.112)	-0.580*** (0.156)
Province fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Adjusted R^2	0.97	0.95	0.97
Observations	406	406	406

Source: See text.

Notes: Each entry contains the coefficient and robust standard error in parentheses from an ordinary least squares regression model.

* Statistically significant at the 0.10 level, ** at the 0.05 level, *** at the 0.01 level (two-tailed tests).

Table 3: Unionization and Output in China, 1994-2008

	Dependent Variable
	Log GDP per capita (1)
Union coverage density (lagged one year)	0.426*** (0.101)
Log population	0.434*** (0.142)
Log fixed assets investment per capita	0.114*** (0.038)
Log government expenditure per capita	0.311*** (0.045)
Private sector employment share	0.134 (0.116)
Province fixed effects	Yes
Year fixed effects	Yes
Adjusted R^2	0.97
Observations	406

Source: See text.

Notes: Each entry contains the coefficient and robust standard error in parentheses from an ordinary least squares regression model.

* Statistically significant at the 0.10 level, ** at the 0.05 level, *** at the 0.01 level (two-tailed tests).

Table 4: First Stage Estimates of the Instrumental Variables Model

	Dependent Variable: Union Coverage Density (lagged one year)
Average union density rate in neighboring provinces (lagged one year)	0.256** (0.100)
Provincial policy requiring unions within 12 months (lagged one year)	0.022*** (0.007)
Log population	0.0001 (0.105)
Log fixed assets investment per capita	0.032*** (0.012)
Log government expenditure per capita	-0.026 (0.026)
Private sector employment share	0.150* (0.087)
F-test of excluded instruments $F(2, 358)$	8.61
p-value for F-test of excluded instruments	0.0002
Adjusted R^2	0.93
Observations	406

Notes: Each entry contains the coefficient and robust standard error in parentheses.
    * Statistically significant at the 0.10 level, ** at the 0.05 level, *** at the 0.01 level (two-tailed tests).

Table 5: Unionization, Wages, Employment, and Productivity in China—Instrumental Variables Results

	Dependent Variable		
	Log wage (1)	Log employment (2)	Log value added per employee (secondary industry) (3)
Union coverage density (lagged one year)	-0.038 (0.333)	0.223 (0.320)	0.672 (0.578)
Controls from Table 2	Yes	Yes	Yes
Endogeneity test p-value	0.777	0.117	0.929
Overidentification test p-value	0.768	0.059	0.305
Adjusted R^2	0.99	0.99	0.98
Observations	406	406	406

Source: See text.

Notes: The first row contains the coefficient and robust standard error in parentheses from instrumental variables regressions in which (a) the average union density rate in neighboring provinces and (b) an indicator for whether the province has a policy requiring organizations to set up unions within 12 months are used as instruments for union density. * Statistically significant at the 0.10 level, ** at the 0.05 level, *** at the 0.01 level (two-tailed tests).

Table 6: Unionization and Output in China—Instrumental Variables Results

	Dependent Variable
	Log GDP per capita (1)
Union coverage density (lagged one year)	1.256*** (0.406)
Controls from Table 2	Yes
Endogeneity test p-value	0.024
Overidentification test p-value	0.884
Adjusted R^2	0.99
Observations	406

Source: See text.

Notes: The first row contains the coefficient and robust standard error in parentheses from instrumental variables regressions in which (a) the average union density rate in neighboring provinces and (b) an indicator for whether the province has a policy requiring organizations to set up unions within 12 months are used as instruments for union density.

* Statistically significant at the 0.10 level, ** at the 0.05 level, *** at the 0.01 level (two-tailed tests).
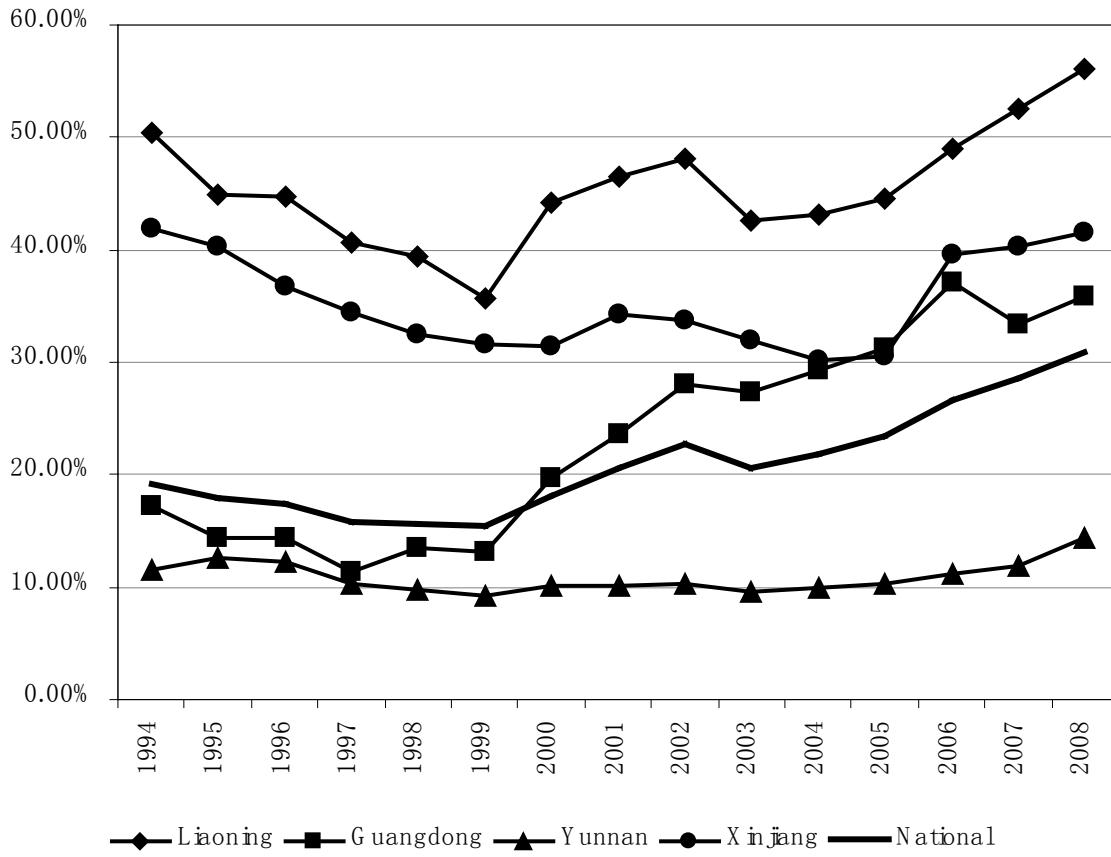
Figure 1: Chinese Union Density, 1994-2008: Aggregate and Selected Provinces