Meat or Poison? Minimum Wages for Chinese Firms and Workers

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Abstract: *This paper studies the effects of increases in minimum wages on labor share of income by exploiting the 2004 minimum-wage reform in China. It uses firm-level data from Annual Survey of Industrial Firms (ASIF) and adopts the contiguous-city-pair approach to deal with the endogeneity issue. First, it confirms that for those firms which are more exposed to minimum wages, rising minimum wages result in higher average wages and lower employment. Second, it finds that rising minimum wages reduce firms' markups in the output markets under the combined influence of firm exit and total factor productivity, while reducing firms' markdowns in the input markets, and thus raising the relative factor share of labor. In addition, such short-term effects of minimum-wage policies continue into the medium term, with some moderate decline in magnitude. Finally, it conducts heterogeneous analysis based on firms' ownership types, finding significant differences between state-owned enterprises (SOEs) and the others (i.e., domestic private firms and foreign firms). The paper suggests that minimum wages are generally effective in alleviating labor exploitation through both direct and indirect channels.*

Key Words: Minimum Wage, Labor Market, Monopsony, Oligopsony
JEL Classification: J3; J42; J2

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I. Introduction

The exploitation of labor by corporations has been a topic of heated discussion throughout China's path of fast development over the past few decades. Despite the massive growth in aggregate wealth, gains for the labor force do not appear to grow proportionally, as seen by Chinese employees' persistently low earnings. In 2004, the average monthly income for a manufacturing worker in China was 141 dollars, which is less than half the wage earned by a comparable worker in Mexico and is just 5.6% of the wage earned by similar workers in the United States (U.S.) (Mayneris et al., 2018). Several elements of China's labor market, including limited labor mobility due to Hukou policy and low-skilled manufacturing employees, may contribute to explain this occurrence. These factors render the labor supply particularly inelastic, resulting in greater power of employers to impose stringent conditions on workers and a greater share of the benefits from increased profitability without compensating workers fairly. (Brezezinska et al., 2022, Brooks et al., 2021a).

Concern and desire for a more equitable distribution have increased throughout time, and the minimum wage legislation has been suggested as one of the most effective legislative measures for preventing such worker exploitation. With national minimum-wage legislation beginning in the 1990s, the adjustment frequency, growth rate, and enforcement of minimum standards in China have improved dramatically, particularly since a comprehensive minimum-wage reform in 2004. (Fan et al., 2018). These policy shifts prompted researchers to study the mechanism by which the minimum wage influences firms' responses in employment, wage payment, firms' labour to capital substitution, decisions on import and export, and TFP (Hau et al., 2020; Fan et al., 2018; Gan et al., 2016). However, the currently existing literature still has not expounded on the role of minimum wage on the exercise of firms' monopsony power against labour for the level of wages and labour's share, even though these are the primary purpose of minimum wage regulation.

This research aims at exploring formally the effect of minimum wage regulation on labor share in China. Investigating the minimum wage policy in the context of China is particularly rewarding for two reasons: first, there are rich regional variations in the level and growth rate of minimum wage standards, allowing for statistically significant results; and second, understanding the market responses to active labor market regulation in China could provide insights for transition economies. To address the research question, we utilize extensive firm-level data from Annual Survey of Industrial Firms (ASIF) from 1998 to 2007. Comprehensive minimum-wage reform in 2004 is an essential minimum wage policy implementation; before to 2004, the minimum wage increased at a moderate pace and was only partially enforceable, and a high proportion of businesses do not comply with local minimum wage. With the reform, the minimum wage rose faster with dramatic increase in firms that comply with minimum wage (Mayneris 2018). Nonetheless, the level of minimum wage and the severity of government surveillance varied by region, and each province governor still had a jurisdiction to carefully target minimum wage in the consideration of the local economy. This policy environment motivates to employ the empirical strategy that exploits the 2004 reform of minimum wages (Mayneris 2018), and deals with the potential endogenous minimum wage setting by adopting the contiguous-city-pair approach, conducting within-pair comparison of cities that share a border but belong to two different provinces (Fan 2018).

Theoretically, the influence of legislative minimums on labor share is uncertain. On the one hand, the increased labor cost may discourage employment as firms substituting labor input with other production inputs, or some firms may entirely exit market due to increase variable costs. Increased firm exit may reinforce surviving firms' market power, which then allows them to enjoy a greater labor share than before. On the other hand, if the labor market is largely characterized by monopsonistic exploitation of firms, then a minimum wage hike would induce a decline in the firms' share of economic rents. To comprehend the underlying mechanism, a variety of firm responses

are investigated, including the average salary, employment, TFP, firm exit, markup, markdown, and relative factor share of labor.

The empirical results of this research affirm that increases in minimum wages relieve labor exploitation. Rising minimum wages are found to raise average wages and reduce markdowns for firms with greater exposure to minimum wages, thus improving labor share, despite the adverse effect on employment. Contrary to the expectation, however, increases in minimum wages appear to reduce markups of exposed firms slightly, as could be explained by their responses in terms of TFP and firm exit. These effects seem persistent, despite diminishing over time. Furthermore, across firms of different ownership types, there is significant heterogeneity, which is most pronounced between state-owned enterprises (SOEs) and the others (i.e., domestic private firms and foreign firms).

This paper is related with the vast literature on the assessment of higher labor costs on firms' adjustment and workers' welfare. Majority of research on this focuses on the employment effect. An early group of research in developed countries, using various methodologies, fails to reach a consensus on the direction of influence (Card and Krueger, 1994; Card and Krueger, 2000; Neumark and Wascher, 2000). More recently, Dube et al. (2010), who employ an estimation method that implements within-pair comparison of neighboring counties in the U.S., find no adverse impacts of minimum wages on employment, and argue that heterogeneities in local trends rather than the minimum wages are the true cause of employment effects documented in previous studies. More recently, papers on this issue in China show that employment is significantly discouraged by minimum wage policies, particularly for disadvantaged groups such as female and low-skilled labor (Huang et al., 2014; Fang and Lin, 2015; Long and Yang, 2016). In response to the rising labor cost, firms appear to reduce the investment in human capital and accelerate the input substitution from labor to physical capital (Haepp and Lin, 2017; Hau et al., 2020). Additionally, researchers generally conclude that the minimum wage policy in China exerts positive influence on productivity while decreasing the survival rate of firms in the meantime (Mayneris et al., 2018; Hau et al., 2020; Bai et al., 2021). Based on above factors, firms' profitability seems to be eroded by the minimum wage regulation (Draca et al., 2011; Long and Yang, 2016). This research contributes to this body of knowledge by assessing the efficiency of minimum wage policy in achieving one of its primary goals, i.e., increasing the labor share of income through reducing firms' market power, a relatively unexplored aspect in the context of China.

This paper also belongs to the literature on the determinants of firms' market power as well as labor share of income. Berger et al. (2022) design an oligopsony model and document an inverse relationship between the power of firms in the labor market and the share of income gained by labor in the U.S. This relationship is also demonstrated in India and China by Brooks et al. (2021a) by developing a model where firms have both monopsony and monopoly power. Numerous papers have studied the determinants of such market power and in turn labor share of income, with majority of them focusing on developed countries. One key contributing factor to the declining labor share identified by the literature is the rising dispersion of productivity among firms and the accompanying reallocation of resources towards firms at the top of the productivity distribution, which, as a result of their increasing market power, become less subjective to competition over hiring workers (Kehrig and Vincent, 2017; Gouin-Bonenfant, 2018; Autor et al., 2020). A study utilizing the Golden Quadrilateral highway system in India confirms this mechanism by examining such reallocation of resources resulting from improved transportation infrastructure (Asturias et al., 2019). However, another paper exploring this highway system shows the opposite result, witnessing reinforced market competition and an increase in labor share (Brooks et al., 2021b). Other explanations for the decline in labor share of income include the outsourcing and offshoring of labor-intensive sections within the production process (Elsby et al., 2013) and a reduction in the relative cost of capital investment that leads to a shift from labor to capital input (Karabarbounis and Neiman, 2014). A relevant study in China

finds that the decreasing labor share of income is driven by institutional changes, such as reforms in the labor and product markets, rather than the capital-labor substitution, which aligns with the finding in the developed countries that the lower labor share comes from the increasing market concentration due to large and productive firms (Berkowitz et al., 2017a). None of the literature studies how minimum wages affect the labor share. This paper fills this gap by investigating the causal relationship using DID with the contiguous-city-pair approach.

Ownership types of firms could matter for their reactions to the minimum-wage reform. Previous research has found that firms of different ownership types are heterogeneous in various aspects, including capital intensity, innovation, and profitability, in both developed and developing contexts, consistently discovering an inverted U-shaped relationship between the degree of foreign ownership and firms' performance (Gurbuz and Aybars, 2010; Greenaway et al., 2014; Hintosova and Kubikova, 2016). In particular, SOEs in China are treated differently compared to firms of other ownership types. SOEs generally have non-economic goals, such as facing political pressure to employ excess workers, and are advantageous in accessing capital as well as bank finance due to their political connections (Firth et al., 2009; Berkowitz et al., 2017b). In fact, these privileges enable Chinese SOEs to survive and to be profitable in spite of the low productivity compared to other firms (Song et al., 2011; Berkowitz et al., 2017b). Such low productivity may come from the fact that state ownership harms investment efficiency in China (Dollar and Wei, 2007; Chen et al., 2011). Wang and Wang (2015) find positive effects of foreign ownership on employment and wages. With regard to the minimum-wage policy, compliance behavior may vary among firms of different ownership types (Ye et al., 2015). Moreover, research in multiple dimensions related to the impacts of Chinese minimum wages shows significant heterogeneity in various firm-level outcomes. For instance, Haepp and Lin (2017) conclude that unlike SOEs and private firms, foreign enterprises do not react to the minimum-wage regulation by reducing human capital investments, whereas others show that among all firms, SOEs are exceptionally insensitive to changes in minimum wages, as indicated by their minor responses in aspects such as TFP, outward FDI, and robot adoption (Fan et al., 2018; Hau et al., 2020; Fan et al., 2021). None of the previous studies investigates the heterogenous effects of minimum wages on market concentration and labor share, and this paper addresses this.

The paper is organized as follows. Section 2 provides the background information on minimum-wage legislation in China. Section 3 describes the data used and the empirical strategy. Section 4 presents the results of a variety of outcome variables in combination with economic analysis. Section 5 displays and interprets the results from heterogeneous analysis based on firms' ownership types. Section 6 concludes.

2. Minimum Wages in China

China's national minimum-wage policy was first launched by the Chinese Ministry of Labor in 1993. Regulations written into the Labor Law authorized provincial, autonomous-region, and municipal governments to set local minimum wages for cities under their jurisdiction. Although the minimum-wage regulation was implemented nation-wide, the proportion of workers covered by the legislation and the growth of minimum-wage standards remained low. Moreover, compliance among businesses did not keep pace due to low level of penalties. In 2004, the minimum-wage system was reinforced by the newly passed Minimum Wage Regulations. The minimum-wage level for each city under jurisdiction would be determined by the government with great flexibility according to local socioeconomic factors, such as employment and wages, labor productivity, living costs, and economic development. Governments were further required to renew the local minimum-wage rates at least once every two years, and publicly disclose any changes in level within one week. The new rules introduced hourly minimum wages for part-time workers in addition to the monthly minimum wages for full-time employees, and prohibited the inclusion of

overtime pay and compulsory supplements so as to meet the minimum-wage standards. It also raised the penalties as a percentage of owed wages for violations from 20-100% to 100-500%. Supervision and enforcement of minimum-wage regulations became the responsibility of the local labor authorities (Gan et al., 2016; Fan et al., 2018; Mayneris et al., 2018).

There are rich regional variations in both the level and the growth rate of minimum-wage standards. In 2004, for instance, the monthly minimum wage in real term was around 240 RMB in Luoyang, 350 RMB in Shenyang, and 590 RMB in Hangzhou. Figure 1 plots the distribution of minimum wages across China over the sampling period using the panel dataset constructed. With significant variation among cities in each year, there is a clear pattern that the average level has been rising continuously over time. Figure 2 shows the distribution of the average annual growth rate of minimum-wage level nationwide. After the 2004 reform, the longer tail to the right compared to the pre-reform period indicates a remarkable rise in the percentage of cities that experience a rapid growth in the minimum-wage standard. Moreover, in Figure 3, following the reform in 2004, the proportion of firms that offer an average wage below the local minimum wage decreases, while the proportion with an average wage just above the minimum standard increases, which implies improved compliance due to greater enforcement.

3. Data and Methodology

3.1 Data

The firm-level data used in this paper comes from the Chinese Annual Survey of Industrial Firms (ASIF) conducted by the National Bureau of Statistics (NBS), which is a widely used dataset to study Chinese firms. The annual survey started from 1998 and includes all SOEs as well as those medium and large non-SOEs whose annual sales are above 5 million RMB. It covers over half a million firms from more than 400 cities in 31 provincial-level administrative regions. It contains comprehensive firm-level data, including location, industry, ownership type, employment, and full information on financial statements. By adopting the contiguous-citypair approach, the paper constructs a dataset that excludes the firms located in those cities not constituting a pair. It drops observations with missing value of assets, wage, and the number of employees, as well as firms that changed location during the investigating period. The final dataset contains nearly 200,000 firms from over 200 cities in 26 provincial administrative regions that form 279 city pairs in total during the period between 1998 and 2007. This paper uses the city-level minimum-wage data from Fan et al. (2018), who manually collected the minimum wages of each city in China from a variety of online sources, such as government websites, statistical bulletins, and labor reports. Data on the city-level controls, including GDP per capita and population, comes from Brzezinska et al. (2022).

To measure firms' market power in the output and input markets, this paper follows the model developed by Brooks et al. (2021a) and also used in Brooks et al. (2021b) to calculate the measures of markup and markdown. A markup, measuring the gap between the output price and the cost of production, is an index of a firm's monopoly power; a markdown, measuring the gap between the value of marginal product of labor and the wage, is an index of a firm's monopsony power. Following Brooks et al. (2021a), this paper uses three different methods to calculate markups and markdowns, namely the standard DLW (De Loecker and Warzynski) approach, the CRS (constant returns to scale) approach, and the CD (Cobb-Douglas) approach. For other outcome variables, the average wage of a firm is calculated as the total yearly wages payable divided by the number of workers, and the relative factor share of labor is defined as the ratio of expenditure on labor (including not only wages, but also labor and unemployment insurance, pension and medical insurance, housing fund, employee education expenses, as well as research and development expenses) to expenditure on capital.

Summary statistics of firm-level variables are reported in Table 1, where Panel A covers the whole sample period (1998-2007), while Panel B and C summarize the periods before and after the 2004 reform, respectively. The average annual wage of firms during the sample period is 11,170 RMB, with a substantial rise in level of 5,390 RMB after the reform. With an overall average of 296 workers per firm, the mean employment drops by 30% following the reform. A mean greater than the median indicates that these variables have a positively skewed distribution. Average markups measured by DLW, CRS, and CD are 0.77, 1.10, and 0.25. Average markdowns are, respectively, 1.01, 1.05, and 1.05. While the DLW and CD markups are comparatively lower, other results are very close to the values for China reported in Brooks et al. (2021a). After the reform, whereas the mean markup shows no clear trend, average markdown seems to experience a moderate increase, and the mean labor share rises by 80%. As shown in Figure 4, the average relative factor share of labor has been growing continuously, and around the vertical line, there is an acceleration in growth following the minimum-wage reform in March 2004. The average annual growth rate of labor share is 12.2% in pre-reform years and 14.2% in post-reform years. With regard to the heterogeneity analysis, according to Table 2, among all firms, those with domestic private ownership account for over 70% of the sample, leaving the rest to be shared between SOEs and foreign enterprises

3.2 Empirical Specification

A main concern of this analysis is that the formulation of minimum-wage policy is largely endogenous. When setting the minimum-wage level, governments take into account crucial socioeconomic factors, making it hard to identify the direction of causality. The problems of measurement errors and omitted variables may also present. To deal with such endogeneity issue, this paper uses an identification strategy involving two main components. First, drawing inspiration from Mayneris et al. (2018), the paper treats the 2004 minimum-wage reform as a shock that increases the minimum-wage level while improving enforcement, and conducts a difference-in-difference (DID) analysis to examine its impacts on various aspects at the firm level. It divides the sample period into a pre-reform period (1998-2003) and a post-reform period (2004-2007). For each year, it identifies two types of firms according to the exposure to minimum wages. It defines exposed firms as those whose average wage in the previous year is below the local minimum-wage level of the current year, and the others as non-exposed. This allows us to study the impacts of rising minimum wages by comparing the outcomes of exposed firms to those of the non-exposed ones after the reform, relative to the same outcome gap before the reform. Among the approximately 2 million observations in the sample, 15% are exposed to the minimum-wage level of the corresponding year.

Second, this paper adopts the approach by Dube et al. (2010), who utilize contiguous counties across the state border in the U.S. to study the effects of minimum wages. The contiguous-citypair approach, as the analogue in the context of China, has been used to study this topic by Fan et al. (2018) and Fan et al. (2021). Two cities are considered as a pair if they are contiguous but belong to different provinces, thus having different minimum-wage levels set by their provincial governments. This paper, following Fan et al. (2018), constructs a dataset of all city pairs in China, and implements the approach by including city-pair-year fixed effects when doing regressions in order to capture the time-varying unobservable shocks that are common to the cities within a pair. This approach addresses the endogeneity concern not only because bordering cities tend to have more similar economic conditions, but also because these cities are likely to be remote from the provincial governments and thus have minimum-wage levels that are arguably less affected by local conditions. By employing this method, the paper considers relative changes in the minimum wages between the two cities within a pair, comparing the firms in one city with those in the other.

Thus, using the DID approach by exploiting the 2004 minimum-wage reform following Mayneris et al. (2018) while doing comparison within contiguous city pairs, this paper builds a regression model as shown below:

$$(1)\ y_{nict} = \beta_0 + \beta_1 Exposed_{nct} + \beta_2 Exposed_{nct} \times Reform_t + \beta_3 Z_{ct} + \beta_4 X_{nt} + \varphi_n + \varphi_t + \varphi_{it} + \varphi_{pt} + \epsilon_{nict}$$

where y_{nict} denotes an outcome variable (among average wage, employment, TFP, firm exit, markup, markdown, and relative factor share) of firm n in industry i in city c at time t. $Exposed_{nct}$ is a dummy indicating whether firm n's average wage at $t-1$ is below the minimum-wage level of city c in year t. $Reform_t$ is a dummy that takes the value of 1 for the post-reform years from 2004 to 2007. β_1 measures the difference in outcome between exposed firms and non-exposed firms, whereas β_2, as the main coefficient of interest in this study, shows the exposed-non-exposed outcome gap after the reform, relative to this gap in the pre-reform period. Hence, $\beta_1 + \beta_2$ represents the total difference in outcome between firms with and without exposure to the minimum-wage policy after the reform.

Apart from the variables of interest, the model includes a range of controls and fixed effects to alleviate endogeneity concerns. Z_{ct} is a vector of city-level controls, including log per-capita GDP and log population, and X_{nt} is a vector of firm-level controls that consists of log employment, log relative factor share, log output sales, number of years in existence, ownership type, and export status [2] . φ_n refers to the firm fixed effects, capturing time-invariant unobserved firm-specific characteristics that may affect outcomes. φ_t denotes the year fixed effects and controls for overall macroeconomic factors. φ_{it} is the industry-year fixed effects, accounting for time-varying characteristics common to firms in the same industry[3] . Adopting the contiguous-city-pair approach, φ_{pt} represents the city-pair-year fixed effects, which capture the time-varying shocks specific to a city pair. ϵ_{nict} is the cluster-robust standard error clustered at city-industry level. In addition to the immediate responses, this paper also examines the medium-term effects of the minimum-wage reform through replacing each outcome variable by its value in the next year.

The ASIF data involves three types of firms, namely, SOEs, domestic private firms, and foreign firms. As mentioned earlier, firms of different ownership types could differ in numerous dimensions. It is thus meaningful to delve into their heterogeneous responses to the 2004 minimum-wage reform. The heterogeneity analysis is implemented using the following specification:

$$\begin{aligned}(2)\ y_{nict} \quad &= \beta_0 + \beta_1 Exposed_{nct} + \beta_2 Exposed_{nct} \times Privat_{en} + \beta_3 Exposed_{nct} \times Foreign_n \\ &+\beta_4 Exposed_{nct} \times Reform_t + \beta_5 Exposed_{nct} \times Reform_t \times Private_n \\ &+\beta_6 Exposed_{nct} \times Reform_t \times Foreign_n + \beta_7 Z_c t + \beta_8 X_{nt} + \varphi_n + \varphi_t + \varphi_{it} + \varphi_{pt} + \epsilon_{nict}\end{aligned}$$

where $Private_n$ is a dummy of domestic private ownership and $Foreign_n$ is a dummy of foreign ownership[4]. Here, SOEs are treated as the benchmark group. Hence, the coefficients β_1 and β_4 measure, respectively, the pre-reform outcome gap between exposed and nonexposed firms and the response of the outcome gap to the reform for SOEs. β_2 measures the additional difference in outcome for private firms prior to the reform, while β_5 presents the change in outcome gap for private firms in addition to that for SOEs following the reform. As a result, the total exposed-non-exposed disparity for firms with private ownership is measured by $\beta_1 + \beta_2$, and the total effect of the minimum-wage reform on private exposed firms relative to non-exposed ones is estimated by $\beta_4 + \beta_5$. Similarly, for foreign firms, the coefficients of interest are $\beta_1 + \beta_3$ and especially, $\beta_4 + \beta_6$.

[2] Note that among this full set of firm-level controls, the specification for each outcome variable only includes a subset of controls that were not used when constructing this outcome measure

[3] Note that this paper uses the industry classification at the 2-digit level throughout to ensure a sufficient number of observations within each cluster.

[4] Note that when analyzing heterogeneity, this paper focuses on the short-term scenario and uses unweighted regressions.

4. Results

4.1 Direct Responses from Firms

This subsection discusses firms' direct reactions in terms of average wage, employment, TFP, and firm exit, to the minimum-wage reinforcement in 2004. Table 3 reports the baseline results for these firm-level outcomes of interest. Average wage is the dependent variable in Column (1). Panel A shows the immediate effects after the 2004 reform. A negative and significant coefficient on the Exposed dummy confirms that before the reform, firms with exposure to minimum wages are those offering relatively lower wages. The main interest of this study lies in the interaction term between the Exposed dummy and Reform dummy. According to the coefficient, the average wage gap between exposed and non-exposed firms reduces by 31.9% after the reform[5] . This implies that the minimum-wage policy induces firms to increase wages and thus is binding. Considering this along with the pre-reform gap, despite the growth in wage level, exposed firms still have an average wage that is 26.6% lower than non-exposed firms after the reform[6]. In addition, the medium-term effects in one year after the reform are reported in Panel *B*. Firms with exposure to minimum wages have lower wages on average than nonexposed ones, while the reform helps to narrow the wage discrepancy by 18.4%. Therefore, it seems that over time, the same story continues with a reduction in the magnitude of impacts.

The employment response is shown in Column (2) of Table 3. In the pre-reform period, the average number of workers in exposed firms is 25.2% higher than that in non-exposed firms, while the 2004 reform reduces this difference in employment level by 13.9%. It affirms that firms with exposure to the regulation react to the rise in labor costs by hiring fewer or firing more workers. After the reform, exposed firms still tend to have more employees. In the medium term, the reform decreases the employment gap between the exposed and the nonexposed by 10.2%, slightly weaker than its immediate effects but still significantly negative.

Column (3) considers the response of TFP. The coefficient on the Exposed dummy shows that compared to firms that are not exposed to minimum wages, the exposed firms in general have significantly lower productivity in the beginning. This may explain why these firms are unable to pay higher wages and thus are more likely to be exposed to the regulation. However, the 2004 reform, while causing a relative surge in average wage and a relative decline in employment level for exposed firms, does not appear to generate the desirable improvement in productivity as argued by the literature, relative to non-exposed firms in either the short term or the medium term.

Column (4) presents the results using firm exit as the dependent variable. Firm exit is constructed as a dummy variable, which takes value 1 in year t if the firm is active (i.e., there exists the observation in the dataset) in year $t-1$ but not in t. Due to this setting, we do not have firm data in the year of exit, and therefore, can only analyze the medium-term effects (i.e., with a one-year lag) on firm exit. It appears that pre reform, exposed firms exit 2.0% more on average than their non-exposed counterparts. The negative coefficient on the interaction term shows that the difference in firm exit between exposed and non-exposed firms decreases by 1.0% following the reform. This negative effect of minimum wages on exit, despite small in magnitude, is counterintuitive. Naturally, one would expect that facing more pressure in terms of higher production costs, firms that are unable to adjust would leave the market. More insights are to be drawn in the following section when doing heterogeneity analysis. For now, the market seems to become less concentrated with the minimum-wage reinforcement, which is a desirable outcome.

[5] $(e^{0.277} - 1) \times 100\% \approx 31.917\%$

[6] $(e^{-0.586+0.277} - 1) \times 100\% \approx -26.582\%$. Note that other calculations on the percentage change in this section are done in the similar way

4.2 Markup

Columns (5) – (7) of Table 3 show the influence of the 2004 reform on markup, an indicator of firms' market power in the output market. All three markup measures yield positive and significant coefficients on the Exposed dummy, which means that in the beginning, exposed firms are more likely to enjoy higher markups than the non-exposed. This could be due to the fact that firms with larger market shares in the output markets tend to have greater bargaining power when negotiating labor contracts with workers and thus tend to pay lower wages, leading to higher possibility of minimum-wage exposure. Furthermore, DLW and CD measures show that the minimum-wage reform causes the markup gap between exposed and non-exposed firms to shrink by 0.9% and 0.2%, respectively, compared to its pre-reform level, whereas the CRS measure shows no significant effect. Therefore, the conclusion would be that the rising minimum wages at best have a negative impact on firms' markups that is limited in magnitude. Such effect quickly fades and becomes insignificant after one year of the reform. This result contradicts the traditional expectation of a higher markup following the reinforcement of minimum wages, according to the logic that more stringent minimum-wage regulation will encourage improvement in productivity (which causes a decrease in production cost) and generate firm exit (which causes an increase in output price for surviving firms). Since the above results have shown that the impacts on TFP and exit are not as argued, it is not surprising that the markup declines unexpectedly following the reform. Again, this mechanism will be investigated in more depth when performing heterogeneous analysis.

4.3 Markdown

In Columns (8) – (10), markdown is the outcome variable. Prior to the reform, average markdown of exposed firms is larger than non-exposed ones by over 40%. This is an intuitive finding, since markdown measures the discrepancy between the value of marginal product of labor (VMPL) and wage. Given VMPL, higher markdowns imply lower wages, and thus higher likelihood for firms to be exposed to the local minimum wages. The 2004 reform has a negative impact on the markdown gap between firms with and without exposure, ranging from 12.3% to 14.7% in magnitude according to different measures. The effect appears to be persistent, despite being more than halved in intensity after one year of the reform. It thus seems that the minimum-wage regulation does help alleviate labor exploitation directly to a considerable extent by rebalancing the relative power of firms and workers in the input market.

4.4 Relative Factor Share

Finally, the results in terms of relative factor share of labor input is presented in Column (11) of Table 3. Recall that the relative factor share is calculated as (the log of) the labor-to-capital expenditure ratio. In line with expectations, firms with exposure tend to have a relative labor share that is 36.4% lower than that of the non-exposed counterparts. Following the reinforcement of the minimum-wage system in 2004, exposed firms experience a relative increase of 22.5% in the relative labor share, the intensity of which is approximately halved in the medium term. Such remarkable improvement in the labor share of income again verifies the effectiveness of the minimum-wage legislation in protecting the welfare of labor in China.

4.5 Robustness Check

Note that the results shown in the table and discussed above are from the preferred regressions that include the complete set of controls and fixed effects. As a robustness check, this paper also runs regressions using a simpler version of specification, which includes city-level controls, firm fixed effects, year fixed effects, and city-pair-year fixed effects, leaving out the firm-level controls and industry-year fixed effects. The short-term results for average wage, employment, markdown, and relative factor share are highly consistent with those reported in the table. There are several discrepancies for other outcome variables. First, for TFP, rather than being insignificant, the reform seems to be associated with a slight relative drop of 2.1% in productivity of exposed firms. Second, the reform appears to have no significant effect on all markup measures. The medium-term results are robust for all dependent variables except firm exit. Instead of exiting relatively less compared to the pre-reform level, exposed firms see a small relative rise in exit by 3.6% following the reform. Overall, it seems that the aggregate firm-level responses in terms of TFP, exit, and markup are weak if they exist at all.

Apart from the use of different empirical specifications, this paper also checks the robustness of results by implementing weighted regressions. Results in Table 3 are obtained from unweighted regressions that treat all observations in the dataset equally. However, with the adoption of the contiguous-city-pair approach, some cities that share a border with more than one city in the adjacent one or more provinces constitute more than one city pair. As a result, observations of firms in these cities are included in the sample for multiple times. Therefore, this paper also runs weighted regressions following Huang et al. (2014) by weighing observations using the inverse of the time of repetitions. Again, the majority of both immediate and medium-term results are invariant in sign, only with some moderate changes in size. The only exceptions are that the minimum-wage reform is now associated with an increase in the TFP gap between exposed and non-exposed firms of 1.8% and 1.4% in the short and medium terms respectively, and that in the medium term, the CRS measure of markup now shows no significant difference between the two groups of firms before the reform but a 0.4% relative rise for exposed firms following the reform (significant at 10% level). Other than these discrepancies that are negligible in magnitude, the baseline results are proven to be highly robust.

5 Heterogeneous Effects by Ownership Type

5.1 Direct Responses from Firms

Heterogeneous results of all firm-level outcomes of interest are shown in Table 4. Column (1) has average wage as the dependent variable. As the benchmark, exposed SOEs have an average wage that is 45.8% lower than non-exposed counterparts in the pre-reform period. For private firms, this value is slightly lower by 2.4%, and for foreign firms, it is slightly higher by 2.0%. Moreover, the reform causes the average wage gap between exposed and non-exposed SOEs to rise by 21.8% compared to its pre-reform level. The magnitude increases to 31.1% for private firms, and becomes even larger (39.2%) when it comes to foreign enterprises. The results align with the baseline findings, with additional insights that foreign firms are the most responsive to the minimum-wage reinforcement in terms of the wage level, followed by private firms, while SOEs tend to raise wages less aggressively. This pattern is consistent with the perception that foreign companies generally have stricter compliance with regulations in the destination country, possibly due to the relatively large losses from the potential damage of corporate reputation (Fan et al., 2018).

Next, heterogeneous results of employment level are reported in Column (2). The coefficients imply that for each ownership type, firms exposed to minimum wages on average employ a larger number of workers than non-exposed

firms, and this pattern is especially clear for SOEs. Following the reform, exposed SOEs experience a large relative drop in employment of 21.7%, while the extent of relative downsizing is much smaller (around 10%) in private and foreign enterprises. It thus appears that facing the pressure on labor cost, SOEs prefer to compress the employment rather than obey the regulation and offer higher wages, whereas private and foreign firms in general increase wages by more while minimizing the instances of layoff.

In Column (3), TFP is the outcome of concern. For all ownership types, the exposed group is associated with lower productivity than the non-exposed group before the reform. The interesting part lies in the TFP reactions of firms to the 2004 reform. The negative and significant coefficient for SOEs means that the reform gives rise to a 9.7% productivity drop for exposed SOEs relative to non-exposed ones compared to the pre-reform gap. In contrast, there is a small but significant increase in the exposed-non-exposed productivity gap of 1.8% and 3.7% for private and foreign enterprises, respectively, following the reform. Therefore, it seems that both private and foreign firms are able to innovate and shrink the production costs to some extent in order to offset the rise in wage level, and thus strengthening the minimumwage system induces productivity gains for them. However, this desirable implication does not apply to SOEs, which, being comparatively unproductive in the first place, seem to face practical constraints in technology development and adoption. Rather, the drop in productivity could result from the inefficient adjustment process of SOEs to the reinforced minimum-wage regulation as well as its potential distortions on within-firm operation, such as the employment structure and management mode.

Column (4) considers firms' heterogeneous repercussions in terms of exit. Consistent with the baseline result, in the pre-reform period, more of the exposed enterprises exit the market than their non-exposed counterparts, regardless of the ownership type. The consequence of the 2004 reform again varies for different types of firms. While exposed SOEs encounter a 2.9% relative surge in the instances of exit compared to the level before the reform, private and foreign firms with exposure to minimum wages exit the market relatively less by 1.8% and 1.2%, respectively, following the reform. It thus appears that tightening the minimum-wage regulation leads to more exit by SOEs, probably due to the inability to improve TFP so as to survive, while private and foreign firms manage to become more productive so that they do not have to exit. Moreover, the increased exit by SOEs leaves larger market space to the other two types of firms, increasing the chance for them to survive and enabling more entrance of potentially profitable competitors. Consequently, after the 2004 reform, the market for private and foreign enterprises becomes more competitive, whereas it is the opposite for SOEs. This argument would work if we assume partial segmentation between the market for SOEs and that for the other firms. It seems like a reasonable assumption since some goods and services are typically provided by SOEs solely, such as those related to the electricity network, transportation infrastructure, and natural resources, while some other industries, including finance, culture, and manufacture, are occupied by both SOEs and non-SOEs.

5.2 Markup

Columns (5) – (7) of Table 4 contain the estimates of heterogeneity analysis for markup. Viewing in combination the three markup measures, exposed firms of each ownership type have pre-reform level of markups that is higher on average compared to that of non-exposed firms, the degree of which is likely to be largest for SOEs. This is in line with the baseline result. Nonetheless, recalling the negative effect of the 2004 reform on the markup when considering all firms in aggregate, it now discovers underlying heterogeneous effects across ownership types. Two of the three measures show that the minimum-wage reinforcement increases the markup gap between exposed and non-exposed SOEs by either 4.2% or 1.2% according to different measurement approaches, but decreases the exposed-non-exposed markup gap for both private and foreign companies by either 0.7% or 0.2% approximately.

Previous results have revealed that, on the one hand, the TFP of exposed SOEs declines relative to non-exposed SOEs, implying higher costs of production after the reform, and thus lower markups. On the other hand, the fact that exposed SOEs exit relatively more compared to nonexposed ones than in the pre-reform period implies an increase in the market power of surviving SOEs, and in turn an increase in markup. Between these two conflicting forces, the influence through firm exit channel appears to dominate, as indicated by the larger markup gap for SOEs following the reform. The story for private and foreign firms is exactly the opposite. With the productivity improvement triggering an increase in markup and the reduced firm exit exerting influence in the opposite direction, the force of firm exit again wins and results in a lower relative markup for exposed private and foreign firms after the reform. Despite the interesting story, note that the effects are statistically significant but almost negligible in magnitude.

5.3 Markdown

Heterogeneous results with the dependent variable being the markdown obtained using various methods are reported in Columns (8) – (10). Consistent with the baseline finding, all markdown measures indicate that exposed firms tend to have comparatively higher markdowns. The difference in markdown level is considerably larger for private and foreign enterprises than for SOEs. Post reform, SOEs with exposure to minimum wages experience a relative decrease of 13.8% compared to non-exposed SOEs. The size of the decrease for private firms may be slightly larger at 10% significance level, and is remarkably larger, amounting to around 32.6%, for foreign enterprises. Hence, as expected, the 2004 minimum-wage reinforcement generates a substantial decline in markdown for firms. This means that the minimum-wage reform works well to alleviate the exploitation of labor by enterprises of all types of ownership through the direct channel in the input market, where the large rise in wage level successfully transforms into greater power of labor relative to firms. Moreover, the markdown decreases most for foreign firms, partially coming from the relatively large rise in wages as found earlier. Foreign firms appear to be the most willing and able to take care of the interest of workforce in accordance to the minimum-wage regulation, probably due to cultural conventions.

5.4 Relative Factor Share

Column (11) of Table 4 shows the DID estimation of relative factor share of labor for firms of different ownership types. Prior to the reform, regardless of the ownership, exposure to minimum wages is associated with a smaller factor share of labor relative to capital. After the reinforcement in 2004, there appears a considerable rise in relative labor share of exposed firms in comparison with non-exposed firms. The magnitude of the rise is greatest for foreign firms (41.3%), followed by 21.2% for private firms, and finally 13.2% for SOEs. Therefore, the minimum-wage reform is proven to be highly successful in achieving the objective of improving labor share of income among production inputs.[7]

[7] For the heterogeneity analysis, this paper also uses the weighted regression approach to check the robustness of results. According to the weighted specification, all three markdown measures show that the effect of the 2004 reform on markdown for private firms is statistically indifferent to that for SOEs. Except for this minor discrepancy, the results for heterogeneity in all firm-level outcomes are consistent with the unweighted scenario, with neglectable variation in size

6 Conclusion

Given the high degree of labor exploitation by firms and the evolution of minimum-wage system in China, there has been an ongoing discussion on how stricter labor market regulations would influence the economic position of workers. This paper explores how the rising minimum wages affect firms' market power and labor share of income in China. Utilizing firmlevel data from ASIF and the 2004 minimum-wage reform, it provides clear empirical support for the effectiveness of minimum-wage policy in safeguarding the interests of labor force.

The study adopts the model of Brooks et al. (2021a) and utilizes DLW, CRS, and CD methods in obtaining the measures of firms' monopsony and monopoly power. To identify the effects of minimum-wage policy on firm-level outcomes, it employs the DID method that exploits firstorder differences between firms with and without exposure to minimum wages and secondorder differences before and after the comprehensive reform in 2004. Another crucial component of the identification strategy is the contiguous-city-pair approach, which eliminates the endogeneity issue by directly comparing within each pair of adjacent cities on the province border. Beyond the baseline analysis, it examines the policy implications in the medium term as well as heterogeneous responses from SOEs, private firms, and foreign enterprises.

Through studying the repercussions of a set of firm-level outcomes, the overall consequence of minimum-wage reinforcement on labor share becomes clear. In spite of its adverse effect on employment, the rising minimum wages convert into a real increase in the average wages offered by firms, producing a substantial reduction in markdown, thus directly relieve labor exploitation through manipulating the labor market. These positive effects are found to be significant in size (above 30% for average wage and around 13% for markdown) and persistent to a great extent. In addition, firms' moderate responses to the reform in terms of productivity and firm exit jointly cause a slight decline in markup for the aggregate economy in the short term. This effect, although quantitatively limited (below 1%), implies intensified competition in the output market for firms, thus more opportunities and greater bargaining power for workers. This indirect mechanism related to the output market also contributes to expanding the proportion of income allocated to labor. In consequence, reinforcement of the minimum wages turns out to be highly pro-competitive, and succeeds in improving the situation of the workforce in the labor market, as corroborated by the substantial rise (over 20%) in relative factor share of labor following the reform.

Underlying this aggregate picture, there are huge discrepancies among firms with different ownership structures. The degree of compliance, as shown by the size of average wage increase, is lowest for SOEs and highest for foreign firms, with private firms in the middle. The negative employment effect is the most severe for SOEs. Minimum-wage regulation appears to be associated with a growth in TFP and a drop in firm exit for private and foreign enterprises in a moderate way, but a fall in TFP and a rise in firm exit for SOEs. The interaction between these two forces results in a slight decrease in markup for private and foreign firms and an increase in markup for SOEs. In the labor market, markdown decreases the most for foreign enterprises following the reform. Such direct and indirect channels in combination generate substantial improvement of relative labor share for foreign firms (over 40%), followed by the private firms (over 20%) and finally, SOEs (over 10%). Therefore, the minimum-wage policy generates the most significant positive influence on firms' performance and achieves the highest extent of resource reallocation for foreign companies, while exerting somewhat mixed effects on the SOEs. However, for all types of firms, minimum wages appear to facilitate market competition and raise the labor share of income in the economy.

The paper has some limitations that could inspire future research. First, it utilizes the markdown and relative factor share of labor (expenditure on labor divided by expenditure on capital) as indexes of labor share. A possible extension is to explore alternative indexes, such as labor earnings as a proportion of the firm's total value-added. Second, using firm-level data, workers covered by which are most likely in the formal sector, the conclusions may not generalize to the overall population. Third, this research considers the effects of minimum wages on an average

worker in a given firm. An ideal analysis of within-firm diversity in the effects of minimum wages on individual workers would require an employer-employee matching dataset. Other areas for future research may include a more sophisticated investigation into the mechanism through which markup is affected and the interaction process between firms' monopsony and monopoly power in determining the income share allocated to labor.

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Appendix

The measures of markup and markdown are calculated following Brooks et al. (2021a). A markup, defined as the ratio of the output price to marginal cost of production, measures monopoly power of a firm. By assuming perfect price-taking in the material-input market and some market power in the labor-input market as well as the output market, and solving a profit maximization problem, the model gives rise to an expression for markup:

$$\mu^M_{nict} \equiv \frac{\frac{\partial log(F_{it})}{\partial log(x^M_{inct})}}{\frac{\omega^M_{ict} x^M_{nict}}{p_{nict} y_{nict}}} \equiv \frac{\theta^j_{it}}{\alpha^j_{it}} (3)$$

where μ is the markup, F is the production function, ω is the factor price, x is the quantity of inputs, p is the output price, y is the quantity of output, and θ is the output elasticity, with the subscripts denoting firm n in industry i at location c at time t and superscript M denoting materials. Markdown is then derived as the ratio of labor-based markup to materialbased markup, which is a normalized measure of monopsony power:

$$\mu_{it} = \frac{\mu^L_{it}}{\mu^M_{it}} \ (4)$$

with the superscript L denoting labor

In order to obtain these measures in practice, this paper follows Brooks et al. (2021a) and calculates markups using multiple approaches. The standard approach, employed by De Loecker and Warzynski (2012) (referred to as DLW), estimates the production function according to Ackerberg et al. (2015) to obtain the output elasticity and then calculate the markup using Equation (3). A main problem of this approach is that the assumptions required to identify production preclude the estimation of output elasticity with respect to materials (Gandhi et al., 2016; Brooks et al., 2021a). Nevertheless, the DLW method is included here as it is a standard way of measuring markups.

The second approach derives the markup of a firm as the ratio of its total sales to production costs, i.e., the gross profit margin, according to the following formula:

$$\mu^M_{nict} = \frac{sales_{nict}}{costs_{nict}} = \frac{p_{nict} y_{nict}}{\omega^K_{ict} x^K_{nict} + \omega^L_{ict} x^L_{nict} + \omega^M_{ict} x^M_{nict}}, (5)$$

with the superscript K denoting capital (referred to as CRS due to its constant returns to scale assumption). The issue of this method lies in the assumption of price-taking in the input markets, which is inconsistent with the monopsonistic power in the model. Hence, the CRS measure could be improper in this context, since it attributes all profits to markups in the output market when actually a proportion could come from markdowns in the input markets. In terms of the denominator, the ASIF data contains direct measures of payment to labor and expenditure on materials, but only the value of capital stock x^K_{nict}. Therefore, to obtain the expenditure on capital, this paper again follows Brooks et al. (2021a) and adds together an interest rate of 0.10 and a standard depreciation rate of 0.05 to construct a return to capital ω^K_{ict} of 0.15.

The third alternative, finally, is compatible with the model. Similar to the DLW approach, it is based on Equation (3), but in addition, assumes Cobb-Douglas production function with respect to materials (thus referred to as CD), i.e.,$\theta^M_{it} = \theta^M$, which is a value that needs to be assigned. This paper chooses the value of θ^M that equalizes the resulting mean markup with that of the CRS method. Aware of potential errors in measurement, for each markup measure, this paper winsorizes the 1% tails of distribution. Next, the paper calculates the labor-based markup μ^L_{nict} using this CD approach by assigning a value of θ^L such that the labor-based markup equals material-based markup when the firm has no market power. Then, using Equation (4), the paper obtains corresponding measures of markdown using each of the three alternatives.

Figures

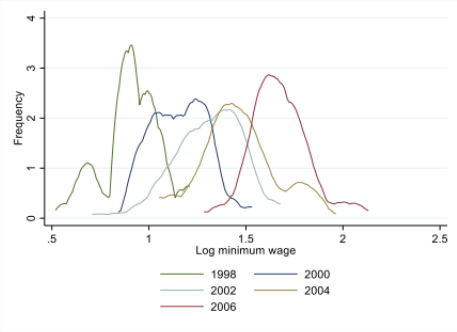

Figure 1. Distribution of minimum wages, 1998-2006.
Notes: Minimum wage is converted to annual level and in thousand RMB (in real term) in order to match with firm-level data from ASIF.

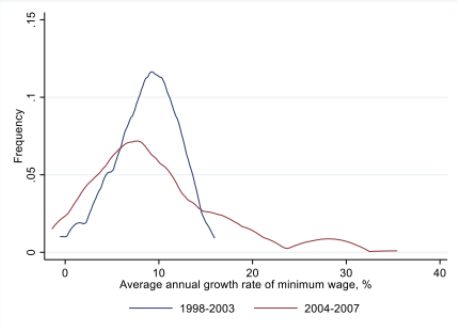

Figure 2. Distribution of growth rates of minimum wages, 1998-2007.

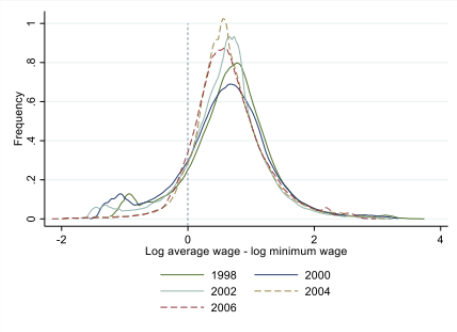

Figure 3. Distribution of normalized average wages, 1998-2006.

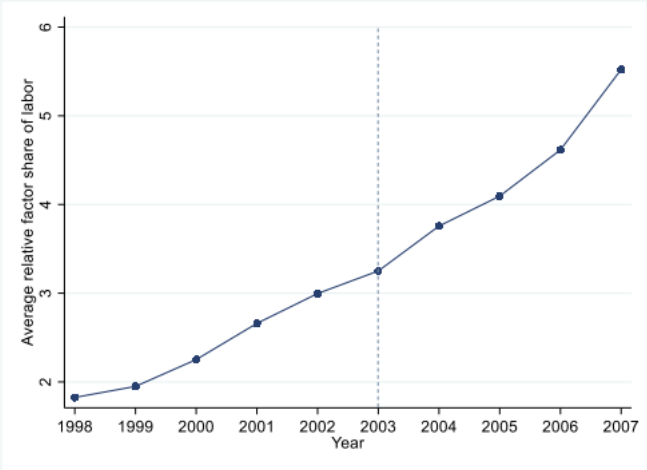

Figure 4. Change in labor share, 1998-2007.

Tables

Table 1. Summary statistics: firm-level characteristics.

Variable	Mean	Median	SD	Min	Max
Panel A: Whole Period (1998-2007)					
Average Wage	11.17	9	9.41	0.98	70.83
Number of Workers	295.53	112	1,396.41	1	289,938
Markup (DLW)	0.77	0.61	0.68	0.06	4.73
Markup (CRS)	1.10	1.09	0.34	0.24	2.93
Markup (CD)	0.25	0.23	0.13	0.07	1.17
Markdown (DLW)	1.01	0.50	1.43	0.03	7.57
Markdown (CRS)	1.05	0.64	1.15	0.12	5.77
Markdown (CD)	1.05	0.61	1.25	0.06	6.18
Relative Factor Share	3.66	1.45	9.64	0.001	1,755.32
Panel B: Pre-Reform Period (1998-2003)					
Average Wage	8.30	6.80	7.12	0.98	70.83
Number of Workers	352.56	130	1,569.54	1	289,938
Markup (DLW)	0.81	0.61	0.73	0.06	4.73
Markup (CRS)	1.05	1.05	0.36	0.24	2.93
Markup (CD)	0.25	0.22	0.14	0.07	1.17
Markdown (DLW)	0.84	0.42	1.22	0.03	7.57
Markdown (CRS)	0.97	0.58	1.10	0.12	5.77
Markdown (CD)	0.95	0.53	1.19	0.06	6.18
Relative Factor Share	2.57	1.10	6.52	0.001	569.13
Panel C: Post-Reform Period (2004-2007)					
Average Wage	13.69	10.95	10.40	0.98	70.83
Number of Workers	245.56	100	1,222.61	1	158,288
Markup (DLW)	0.73	0.60	0.62	0.06	4.73
Markup (CRS)	1.15	1.12	0.31	0.24	2.93
Markup (CD)	0.24	0.23	0.11	0.07	1.17
Markdown (DLW)	1.16	0.58	1.58	0.03	7.57
Markdown (CRS)	1.13	0.70	1.19	0.12	5.77
Markdown (CD)	1.14	0.68	1.29	0.06	6.18
Relative Factor Share	4.62	1.89	11.64	0.002	1,755.32

Notes: Average wage is at the annual level and in thousand RMB (in real term).

Table 2. Summary statistics: ownership types.

Ownership	Freq.	Percent
SOE	30,200	15.38
Domestic Private	144,378	73.51
Foreign	21,823	11.11
Total	196,401	100.00

Notes: Here it reports the number of firms instead of the number of observations, because of the duplicates in observations generated by the contiguous-city-pair approach.

Table 3. Minimum wages and firm-level outcomes: baseline results.

Variable	(1) Average Wage	(2) Employment	(3) TFP	(4) Firm Exit	(5) Markup (DLW)	(6) Markup (CRS)	(7) Markup (CD)	(8) Markdown (DLW)	(9) Markdown (CRS)	(10) Markdown (CD)	(11) Relative Factor Share
Panel A: Short-Term Effects											
Exposed	-0.586***	0.225***	-0.064***	-	0.022***	0.014***	0.006***	0.339***	0.376***	0.375***	-0.453***
	(0.008)	(0.005)	(0.005)		(0.003)	(0.002)	(0.001)	(0.011)	(0.010)	(0.011)	(0.007)
Exposed × Reform	0.277***	-0.150***	0.010	-	-0.009**	-0.003	-0.002**	-0.131***	-0.159***	-0.153***	0.203***
	(0.007)	(0.005)	(0.007)		(0.004)	(0.003)	(0.001)	(0.012)	(0.011)	(0.012)	(0.008)
Observations	1,902,635	1,870,667	1,870,667	-	1,894,917	1,870,667	1,894,917	1,894,917	1,870,667	1,894,917	1,870,667
R-squared	0.728	0.916	0.977	-	0.775	0.569	0.508	0.774	0.726	0.726	0.784
Adjusted R-squared	0.699	0.906	0.975	-	0.750	0.521	0.454	0.749	0.695	0.696	0.760
Panel B: Medium-Term Effects											
Exposed	-0.299***	0.123***	-0.038***	0.020***	0.016***	0.006***	0.004***	0.157***	0.183***	0.182***	-0.242***
	(0.009)	(0.005)	(0.005)	(0.001)	(0.003)	(0.002)	(0.001)	(0.010)	(0.009)	(0.010)	(0.008)
Exposed × Reform	0.169***	-0.108***	0.009	-0.010***	-0.005	0.002	-0.001	-0.053***	-0.075***	-0.071***	0.112***
	(0.007)	(0.005)	(0.007)	(0.001)	(0.004)	(0.003)	(0.001)	(0.011)	(0.010)	(0.011)	(0.008)
Observations	1,702,957	1,674,593	1,670,819	1,870,667	1,695,733	1,670,819	1,695,733	1,695,733	1,670,819	1,695,733	1,670,819
R-squared	0.704	0.914	0.964	0.218	0.775	0.578	0.514	0.768	0.733	0.734	0.779
Adjusted R-squared	0.671	0.904	0.960	0.131	0.750	0.529	0.458	0.742	0.702	0.704	0.753
City-Level Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Level Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City-Pair-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: ***Significant at 1% level; **Significant at 5% level; *Significant at 10% level.
Robust-cluster standard errors are reported in parentheses.
Three dependent variables, average wage, employment, and relative factor share, are in logarithm.
The whole set of controls and fixed effects is applied to both short-term and medium-term regressions.

Table 4. Minimum wages and firm-level outcomes: heterogeneous effects by ownership type.

Variable	(1) Average Wage	(2) Employment	(3) TFP	(4) Firm Exit	(5) Markup (DLW)	(6) Markup (CRS)	(7) Markup (CD)	(8) Markdown (DLW)	(9) Markdown (CRS)	(10) Markdown (CD)	(11) Relative Factor Share
Exposed × SOE	-0.612***	0.294***	-0.075***	0.015***	0.045***	0.017***	0.012***	0.182***	0.243***	0.218***	-0.470***
(Benchmark)	(0.009)	(0.008)	(0.008)	(0.002)	(0.008)	(0.004)	(0.002)	(0.013)	(0.013)	(0.014)	(0.010)
Exposed × Private	0.044***	-0.106***	0.017*	0.009***	-0.034***	-0.004	-0.009***	0.216***	0.187***	0.222***	0.037***
	(0.010)	(0.009)	(0.010)	(0.002)	(0.008)	(0.005)	(0.002)	(0.016)	(0.015)	(0.016)	(0.011)
Exposed × Foreign	-0.037**	-0.104***	-0.013	0.008*	-0.031***	-0.009	-0.008***	0.400***	0.338***	0.363***	-0.112***
	(0.018)	(0.015)	(0.018)	(0.004)	(0.011)	(0.008)	(0.003)	(0.037)	(0.033)	(0.036)	(0.023)
Exposed × Reform × SOE	0.197***	-0.245***	-0.102***	0.029***	0.041**	0.001	0.012***	-0.148***	-0.149***	-0.150***	0.124***
(Benchmark)	(0.015)	(0.015)	(0.020)	(0.004)	(0.018)	(0.010)	(0.005)	(0.022)	(0.022)	(0.023)	(0.019)
Exposed × Reform × Private	0.074***	0.135***	0.120***	-0.047***	-0.048***	-0.005	-0.014***	-0.021	-0.046*	-0.047*	0.068***
	(0.016)	(0.016)	(0.021)	(0.004)	(0.018)	(0.010)	(0.005)	(0.025)	(0.025)	(0.026)	(0.020)
Exposed × Reform × Foreign	0.134***	0.146***	0.138***	-0.041***	-0.048**	0.011	-0.013**	-0.246***	-0.246***	-0.237***	0.222***
	(0.025)	(0.023)	(0.029)	(0.006)	(0.021)	(0.013)	(0.005)	(0.046)	(0.041)	(0.044)	(0.034)
City-Level Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Level Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City-Pair-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,902,635	1,870,667	1,870,667	1,870,667	1,894,917	1,870,667	1,894,917	1,894,917	1,870,667	1,894,917	1,870,667
R-squared	0.729	0.916	0.977	0.218	0.775	0.569	0.508	0.774	0.726	0.727	0.784
Adjusted R-squared	0.699	0.906	0.975	0.131	0.751	0.521	0.454	0.749	0.696	0.696	0.760

Notes: ***Significant at 1% level; **Significant at 5% level; *Significant at 10% level.
Robust-cluster standard errors are reported in parentheses.
Three dependent variables, average wage, employment, and relative factor share, are in logarithm.