

Discussion Paper Series

IZA DP No. 18994

October 2026

Employer Concentration and Minimum-Wage Employment Effects: Evidence from China's Transition

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Employer Concentration and Minimum-Wage Employment Effects: Evidence from China's Transition^{*}

Abstract

How do local labour markets shape the employment effects of minimum wages? We evaluate this question using comprehensive manufacturing firm data and over 28,000 hand-collected county-level minimum wages during China's market transition (1998–2007). We find that, consistently with monopsony models, the employment response to higher minimum-wage exposure becomes less negative as local employer concentration increases, with positive point estimates arising in highly concentrated markets in some specifications, particularly among domestic private firms. Higher minimum-wage exposure may also be associated with lower reported training expenditure and greater firm exit. Our findings indicate that the employment effects of minimum wages can depend critically on local market structures, highlighting the importance of geographical and institutional heterogeneity when assessing labour regulation in transitioning economies.

JEL classification

J31, J38, J42

Keywords

minimum wages, labour market concentration, employment, monopsony, China

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^{*} The authors thank comments from Enzo Almeida, Pierre-Philippe Combes, António Melo, João Pereira, Helian Xu, Peter Norland and participants at the 100th Western Economic Association International Annual Conference, the 2024 Annual Conference of China's Labor Economists Forum and at a Hunan University workshop. A previous version of this paper circulated under the title 'Local labour concentration moderates the disemployment effects of minimum wages in China'. All errors are our own.

1 Introduction

Minimum wage (MW) policies can serve as a primary instrument for improving the earnings of low-wage workers and addressing inequality in both developed and developing economies. A recent survey, (Dube & Lindner 2024*a*), indicates that MW policies 'have had limited direct employment effects while significantly increasing the earnings of low-wage workers — at least at certain levels and in particular economic contexts' (Dube & Lindner 2024*a*). Particular studies do still find negative employment effects of MW increases (Jha et al. 2026), insignificant effects (Rao & Risch 2026) or even positive effects (Cengiz et al. 2022).

This heterogeneity in employment responses to MWs has motivated renewed attention to the roles of labour market structures, particularly as a growing body of research documents substantial employer concentration and potential departures from perfect competition (Dodini et al. 2024, Martins & Melo 2024, Bassanini et al. 2026). Indeed, employer concentration can reconcile the different or even contradicting employment effects of MWs. For instance, in a perfectly competitive market, a typical firm decides the number of employees to equate marginal revenue product of labour and the market wage rate for the workers' skill. In this case, a rise in MWs results in firms laying off employees. However, in monopsonistic labour markets, the employment and wage levels of firms that face upward-sloping labour supply curves are both lower. If a statutory MW is increased and set between the monopsonistic wage and the competitive wage, the marginal cost of labour becomes constant and employment could increase.

Key recent contributions that test empirically the monopsony hypothesis include Okudaira et al. (2019), for the Japanese labour market, and Azar et al. (2024) and Rao & Risch (2026), which study low-wage labour markets in the U.S.. Okudaira et al. (2019) find less negative employment effects from minimum wage increases in more concentrated local labour markets. Azar et al. (2024) find that, while minimum wage significantly decreases employment in low-concentrated markets, such MW-induced employment changes become less negative

as employer concentration increases. These employment changes are even estimated to be positive in highly concentrated markets, particularly in the retail labour market. Investigating the impact on U.S. independent businesses, Rao & Risch (2026) found that minimum wage increases result in the exit of least productive firms, and reallocation of output, profit and workers from these firms towards larger firms.

However, the implications of this insight for developing and transition economies remain largely unexplored. This gap is consequential: developing countries can have a larger share of low-wage workers, weaker labour market institutions, and more concentrated market structures. Moreover, economies moving from central planning to markets, such as China, can exhibit distinctive features that may shape regulatory incidence. These include the legacy of state-owned enterprises as dominant local employers, limited worker mobility due to institutional constraints, and substantial regional variation in market integration (Meng 2012, Feng et al. 2017, Liu et al. 2025).

To the best of our knowledge, this paper is the first to address the role of employer concentration in minimum wage effects in the case of a developing country. China, with decentralised minimum wage setting and varying labour market structures and institutions, provides a unique major laboratory to evaluate the monopsony argument. And unlike developed countries in which labour markets become increasingly concentrated, China’s market-oriented reforms promoted competition across factor markets, including labour markets (Liu et al. 2025). Our empirical analyses draw on a near universe of China’s labour-intensive medium- and large-sized industrial firms. As of 2000, these firms employed more than one fifth of all workers in the country, corresponding to 162 million people (National Bureau of Statistics of China 2025); our data cover the medium- and large-sized private industrial firms and public firms of all sizes within this sector.¹

¹Most labour markets in the industrial sector are characterized by low levels of concentration, although some firms operate in monopsony. The median Herfindahl-Hirschman Index (HHI) of labour concentration is 0.133, below the threshold of 0.25 that has been regarded as a suggestive cutoff between high- and low-concentration. Indeed, previous studies show there are still substantial rents and rent-sharing in employment relationships in China (Duan & Martins 2022), indicating some degree of market imperfections.

We choose the case of China over 1998-2007 also for the reason that MWs at that time were being adjusted frequently to combat widening income gaps following from the country’s market-oriented reforms. However, similarly to the developed countries mentioned above, the evidence on employment effects of MWs in China is mixed (Fang & Lin 2015). As there is no official MW database in China, we collected and collated 26,821 monthly MWs, corresponding to around 3,000 county-level administrative regions nationwide over 1998-2007. Using these data, we find that MWs represent a large share of the wages paid to workers in many firms. We document stricter enforcement of MW regulation since 2004 and substantial MW increases, in both nominal and real terms. We also find evidence of regional heterogeneity in labour market rigidity, in which the legacy of planned economy creates considerable scope for monopsonistic power in inland China, while the market-oriented reform was sustained by higher MWs in coastal provinces.

Drawing on this original and detailed data set, we exploit both within industry-province-year and within-firm MW variation for identification. We find that the negative MW effects on employment in an emerging economy such as China are reduced when labour market concentration is higher. These MW effects cross zero at an HHI of 0.37. The results are consistent in a battery of robustness checks in which we replace key variables, consider non-linearity of labour market concentration, and use the impact function method (Hau et al. 2020). Moreover, we detect different responses between firms of different ownership, as state-owned and foreign-owned firms do not appear to be sensitive to labour competition, in contrast to their private-owned counterparts; and formal tests reject equality across ownership groups. This pattern is consistent with state-owned and foreign firms operating under different constraints and supports from domestic private firms. This pattern shows that the incidence of labour regulation in a transition economy depends jointly on local employer competition and on ownership institutions inherited from the planning era. We also consider the case of training provision by firms, an intensive margin of adjustment of substantial policy relevance in transition and developed economies alike. We find no statistically significant evidence that

concentration moderates the relationship between minimum-wage exposure and training expenditure.

Building on this novel empirical evidence, we argue that the characteristics of regional markets and institutional legacy should receive greater attention when setting policy. Specifically, local employer competition and ownership composition should inform assessments of the employment consequences of MW change, in contrast to the common practice around the world of setting the same statutory MW for large regions or countries. Besides, the Chinese evidence suggests that MWs can facilitate a smoother transition from a command economy to a market-oriented economy.

This study contributes to three strands of literature. To begin with, it contributes to the reinterpretation of the large literature on the effects of MWs on employment, especially those that consider labour market structure. Dube & Zipperer (2024) and Horton (2025) find that the jobs in compliance with the new MWs were created while those paying below the new MWs disappeared, resulting in structural changes in jobs around the new MWs. Clemens et al. (2021) provide evidence that rising statutory MW led to an increase in higher skill requirements in job posts. Datta & Machin (2024) also find similar change in the hierarchical composition of workforce in contracted firms with the introduction of living-wage clauses in UK government procurement contracts. Several other studies (Mayneris et al. 2018, Berger et al. 2022, Popp 2024, Agarwal et al. 2024) show that firms and employees may respond to a rise of MWs by adjusting other intensive margins (e.g., rising productivity or price pass-throughs). Moreover, in a systematic and ongoing review of relevant studies, Dube & Zipperer (2024) conclude that the studies with a narrow subgroup sample (e.g., teens, restaurant or retail workers) tend to find negative employment effects, while other studies based on a larger sample (e.g., total low-wage groups) are more likely to report small positive effects.

In China, as well as other developing countries, MWs can be important given the larger share of low-wage earners (Alatas & Cameron 2008). China first introduced nationwide MW in 1993, and it was not until 2004 that the regulation covered firms of all types of ownership.

Despite that firm MW compliance remains debated (Hau et al. 2020), empirical evidence suggests that MWs in China incur substantial influence on firms' behaviours. Researchers tend to agree that a MW increase results in rising wage costs among firms (Mayneris et al. 2018, Geng et al. 2022). However, there is a lack of consensus regarding the margins of adjustment and the magnitudes of the effects. For example, using the Urban Household Survey (UHS) data, (Fang & Lin 2015) observe adverse MW employment effects in Eastern and Central China, in contrast to the finding of few significantly positive effects in the central and western regions by Ni et al. (2011). Huang et al. (2014) use Annual Survey of Industrial Firms (ASIF) and find that the firms with higher wages and larger profit margins respond positively to MWs, opposite to those with lower wages and smaller profit margins, and the effects are amplified in the increase in enforcement since the new MW regulation in 2004. Mayneris et al. (2018) find productivity increases and limited job losses among surviving firms as a response to the new 2004 regulation, whereas both Hau et al. (2020) and Geng et al. (2022) document increasing capital-labour substitution and decreasing employment growth. Duan & Martins (2022) find that higher MWs reduce monopsonistic rents shared between employers and employees.

Second, our study provides evidence on labour market concentration in China. Several recent studies uncover potentially higher levels of labour market concentration in other countries, in some cases with large negative effects on wages in developed countries (Azar et al. 2022, 2024, Rinz 2022, Colombo & Marcato 2023, Martins & Melo 2024, Bassanini et al. 2026, Dodini et al. 2024, Amodio & de Roux 2024, Popp 2024, Liu et al. 2025). However, much less is known about labour market concentration and its implications in developing countries. Liu et al. (2025) show that in contrast to developed countries where labour markets are becoming concentrated, Chinese employers face increasing competition. On top of this, labour market institutions, such as employment law or collective bargaining, and sectoral composition of minimum wage workers can be different in a developing country (Dube & Lindner 2024b, Bassanini et al. 2026), leading to potentially different margins of adjustment to MWs and consequently varied employment effects.

Third, the study contributes to ownership institutions and labor regulation during economic transition (Konings et al. 2003, Acemoglu & Robinson 2012, Huang & Qian 2018). In the era of the planned economy, a large share of labour markets were dominated by a small number of large state or collectively-owned firms, creating substantial concentration and monopsonistic power (Meng 2012, Feng & Guo 2021). Besides, these firms served as providers of job security and welfare and have no autonomy to dismiss workers or to set wages according to workers' productivity (Xing 2008). Our results show that the regions in which these firms are concentrated typically introduce lower MWs and these firms are also less responsive to minimum wages vis-à-vis privately-owned firms. This is consistent with relevant studies on Eastern Germany that the labour market dynamics and institutions demonstrate unique features when compared to Western Germany (Bachmann et al. 2026, Popp 2024).

The remainder of this paper is as follows: The next section presents the institutional aspects of China's labour market and its MW setting. Section 3 presents our data and methodology. Section 4 describes and discusses our results. Finally, Section 5 concludes. Overall, our findings highlight the role of local labour markets in the evaluation of labour policies and, in particular, MWs, also in the context of emerging economies.

2 Institutions and minimum wages in China

Minimum wages (MWs) in China were first introduced in the 1993 Minimum Wage Regulation for Enterprises (Ministry of Labor and Social Security 1993) which came into force in 1994. This took place in the context of nationwide economic and social reforms initiated by Deng Xiaoping in 1978. Several other major labour-market-related reforms included the reform of state-owned enterprises, e.g., the privatization of small- and medium-size state-owned firms, the introduction of performance-based wages, and large layoffs, with an estimated 30 million workers displaced from state-owned firms between 1995 and 2001. Simultaneously, the higher education expansion since 1999 significantly increased the supply of skilled workers

(Dai & Martins 2024). Foreign direct investment accelerated following WTO accession in 2001, increasing labour market competition. Later reforms, including changes in employment protection, formed the context of minimum wage regulations. (Yang 2023).

According to the 1993 MW regulation (Ministry of Labor and Social Security 1993), provincial governments set several levels of prevailing MW rates (monthly, weekly, daily or hourly) in consultation with local unions and firms, taking advice from local business associations and related departments within the government (for more detail, see Section A.2). Moreover, each locality should decide the effective MWs taking into account local living expenses, average wages, labour productivity and employment rates. The 1993 regulation mandated that the MW value should not be adjusted more than once a year. This policy thus allowed regional governments to experiment and choose between MW setting methods based on local conditions and preferences. These MWs suggested by provincial labour bureaus should be submitted to the Central Labour Bureau (Ministry of Labor and Social Security) for feasibility checks before publication by provincial governments. Local labour bureaus were also responsible for monitoring and fines on firms' noncompliance. In terms of coverage, the Central Labour Bureau mandated that all urban firms were subjected to MWs and allowed provincial governments to decide whether village and township enterprises (VTEs) in the rural areas in each jurisdiction would also be subject to MWs.²

The 1993 MW regulation was subsequently updated in 2004, featuring increased coverage and stricter enforcement. The 2004 regulation mandated that MWs had to be applied to all types of firms. It also required that MWs were adjusted at least once every two years; and that MWs could only be set in terms of monthly or hourly rates, with the former applicable to full-time employment and the latter to part-time employment. Finally, the penalties to firm noncompliance increased considerably, from 20-100% of the wage owed (1993 regulation), to 100-500% (2004 regulation). Mayneris et al. (2018) evaluates the impact of this law, finding

²The prevailing MW regulation does not explicitly exclude the agricultural sector but 15% of workers in agriculture between 2004 and 2009 were working below the prevailing MW (Lin & Yun 2016). The large share of informal employment in agriculture and its seasonal nature may make it difficult to enforce MWs.

large increases in MWs and intensified enforcement, as well as lower survival rates among exposed firms. Amongst surviving firms, Mayneris et al. (2018) find increases in both wage costs and productivity, which resulted in no change in profitability and limited job loss.³

Overall, this policy context led to a large number of MWs. Over the 1998-2007 period, we find a total of 764 different nominal MWs and 1,374 distinct real MWs across regions and years in China. These are shown in Figure 1.

(Figure 1 here)

We also note China’s institutional context of some labour market rigidity, driven by state-owned firms and the household registration system (Hukou). Both dimensions create considerable scope for monopsony. Indeed, there are many examples of ‘factory towns’ (towns dominated by a single firm) across China, such as the city of Daqing (petroleum) and the cities of Baotou and Anshan (steel), and evidence that a higher concentration of state-owned firms reduces labour market dynamics (Meng 2012, Feng & Guo 2021). Moreover, the introduction of MWs in 1993 and their stricter enforcement in 2004 happened as China deepened its market-oriented reform of wage grids.⁴

3 Data and Methodology

3.1 Data

Our study draws on two data sets: the first is the Chinese Industrial Enterprises Database (CIED), which is collected by the National Bureau of Statistics of China (NBSC). This data provides the most comprehensive information about Chinese firms available so far, including firm’s identification, ownership, address, number of workers, total wages, total assets, total

³Ge & Yang (2014) indicate that the average real wage jumped 202% between 1992 and 2007. They also argue that the government’s direct labour market intervention for high-skilled labour is very limited, as these workers had higher employability and were less vulnerable to layoffs during economic transition.

⁴On top of MWs, we also mention China’s wage grids, a structured system used in the centrally planning era to determine employee salaries across sectors and job levels in state- or collectively-owned-enterprises. Wage grids typically consist of predefined salary ranges and criteria based on job positions, qualifications, and years of experience. This system, with some similarities to collective bargaining wage schedules, aims to standardize wages, ensure fair compensation, and address income disparities.

profits, gross output, having been used in many studies (Brandt et al. 2012, Upward et al. 2013, Hau et al. 2020, Duan & Martins 2022). The data includes all non-state-owned firms with annual sales of at least five million yuan and all state-owned firms (regardless of sales).⁵ Due to missing key variables from 2008 onward, our analysis is focused on the 1998-2007 period.

The second data set we use is on MWs. As there is no official MW database in China, we collected and collated the monthly MWs of nearly 3,000 county-level administrative regions, from 1998 to 2007. This was done by browsing the websites of provincial and municipal labour and social security bureaus, the Pkulaw website,⁶ and consulting policy documents. As monthly MWs can change at any time of the year, we computed the annual MW of each county by weighting each MW based on the numbers of months in which it was in force during the year (Xu & Wang 2016). If a labour market includes multiple counties/districts, we compute the relevant annual MW by averaging the annual MW of each county/district. Figure B1 shows the number of counties that adjust MWs each year in the sample period: we find that the prevailing MWs were adjusted each year in around two-third of the counties, whereas since 2004, when the new and more stringent MW regulation took effect, the share of counties that changed MWs increased significantly. Finally, we match the MW and the firm-level data sets by using the labour market classification code present in both data sets.⁷

Our final sample is an unbalanced panel data, consisting of 362,331 unique firms and 1,622,617

⁵These private firms correspond to the universe of medium- and large-size non-state-owned industrial enterprises ('Industrial Enterprises above Designated Size'). The five million yuan corresponds to approximately 500,000 euro. In 2011, the threshold was increased to 20 million yuan. The study sample consequently leaves out micro and informal firms. However, we believe that this has limited effects on our main results, even in the case of a market with numerous smaller firms. As discussed below, our baseline equation involves the Herfindahl-Hirschman Index (HHI), whose value in a market is largely driven by the market shares of large firms. See Appendix A.1 for more details on the data and our sample selection.

⁶<https://www.pkulaw.com/> provides official legal documents on MWs, covering the near universe of laws and regulations, as well as gazettes, legal cases and judicial documents in China. Founded in 1985 in Peking University, where it is housed, this site provides open access to electronic versions of legal documents (including over 11,000 administrative regulations and over 350,000 department regulations). The site is frequently used for academic research. See Appendix A.2 for additional information on MWs in China and Table A1 for the number of counties, labour markets, and MWs per year in our sample data.

⁷To eliminate the influence of outliers, we clean our data following Cai & Liu (2009), Feenstra et al. (2014), and Hau et al. (2020). We also follow the 'Generally Accepted Accounting Principles'. For more details, see Appendix A.1. Furthermore, to address price fluctuations, we use CPI, the fixed asset investment price index from the National Bureau of Statistics of China and the output deflator from Brandt et al. (2012) to convert the nominal values of key variables to real values of 2007, the last year of our empirical analysis.

firm-year observations. Each (firm-year) observation is matched to the applicable (weighted) MW in the same year and labour market, following the steps above.

(Table 1 here)

Table 1 presents the descriptive statistics of the main variables used in our empirical analysis. We find that the ratio of the MW, with respect to the average wage of the firm, is 53.9% on average across all firms. Moreover, the average MW bite (the same ratio but considering the MW of the next year) is 58.4%. These statistics indicate that MWs can represent a large share of the wages paid to workers in many of the firms covered in our data set. For instance, the 90th percentiles of the two distributions above (MW shares and bites) are 82.2% and 88.5%, respectively. Figure 2, which presents the distributions of the MW bite, in one particular year (2007), weighted or not by employment, also highlights the considerable spread in such bites.

(Figure 2 here)

Moreover, the average employment across all firm-years is 277.8 workers, while the average wage is about 13,100 yuan. Each firm represents, on average, 1.3% of its local labour market, a figure that can increase to 2.4% at the 90th percentile. At the same time, the median is only 0.1%, a result that highlights the very large skewness of this variable. This can also be seen from Figure B2, which presents the distributions of firms' local labour market employment share in one particular year (2007).

Regarding labour market concentration, we analyse the Herfindahl-Hirschman Index (HHI), defined as follows:

$$HHI_{l,t} = \sum_{i=1}^{I(l,t)} Share_{i,l,t}^2. \quad (1)$$

Here, $I(l,t)$ is the number of firms in labour market (county or county group) l and year t ; and $Share_{i,j,t}$ is the share or ratio of firm i 's employment in year t with respect to the total employment in firm i 's labour market l in the same year t . By construction, the HHI

can vary between 0 (a large number of very small firms) and 1 (a single observed employer in the defined market).⁸ Figure 3 presents the distribution of HHI by the number of employees across local labour markets (weighted or not by the employment of each local labour market) in a specific year (2007). We find that most labour markets are characterised by low levels of concentration, although some firms operate in monopsony. However, when weighted for employment, the latter cases virtually disappear, indicating that monopsony firms tend to be relatively small. Specifically, the average HHI is 0.221 (0.133 for the median), below the threshold of 0.25 that can be regarded to separate high- and low-concentration labour market. However, we also note that labour market concentration varies substantially, ranging between 0.027 in the first decile and 0.533 in the ninth decile, and exhibits considerable skewness. We exploit this heterogeneity to identify the effect of labour market concentration, as we explain below.

(Figure 3 here)

3.2 Empirical Model

Our interest is to understand the MW employment impact and its interaction with labour concentration. We investigate this by estimating the equation below, following Azar et al. (2024):

$$\ln emp_{it} = \beta_1 Bite_{ilt} + \beta_2 HHI_{l,t-1} + \beta_3 [Bite_{ilt} \times HHI_{l,t-1}] + \gamma X_{i,t-1} + \tau_i + v_{jt} + \varepsilon_{it}, \quad (2)$$

where $\ln emp_{it}$ is firm i 's log employment in year t ; $Bite_{ilt}$ is the annual MW of labour market (county or county group) l (applicable to firm i in year t) divided by the average

⁸We note that a firm's establishments or branches in other regions are not individual legal business entities. Therefore, the employment of these establishments is included in the employment of the firm, which is assigned to its main location or headquarters. We acknowledge that this is a potential source of measurement error, as the data does not provide information to identify these establishments. In contrast, a firm's subsidiaries (affiliates) are treated as independent business entities and, therefore, as different observations in the data. Note also that $HHI = 1$ does not imply that workers have only one potential employer, as employers outside the survey coverage (private small-sized firms or non-industrial firms) are not observed.

annual wage per worker of the firm in year $t - 1$. $HHI_{l,t-1}$ is the Herfindahl-Hirschman Index (HHI) of local labour market l in year $t - 1$.

As to the remaining variables, $X_{i,t-1}$ is a set of firm- and labour market-level control variables, mainly including variables related to the characteristics of the firm itself and possibly having a direct impact on firm employment, regarding the previous year. These include the log total assets, the log inventory-to-output ratio, a private-ownership dummy variable, a foreign-ownership dummy variable, and the log total employment and the log average wage per worker in the labour market. τ_i are firm fixed effects, capturing time-invariant drivers of firm employment, and prompting a longitudinal analysis within firms over time. Given that there are several confounders, e.g., industrial shocks concerning input prices and subsidies, regional institutional and macroeconomic differences, and varying common market conditions, we estimate within industry-province-year cells by including v_{jt} , a fixed effect for each combination of the 28 two-digit industries, the 31 provinces and the ten years covered. In other words, we allow for time shocks that may vary entirely flexibly by province-industry combination. Standard errors allow for clustering at the local labour market level.

Our main interest is in the β_1 and β_3 coefficients, which indicate how the employment effect of the MW bite varies depending on local labour concentration. Under monopsony, the more concentrated the local labour market, the more likely that a firm in the market is underpaying its workers with respect to their productivity (Snell et al. 2026). In this context, a MW increase (if not too large) may lead to employment increases, in contrast to the case of a competitive labour market. Indeed, while β_1 refers to the MW employment effect in competitive labour markets (zero HHI), β_3 indicates how the employment effect evolves as concentration increases. In other words, assuming a negative β_1 coefficient, the β_3 coefficient will have to be positive and of a magnitude larger than β_1 in absolute terms for net positive employment effects to emerge.

Identification is based on MW (and HHI) changes in each region and year. These changes represent varying shocks to firms, depending on their wage levels at the time. As we discussed

before and in Appendix A.2, the determination of MWs in China involves multiple layers of government and timelines. In this context, it is unlikely that MW changes can be fully anticipated by firms. The resulting shocks can therefore influence firms' employment levels. Moreover, these effects can differ depending on the concentration of the local labour market in which they operate. Our identifying assumption is that, conditional on the time-varying covariates and the firm and industry-province-year fixed effects, residual MW changes are uncorrelated with firm-level employment shock.

4 Results

4.1 Main specifications

Our baseline results are presented in Table 2. We report the employment effects of MWs in the odd columns (1, 3, and 5) and the effects of MWs, labour market concentration, and their interaction, in the even columns (2, 4 and 6). The first pair of columns (1 and 2) controls exclusively for industry-province-year fixed effects (one fixed effect for each combination of an industry, a province, and a year), while the second pair of columns (3 and 4) adds firm fixed effects to the previous specification. The last pair of columns corresponds to the most detailed specification, as it also adds additional time-varying control variables to the previous sets of control variables, as described above.

(Table 2 here)

Table 2 consistently yields negative and significant point estimates for the *MWBite* parameter. These coefficients range between -0.251 and -0.017. When firm fixed effects are considered, and the analysis draws on within-firm time variation, the coefficients are much smaller, in absolute values, decreasing to -0.034 and -0.017. Considering our benchmark specifications of columns 4 and 6, which include firm and industry-province-year fixed effects, the concentration interaction and, in column (6), the full set of time-varying controls, we find similar coefficients (-0.039 and -0.02), both significant at the 1% level. A 10-percentage-point

increase in the MW bite decreases firm employment by approximately 0.2% in a labour market with zero concentration.

Turning to the interaction between labour market concentration and the MW bite, the coefficient β_3 is positive and statistically significant in both benchmark specifications: 0.100 in column (4) and 0.054 in column (6). These indicate that negative MW bite is attenuated as labour market concentration rises. Figure 4 displays the implied marginal effect of the MW bite over the empirical distribution of lagged HHI, with 95% confidence intervals. The marginal effect crosses zero at an HHI of approximately 0.37; however, the confidence intervals include zero throughout the positive part of the curve, so the positive point estimates arising in highly concentrated markets are not statistically distinguishable from zero. We therefore interpret the interaction as evidence of attenuation rather than reversal of the disemployment effect.

(Figure 4 here)

As an alternative specification to equation 2, we allow the moderating role of concentration to be non-linear by letting the MW bite effect vary across terciles of the HHI distribution, as in equation (3), following Azar et al. (2024). Specifically, we estimate the following extended version of equation 2:

$$\begin{aligned} \ln emp_{it} = & \beta_1 Bite_{ilt} + \beta_{2a} HHI_{mid_{it}} + \beta_{2b} HHI_{high_{it}} + \beta_{3a} [Bite_{ilt} \times HHI_{mid_{it}}] + \\ & + \beta_{3b} [Bite_{ilt} \times HHI_{high_{it}}] + \gamma X_{i,t-1} + \tau_i + \nu_{jt} + \varepsilon_{it}, \end{aligned} \quad (3)$$

in which all variables are defined as in 2 and the middle and upper HHI tercile dummy variables, $HHI_{mid_{it}}$ and $HHI_{high_{it}}$, are defined at 0.081 and 0.210, respectively, according to our microdata.

(Table 3 here)

Table 3 presents the results, which support the non-linearity hypothesis: we find that the

point estimates of the interaction parameters, β_{3a} and β_{3b} , are statistically significant and increase with labour market concentration. In the fully specified column (3), the MW bite coefficient is -0.032. The implied total bite effect is -0.012 in the middle tercile and -0.011 in the upper tercile. Attenuation is therefore present in both the intermediate and the upper ranges of concentration and is somewhat stronger in the latter, but the negative bite effect is never fully reversed: the implied marginal effect remains negative even in the upper tercile.⁹

4.2 Robustness: Concentration measure, market definition, and bite measure

We next probe our baseline estimates of Table 2 against a number of potential concerns regarding our empirical strategy. Table B4 addresses thin-market and upper-tail sensitivity. Column (1) excludes the monopsonistic labour market in which HHI equals one; columns (2) and (3) require at least five and at least ten employers in a labour market, respectively; column (4) excludes firms whose own employment share in the labour market exceeds 50%; and column (5) removes each firm’s own employment from its labour market and recalculates the HHI among the remaining employers. Across all five checks, the MW bite coefficient remains essentially unchanged at approximately -0.020 (significant at the 1% level), and the interaction coefficient remains positive and statistically significant, ranging between 0.056 and 0.095. The attenuation result is therefore not driven by literal monopsony, by very thin labour markets with few employers, by dominant firms, or by the mechanical contribution of a firm’s own employment share to the concentration index.

Table B5 considers alternative definitions of the key regressors. Column (1) redefines the labour market at the level of two-digit industries: the MW bite coefficient is -0.022 and the interaction is 0.021, both significant at the 1% level. Column (2) adopts an alternative MW bite definition based on the logged prevailing MW over average wages in the labour market: the level effect of the bite becomes statistically insignificant, while the interaction becomes

⁹We also find similar nonlinear results when considering an interaction at the 0.25 concentration level, which has been used to determine highly concentrated (product) markets. These results are available upon request.

larger. This specification supports the robustness of the moderation pattern. Column (3) adds labour market-specific linear trends: the MW bite coefficient is -0.020 and the interaction is 0.046, both statistically significant and close to the baseline.

Finally, Table B6 examines whether the results are sensitive to the sampling strategy of the data set. Note that the Chinese Industrial Enterprises Database include all state-owned firms, regardless of the sales revenue, and a subsample of firms in the private sectors with an annual sale revenue of more than CNY 5 million. This 5 million-revenue-threshold for private and foreign firms may not only confound the ownership results, but also lead to bias of the baseline estimates, as small firms are underrepresented in the study sample. We address this issue by reconstructing the concentration index using only firms above the CNY 5 million, CNY 10 million and CNY 20 million thresholds, as robustness check against potential bias from underrepresentation of smaller private and foreign firms. The MW bite coefficient remains negative and significant at the 1% level throughout (-0.019, -0.020 and -0.022), while the interaction coefficient remains positive and significant and increases somewhat in magnitude.

4.3 Heterogeneous employment effects by firm-ownership types

The above discussions are based on the assumption that all firms in China maximise profits in flexible markets. However, the Chinese economy remains heavily influenced by state control, particularly through state-owned firms. These firms still represent important shares in critical industries like energy, telecommunications, and finance. While decades of economic reforms have diminished many of the advantages once afforded to these firms, the government’s persistent involvement through policies, subsidies, and regulations continues to shape how these companies operate, including their wage setting and its responsiveness to local labour market conditions. Foreign firms have also been supported through subsidies and may exhibit different levels of productivity.¹⁰ Foreign-owned firms also tend to outperform domestic firms

¹⁰For example, the corporate income tax rate for all domestic firms is 33%, which was reduced to 15% for foreign-owned firms in specific regions and foreign-owned firms could receive tax return if these firms reinvest their revenues. This may free up resources that might be used for hiring and compensation. In addition, metropolis like Shanghai and Shenzhen provided subsidies to foreign firms that hired local workers and/or

with respect to productivity, possibly increasing their resilience against MW increases in any labour concentration. Moreover, employees' rights may be more stringent amongst foreign-owned firms, as some of these firms are subject to labor regulations in both home and host countries. Therefore, here we investigate potential differences across firms' ownership types (state and foreign-owned) in their responses to MWs and labour concentration.

Table 4 reports results separately by ownership. To start with, we report the wage effects in columns (1)-(3) and the employment effects in columns (4)-(6). Considering the wage equations, MW bite increases are associated with significantly higher average wages in domestic private and foreign-owned firms: the MW bite coefficient is 0.031 in column (2) and 0.033 in column (3), both significant at the 1% level. For state-owned firms, by contrast, the coefficient is 0.005 and statistically insignificant. None of the three ownership groups exhibits a statistically significant interaction between MW bite and Lag HHI in the wage equation. We therefore find no evidence that labour market concentration significantly alters the wage pass-through of MW bites for any ownership type. These wage estimates indicate that private and foreign firms complied with MW increases on the wage margin, which lends credibility to the employment responses discussed next.

(Table 4 here)

The employment equations in columns (4)-(6) reveal pronounced heterogeneity. For state-owned firms, neither MW bite nor its interaction is significant. For domestic private firms, the coefficients for MW bite is -0.029 and that for the interaction is 0.126, both significantly different from zero; the implied zero crossing is at an HHI of approximately 0.23. For foreign-owned firms, the estimate for the interaction of MW bite and HHI is statistically insignificant. Besides, we estimate a pooled model with ownership interactions (Table B7). The MW bite-HHI interaction coefficient for domestic private firms (the omitted base group) is 0.102. For state-owned firms, the implied coefficient turns negative, or -0.086, and the difference relative

provided technical and vocational education and training to employees.

to private firms of -0.188 is statistically significant at the 1% level. For foreign-owned firms, the implied coefficient is 0.033, with a difference of -0.069 that is not statistically significant. Formal tests reject the equality of the MW bite-HHI interaction coefficients across ownership groups, and Figure B3 plots the corresponding marginal effects. The attenuation of the MW disemployment effect documented in Section 4.1 thus comes predominantly from domestic private firms. The weaker sensitivity of foreign-owned firms is consistent with Hau et al. (2020), who find that foreign firms are generally less affected by MW policy than domestic firms.

Overall, these findings suggest that the MW responses of state-owned and foreign-owned firms are less sensitive to local labour market competition, in contrast to their domestic private counterparts. This asymmetry may reflect the access of the former two groups to government support, alignment with state objectives (state-owned firms) or higher productivity (foreign-owned firms) (Karlsson et al. 2009). It also suggests that the MW bite-HHI interaction effects presented in Section 4.1 originate in the segment of the economy whose behaviour is most closely aligned with the standard profit-maximising framework that generates the concentration interactions we document.

4.4 Non-linear employment effects: Impact function method

Here we test the robustness of our results to the methodology of Hau et al. (2020). Using the same data set as the one considered here, Hau et al. (2020) argue that a given MW increase has a non-linear effect on the wage bill, which will depend on the closeness between the MW and the average wage of the firm (our metric of bite). They use an impact function (*IF*) method to indicate such closeness. We extend their approach to our specific question by introducing interactions of the impact function and the other variables we are considering here.¹¹ Specifically, we estimate the following equation, including all interactions between the

¹¹See Table 1 for descriptive statistics of the *IF* variable. The Impact Function (IF) is defined as $(mw/w)^Z$, in which mw/w is the ratio of MW to firm's wage per worker (both in year t-1) and Z is 1.313 for small firms ($N \leq 200$), 1.426 for medium firms ($200 < N \leq 1000$) and 1.391 for large firms ($N > 1000$), respectively, in which N is the firm's employment.

three key variables (*MWhite*, *HHI* and the impact function):

$$\begin{aligned}\Delta \ln emp_{it} = & \alpha + \theta_1[IF_{it} \times \Delta \ln mw_{it}] + \theta_2 HHI_{i,t-1} + \theta_3[IF_{it} \times \Delta \ln mw_{it} \times HHI_{i,t-1}] \\ & + \theta_4 IF_{it} + \theta_5 \Delta \ln mw_{it} + \theta_6[\Delta \ln mw_{it} \times HHI_{i,t-1}] + \theta_7[IF_{it} \times HHI_{i,t-1}] \quad (4) \\ & + \gamma X_{ilt} + \tau_i + v_{jt} + \varepsilon_{it}\end{aligned}$$

In line with Hau et al. (2020), the dependent variable is now the difference in log employment levels between years $t - 1$ and t . The right-hand side variables include the change in MWs, $\Delta \ln mw$, and the heterogeneous firm exposure to MW changes, $IF \times \Delta \ln mw$. Based on our research question, we also include the lagged HHI and its interaction with the firm exposure to MWs, $IF \times \Delta \ln mw \times LagHHI$. This last term captures how labour concentration moderates the employment responses of firms of varied degrees of exposure to the MW.

(Table 5 here)

The panel regression with the fully specified model in Column (1) in Table 5 yields negative point estimates of -0.107 for $IF \times \Delta \ln mw$, -0.509 for $\Delta \ln mw \times LagHHI$, and, critically, of 0.899 for $IF \times \Delta \ln mw \times LagHHI$; estimates are very similar in column (2), in which we further consider labour market-specific linear trends. The point estimate of concentration's moderation of the minimum-wage-growth response becomes positive at an IF of 0.57. This specification therefore supports attenuation for sufficiently exposed firms.

4.5 Extensions: Firm exit and training provisions

As noted in previous studies (Mayneris et al. 2018, Rao & Risch 2026, Horton 2025), firms can respond to changes in labour cost (structure) through different margins of adjustment. In the remainder of the section, we investigate some of these channels. To start with, we analyse potential effects of MW and their interactions with labour concentration upon firm exit, which captures an extensive margin of employment. Our outcome of interest here takes value one if a firm was surveyed in a year but not in the next two consecutive years (0 otherwise).

We consider non-state-owned firms between 1998 and 2005, which exit from the survey in years when its annual revenue falls below CNY 5 million. In our results, presented in Table B8, we do not find evidence of significant interaction effects. Similar results emerge when considering exits over a one-year period only. These findings suggest that local labour market concentration influences the MW impact on employment only through the intensive margin of continuing firms analysed in our main results and not through an extensive margin of firm exit.

In another extension, we investigate how MWs and labour market concentration influence firms' provision of training to its employees. We believe this is the first analysis of this question. However, we regard this interaction between MWs and concentration on training (besides wages) to be an important issue, as employee training can play a key role in human capital, economic growth, and public policies. While the extant literature is limited, some studies suggest that MWs can reduce training investments by employers. For instance, as higher MW increase the costs of low-wage workers for firms, liquidity-constrained employers may cut back on non-essential investments, including training (Acemoglu & Pischke 2003, Neumark & Wascher 2008). Higher MW also reduce the scope for backloading wages while training investments take place. Second, local labour market concentration could increase firms' incentives to provide training (Adams-Prassl et al. 2023), for instance through a reduced scope for poaching by other firms (Martins & Thomas 2023).

Our hypothesis here follows the same reasoning as the case of employment above. As labour competition decreases, the gap between productivity and wages may be larger, implying that firms will decrease training investments less for any increase in MWs. In other words, the more concentrated the labour market, the less sensitive will firms' training provision be to any given MW bite. We test this hypothesis by adapting equation 2 and its control variables to the training outcomes available in our data. Table B9 presents the results for two dependent variables: a dummy equal to one if the firm reports positive training expenditure in the year (estimated in a linear probability model) in column (1), and the log of training expenditure

plus one yuan in column (2).

Table B9 presents the results. The MW bite is negatively and significantly related to training on both margins: the coefficients are -0.016 for the probability of providing any training and -0.091 for the log of training expenditure, both significant at the 1% level. Firms exposed to larger MW bites thus appear to adjust partly by curtailing training, consistent with the cost-based mechanisms discussed above. Second, and in contrast to the employment results, we find no statistically significant evidence that labour market concentration moderates these relationships: the coefficients on the MW bite-HHI interaction are -0.018 and -0.040, both insignificant, and the coefficients on HHI itself are also insignificant in both columns. The moderating role of employer concentration documented for employment therefore does not extend to firms' training decisions. We caution, however, that the training variable is available for a subsample of firm-years only, so these null interaction results are better interpreted as an absence of detectable moderation rather than as evidence of no effect.

5 Conclusions

Does local labour market competition influence firms' responses to minimum wages? We considered the case of China, using data covering a very large share of its massive manufacturing sector and 26,821 novel, hand-collected county-level MWs, between 1998 and 2007. We found that, consistently with monopsony views, the negative effects of MWs on employment are reduced when local labour market concentration is higher. While we find instances of positive employment effects of MWs, these only arise for domestic private firms in highly concentrated local labour market. These are indeed the types of firms that can be more likely to respond according to standard profit-maximising behaviour which could produce the concentration interactions we document here. In contrast, state-owned firms in China may have to follow several other restrictions while also benefiting from additional support (e.g., subsidies).

Several policy implications may be drawn from our findings. Policymakers may need to

pay more attention to local labour market structures when setting MWs (and possibly other labour market policies). Specifically, policymakers may need to move away from the highly homogeneous MWs that still prevail in many countries or large regions. In (sub-)regions with high labour market concentration, MW increases might be less harmful to employment than in more competitive local labour markets. Tailoring MW policies to account for regional labour market conditions can thus better balance the goals of supporting workers' labour incomes and their employment levels.

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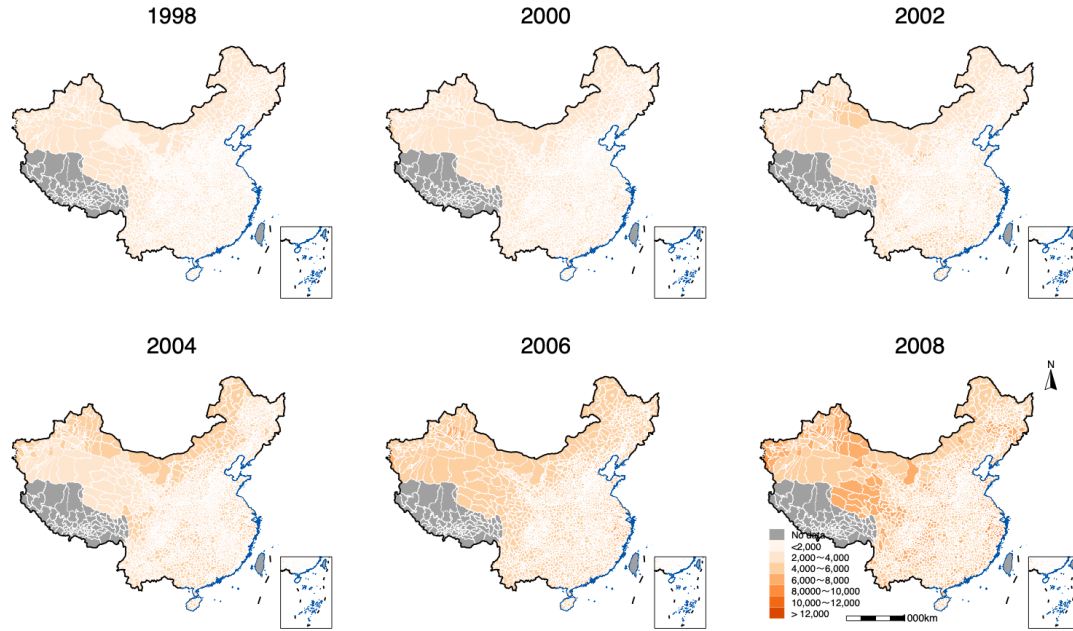
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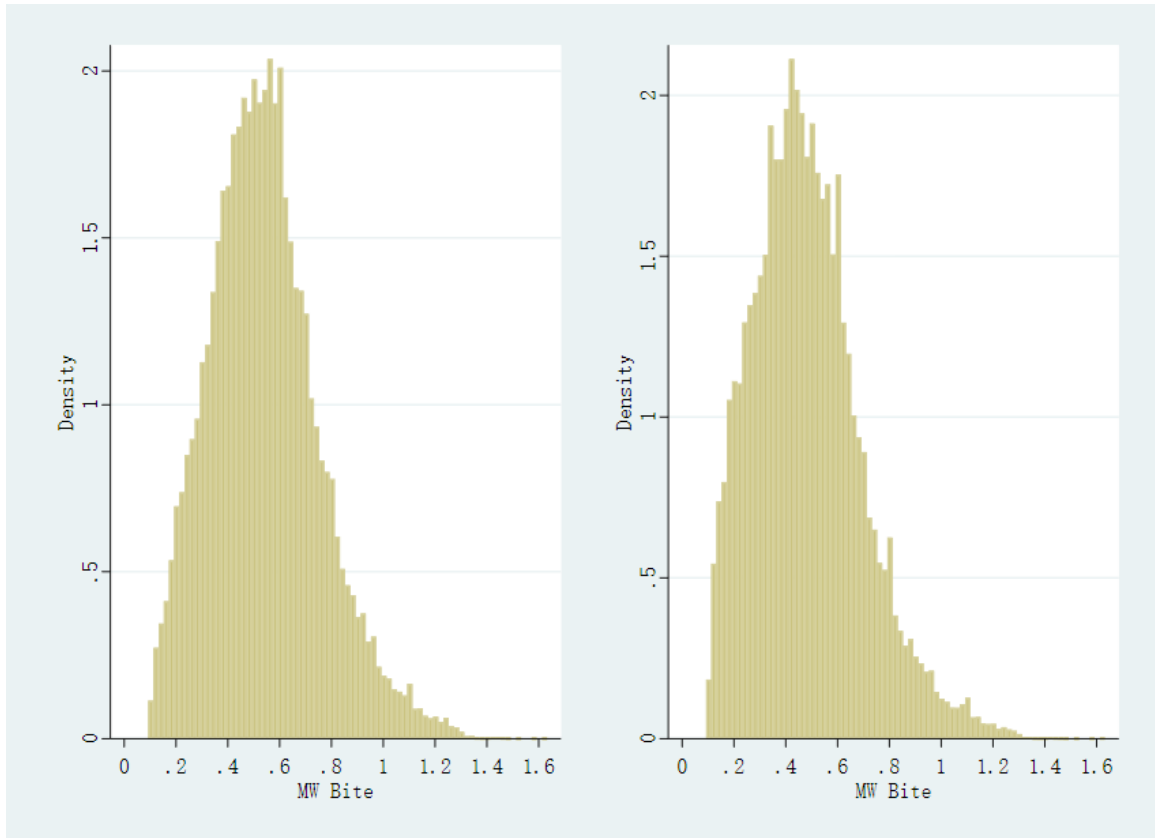
Figures

Figure 1: Nominal minimum wages in China



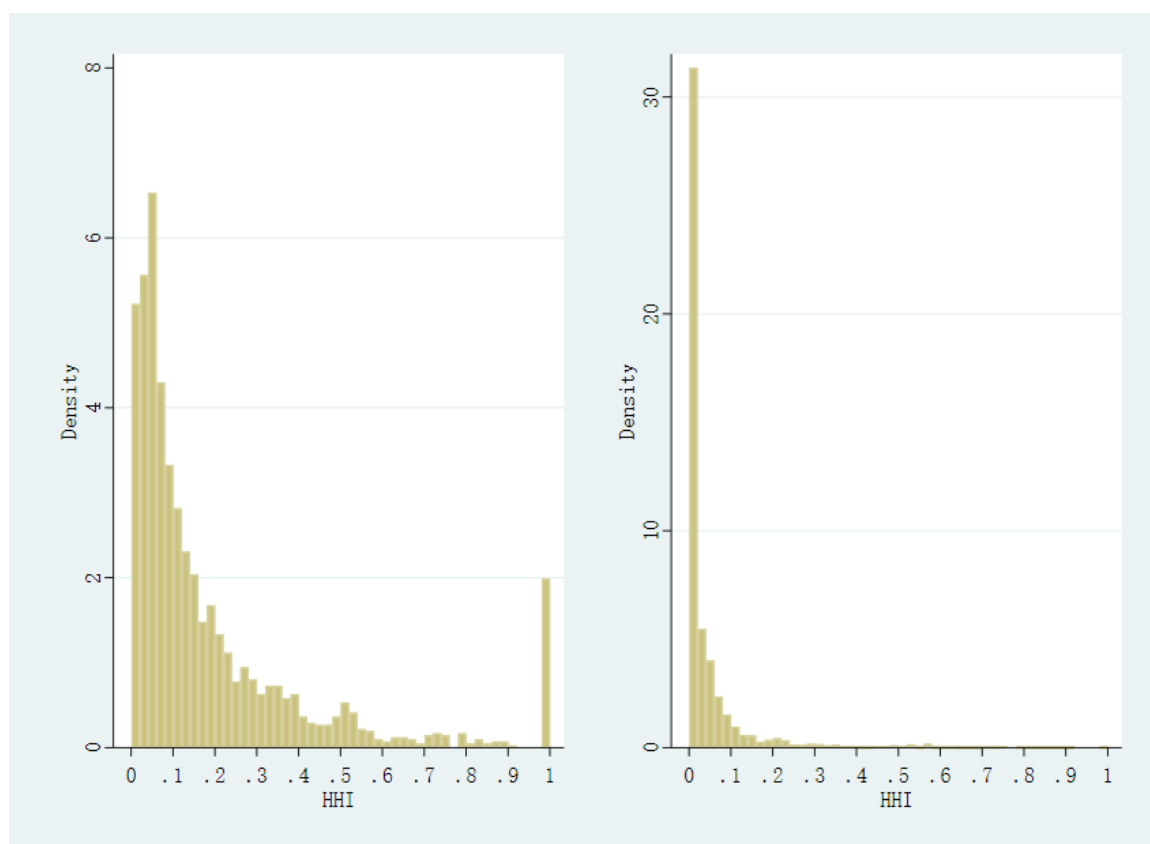
Notes: Distribution of nominal MWs across the years in China in every 2 years between 1998 and 2008. Data collected and compiled by the authors.

Figure 2: **Distribution of unweighted and employment-weighted 2007 MW bites**



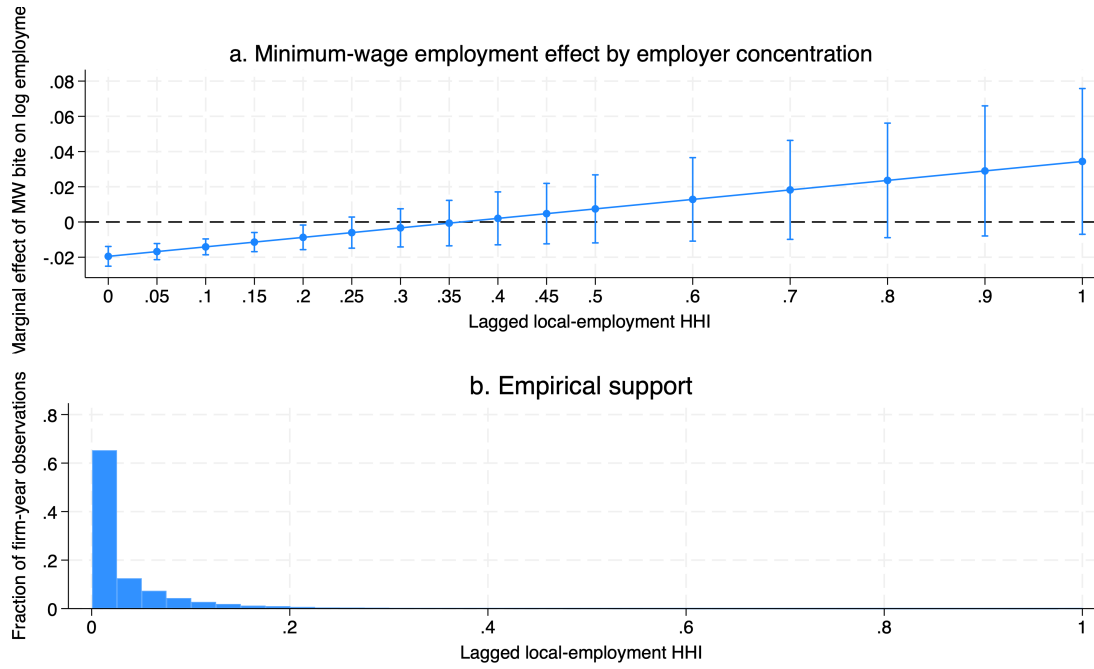
Notes: Own calculations based on the Chinese Industry Enterprises Database. The MW bite is the ratio of the 2007 MW in the county of the firm to the 2006 mean wage per worker of that same firm. Left-hand-side distribution: All firms carry the same weight, regardless of employment. Right-hand-side distribution: Each firm carries a weight proportional to its employment.

Figure 3: Distribution of HHI by the number of employees across local labour markets (left: unweighted; right: employment-weighted), 2007



Notes: Own calculations based on the Chinese Industry Enterprises Database. ‘HHI’ denotes the Herfindahl-Hirschman Index of employment in each local labour market. Left-hand-side distribution: All local labour markets carry the same weight, regardless of employment. Right-hand-side distribution: Each local labour market carries a weight proportional to its employment.

Figure 4: Marginal effects and empirical support



Notes: Panel a shows marginal employment effects of MW bite over HHI (the point estimates and the corresponding 95% confidence interval). Results derived from the fully specified model as in column (6) in Table 2. Panel b shows the distribution of firms (year) in the labour markets with varying degrees of HHI.

Tables

Table 1: Descriptive Statistics, 1998-2007

Variables	Observations	Mean	StDev	P10	P50	P90
Panel A: Firm Statistics – in Levels						
Employment (N)	1,622,617	277.8	1,012	33.00	115.0	530.0
MW/Wage per worker (mw_t/w_t)	1,622,617	0.539	0.329	0.257	0.486	0.822
MW Bite (mw_t/w_{t-1})	1,227,098	0.584	0.348	0.284	0.530	0.885
Wage per worker (wage)	1,622,617	13.101	8.763	5.414	11.175	22.492
Log total asset (lnasset)	1,622,617	9.781	1.405	8.177	9.612	11.64
Inventory to Output ratio	1,622,617	0.218	2.033	0.010	0.104	0.457
Private-owned Firm (private)	1,622,617	0.710				
Foreign-owned Firm (foreign)	1,622,617	0.201				
Total Training Fee	1,155,772	33.03	356.0	0.000	0.000	51.00
If Training	1,155,772	0.401				
Impact Function (IF)	1,227,098	0.461	0.452	0.162	0.379	0.757
Panel B: Labour Market Characteristics						
MW	20,783	3.907	1.166	2.537	3.759	5.511
MW/Average Wage per worker	20,783	0.462	0.175	0.295	0.438	0.648
HHI	20,783	0.221	0.241	0.027	0.133	0.533
Lag HHI	20,783	0.183	0.173	0.026	0.124	0.427
Total Employment	20,783	21,687	87,003	400.0	4,412	41,458
MW Change Rate ($\Delta \ln mw$)	18,726	0.084	0.085	-0.008	0.068	0.205

Notes: Own calculations based on the Chinese Industry Enterprises and MWs databases. All monetary variables converted to 2007 real values using the CPI of each province. Variables presented in thousands of yuan. ‘MW Bite’ is the ratio of MW in current year to wage per worker of each firm in previous year. The impact function (IF) reflects a firm’s exposure to the changes in MW and is calculated according to Hau et al. (2020): Impact Function (IF) = $(mw/w)^Z$, in which mw/w is the ratio of MW to firm’s wage per worker (both in year $t-1$) and Z is 1.313 for small firms ($N \leq 200$), 1.426 for medium firms ($200 < N \leq 1000$) and 1.391 for large firms ($N > 1000$). ‘HHI’ denotes the Herfindahl-Hirschman Index of employment for each labour market-year cell. ‘Total Training Fee’ refers to the education fee paid by firms for their employees, in thousands of yuan (RMB). ‘If Training’ is a dummy variable (if a firm pays training fees for their employees). As to the distribution of observations across years, of the 1.62 million observations, 6.8% are from 1999 and 15.4% from 2006.

Table 2: Minimum Wages and Market Concentration Effects on Employment

	(1)	(2)	(3)	(4)	(5)	(6)
MW bite	-0.252*** (0.015)	-0.247*** (0.020)	-0.034*** (0.002)	-0.039*** (0.003)	-0.017*** (0.002)	-0.020*** (0.003)
Lag HHI		-0.053 (0.096)		-0.109*** (0.036)		-0.039 (0.037)
MW bite x Lag HHI		-0.089 (0.116)		0.100*** (0.023)		0.054** (0.023)
(Industry x Province x Year) FEs	Yes	Yes	Yes	Yes	Yes	Yes
Firm FEs	No	No	Yes	Yes	Yes	Yes
Time-varying Controls	No	No	No	No	Yes	Yes
Observations	1,139,453	1,139,453	1,139,453	1,139,453	1,139,453	1,139,453
Adjusted R-squared	0.124	0.124	0.898	0.898	0.907	0.907

Notes: Dependent variable: Log employment. ‘MW Bite’ is the ratio of MW in current year (t) to wages per worker of each firm in previous year (t-1). ‘Lag HHI’ denotes the Herfindahl-Hirschman Index (HHI) of employment for each labour market in year t-1. Control variables are measured in previous year (t-1): log total assets (*logassets*), inventory to output ratio (*inventory_output*), private-ownership dummy variable (*private*), foreign-ownership dummy variable (*foreign*), log total employment in the labour market (*logtotalemployment*) and log average wages per worker in the labour market (*logtotalaveragewages*). ‘Industry x Province x Year FE’ are fixed effects for each combination of year, province and two-digit industry. Values in parentheses are robust standard errors adjusted for clustering at the labour market level. Significance levels: * 0.10, ** 0.05, *** 0.01.

Table 3: Minimum Wages and Market Concentration Effects on Employment by HHI Terciles

	(1)	(2)	(3)
MW bite	-0.311*** (0.050)	-0.056*** (0.009)	-0.032*** (0.008)
Mid-HHI	-0.105*** (0.033)	-0.031** (0.015)	-0.023** (0.011)
High-HHI	-0.109*** (0.034)	-0.045*** (0.017)	-0.019 (0.012)
MW bite x Mid-HHI	0.060 (0.053)	0.025** (0.011)	0.020** (0.010)
MW bite x High-HHI	0.091* (0.051)	0.034*** (0.010)	0.022** (0.008)
(Industry x Province x Year) FEs	Yes	Yes	Yes
Firm FEs	No	Yes	Yes
Time-varying Controls	No	No	Yes
Observations	1,139,453	1,139,453	1,139,453
Adjusted R-squared	0.125	0.898	0.907

Notes: Dependent variable: Log employment. ‘MW Bite’ is the ratio of MW in current year (t) to wages per worker of each firm in previous year (t-1). ‘HHI’ denotes the Herfindahl-Hirschman Index (HHI) of employment for each labour market in year t-1. ‘Mid-HHI’ and ‘High-HHI’ are dummy variables. ‘Mid-HHI’ is 1 if HHI between 0.081 (33%) and 0.210 (66%). ‘High-HHI’ is 1 if HHI larger than 0.210. Control variables as in Table 2. Values in parentheses are robust standard errors adjusted for clustering at the labour market level. Significance levels: * 0.10, ** 0.05, *** 0.01.

Table 4: **Minimum Wages and Market Concentration Effects on Employment by Ownership**

	(1)	(2)	(3)	(4)	(5)	(6)
		Log wage		Log employment		
	State	Private	Foreign	State	Private	Foreign
MW bite	0.005 (0.008)	0.031*** (0.006)	0.033*** (0.009)	-0.011* (0.006)	-0.029*** (0.003)	-0.006 (0.006)
Lag HHI	-0.047 (0.053)	-0.094* (0.049)	-0.149 (0.101)	-0.029 (0.046)	-0.124*** (0.043)	0.217** (0.100)
MW bite x Lag HHI	0.073 (0.055)	-0.063 (0.044)	-0.148 (0.135)	-0.056 (0.041)	0.126*** (0.028)	-0.112 (0.121)
(Industry x Province x Year) FEs	Yes	Yes	Yes	Yes	Yes	Yes
Firm FEs	Yes	Yes	Yes	Yes	Yes	Yes
Time-varying Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	91,542	788,858	232,868	91,542	788,858	232,868
Adjusted R-squared	0.744	0.633	0.661	0.958	0.893	0.911

Notes: Dependent variable: Log average wage or employment. ‘MW Bite’ is the ratio of MWs in current year (year t) to wages per worker of each firm in previous year (year t-1). ‘Lag HHI’ denotes the Herfindahl-Hirschman Index (HHI) of employment for each labour market in year t-1. Control variables as in Table 2. Values in parentheses are robust standard errors adjusted for clustering at the labour market level. Significance levels: * 0.10, ** 0.05, *** 0.01.

Table 5: Minimum Wages and Market Concentration Effects on Employment Growth (Impact Function)

	(1)	(2)
IF	-0.142*** (0.008)	-0.142*** (0.008)
$\Delta \ln mw$	0.045 (0.049)	-0.000 (0.051)
IF x $\Delta \ln mw$	-0.107* (0.059)	-0.105* (0.059)
Lag HHI	0.049 (0.034)	0.111*** (0.039)
IF x Lag HHI	0.020 (0.052)	0.012 (0.055)
$\Delta \ln mw$ x Lag HHI	-0.509*** (0.182)	-0.508*** (0.189)
IF x $\Delta \ln mw$ x Lag HHI	0.899** (0.381)	0.880** (0.391)
(Industry x Province x Year) FEs	Yes	Yes
Firm FE	Yes	Yes
Controls	Yes	Yes
Labour-market-specific linear trends	No	Yes
Observations	780,483	780,483

Notes: Dependent variable: Changes in log employment between year t and year $t-1$. For the definition and calculation of the impact function (IF), see Table 1. ' $\Delta \ln mw$ ' denotes annual changes in logged annual MW. 'Lag HHI' denotes the Herfindahl-Hirschman Index (HHI) of employment for each labour market in year $t-1$. All specifications include the following control variables in differences: annual changes in the log total assets ($\Delta \log assets$), annual changes in the inventory to output ratio ($\Delta inventory_output$), annual changes in the private-ownership dummy variable ($\Delta private$), annual changes in the foreign-ownership dummy variable ($\Delta foreign$), annual changes in the log total employment in the labour market ($\Delta \log total employment$) and annual changes in the log average wages per worker in the labour market ($\Delta \log total average wages$). 'Industry x Province x Year FE' are fixed effects for each combination of a year, a province and a two-digit industry. Values in parentheses are robust standard errors adjusted for clustering at the labour market level. Significance levels: * 0.10, ** 0.05, ***0.01.

A Data Appendix

A.1 Data Cleaning and Definitions

To eliminate the influence of outliers, following Cai & Liu (2009), Feenstra et al. (2014), Hau et al. (2020), and the 'Generally Accepted Accounting Principles', we drop firm-year observations when the following restrictions apply:

- (1) key variables (wages, total assets, operation profit, sales, inventory, gross output, net value of fixed assets, total liabilities, paid-in capital, etc.) are missing, zero, or negative;
- (2) the number of firm's workers is lower than 8 persons;
- (3) the firm's identification number is missing or the established time is not valid;
- (4) the ratio of added value to sales is outside the range of 0 to 1;
- (5) total assets are less than liquid assets, total fixed assets and the net value of fixed assets;
- (6) firm-year observations change their labour market during the sample period (this implies that 23,476 observations are dropped, accounting for 1.3% of total observations);
- (7) firms do not continuously exist for at least two years (this implies dropping 166,544 observations, of which 116,472 firms only exist for one year);
- (8) the ratio of local MW to the firm average wage across all firm-year observations is in the upper and lower 1% tail of the annual distribution (33,090 observations are thus excluded).

We classify firms as foreign if more than 25 percent of their stock shares are controlled by foreigners (including from Hong Kong, Macao and Taiwan), following the standard definition in China. For the remaining firms, we categorize them as state-owned or private firms according to the largest ownership share in registered capital. The changes in ownership during the research period are relative rare, and occur in only about 3.9% of all firm-year observations.

A.2 Minimum wages

Since the formal implementation of the MW system in China in 1994, the MW system has been gradually promoted throughout the country. MW setting is regarded as an important policy to regulate the labour market. According to the MW Regulation (Ministry of Labor and Social Security 1993), the political process for determining and adjusting the MW involves, in general, the following requirements and principles:

First, the labour and social security administrative departments of provinces, autonomous regions, and municipalities directly under the central government should study and formulate plans for determining and adjusting the MW standards. (Municipalities directly under the central government include Beijing, Shanghai, Tianjin and Chongqing.) These plans should be conducted together with trade unions, enterprise federations or employers' associations. The resulting plans should then be submitted to the Ministry of Labour and Social Security. The contents of the plan include the basis for the determination and adjustment of the MW, the scope of application, the formulation standards and any additional instructions. After receiving the draft plan, the Ministry of Labour and Social Security should seek the opinions of all China Federation of Trade Unions and China Enterprise Federation or Employers' Associations.

Second, When determining and adjusting the monthly MW standard, the bodies above are required to refer to the minimum living expenses of local employees and the remaining population, the consumer price index of urban residents, the social insurance premium and the housing accumulation fund paid by individual employees, the average wage of employees, the level of economic development, and the employment situation.

Finally, the different administrative regions within provinces, autonomous regions and municipalities directly under the central government may have different MW standards. We also note that, as the MW standard was first issued and implemented in Tibet in 2004, and there was no adjustment until 2007, our study does not include the case of Tibet.

We define the annual MW of a given county as $(t1 * mw1 + t2 * mw2)/12$, in which $t1$ and $t2$ are the number of months in which MWs $mw1$ and $mw2$, respectively, were in force during the relevant

year. For example, if a given county in a given year increases its MWs from $mw1$ to $mw2$ in July, then its annual MW in our data will be $(6 * mw1 + 6 * mw2)/12$.

Following Duan & Martins (2022), we regard all the districts in a city as one local labour market (see Baum-Snow et al. (2017) for a detailed description of China’s provinces and cities). These districts are urban areas and usually have the same MW. In contrast, we regard each county as a different local labour market. Counties usually belong to the rural area, which may have different MWs due to their different economic conditions. Table A1 shows the number of counties, labour markets and MWs (real and nominal) in the data.

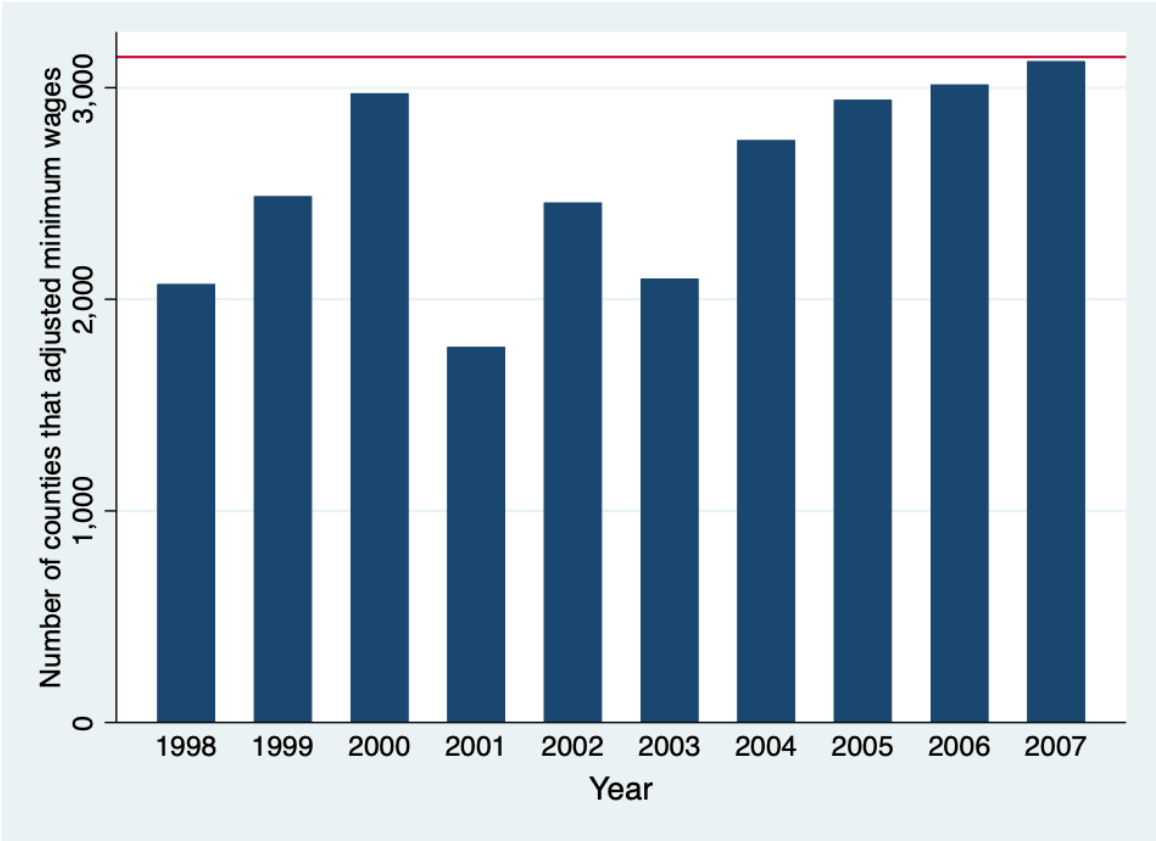
Table A1: Number of Counties, Labour Markets and Minimum Wages per year

Year	Counties	Labour Markets	Different Nominal MW	Different Real MW
1998	2644	2057	35	125
1999	2700	2109	65	124
2000	2687	2095	66	143
2001	2687	2089	85	149
2002	2689	2088	83	138
2003	2686	2081	59	131
2004	2678	2065	101	160
2005	2687	2068	64	143
2006	2690	2072	121	176
2007	2673	2059	85	85

Notes: ‘Nominal MW’ is expressed in 2007 real values (‘Real MW’) by using the CPI of each province. ‘Nominal MW’ and ‘Real MW’ are both defined at the county level. If two different counties have the same MW, we define it as two different MWs.

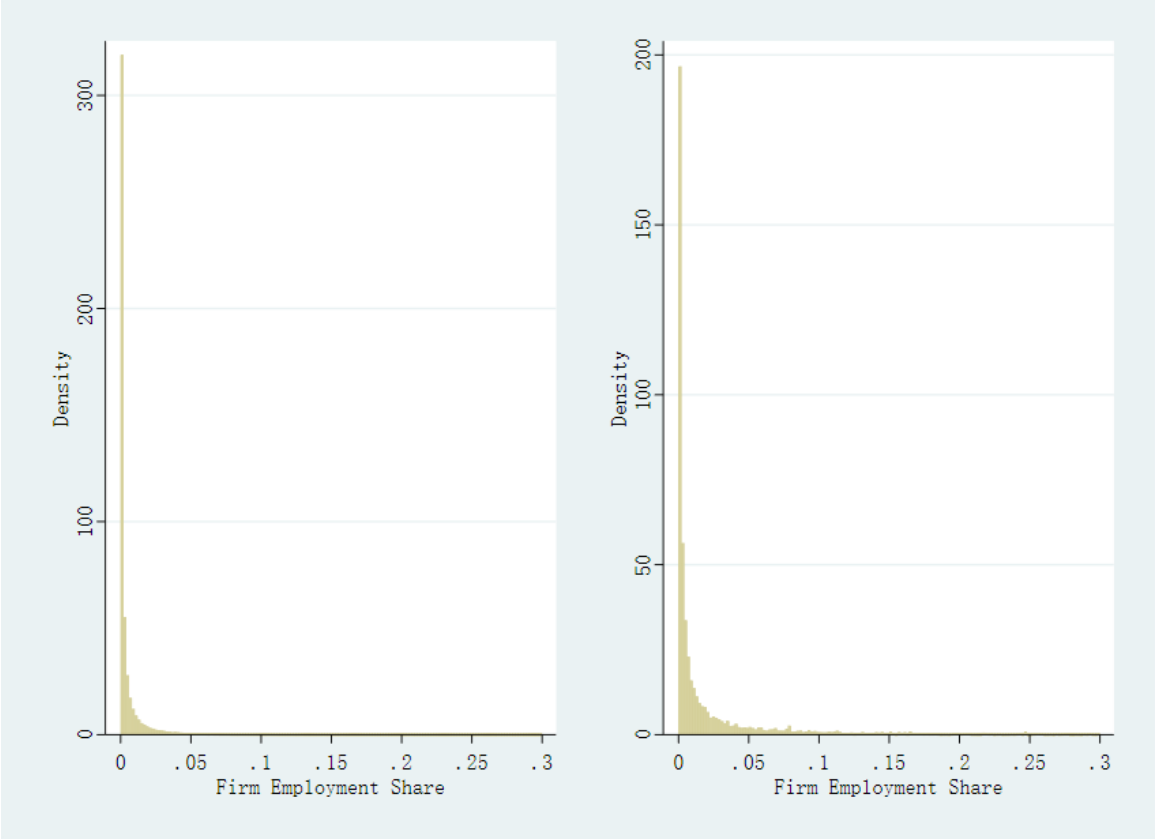
B Additional Figures and Tables

Figure B1: Yearly minimum wage adjustment, 1998-2007



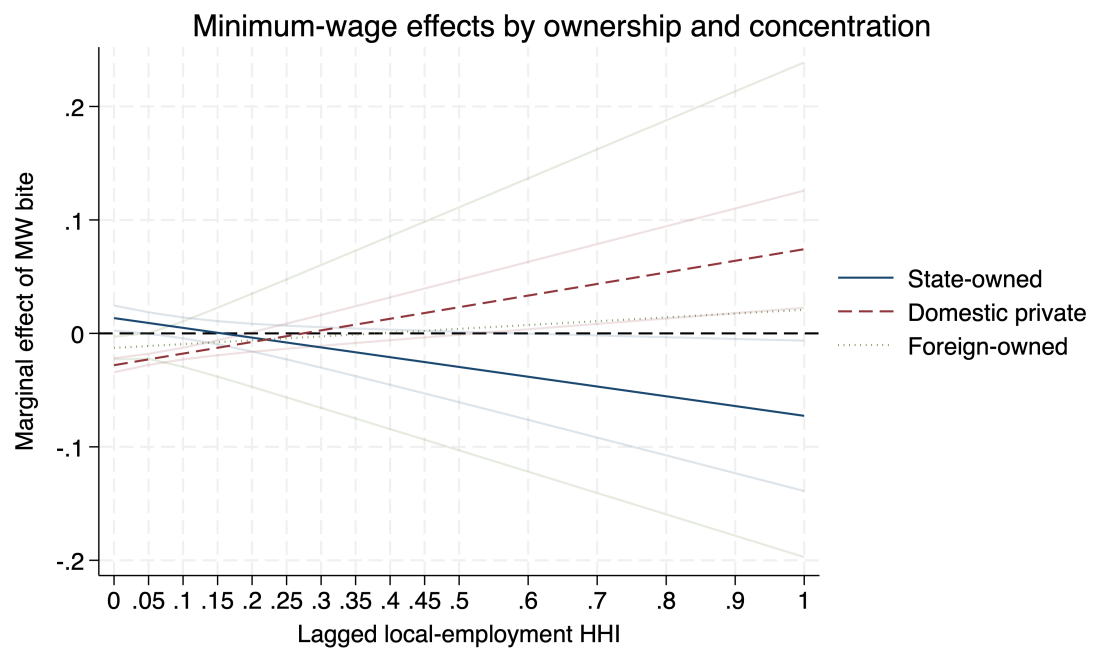
Notes: The graph indicates the number of counties that adjusted MWs in each year between 1998 and 2007. The horizontal red line indicates the total number of counties (3,145) during the study period. Source: Authors' analysis based on hand-collected MW data.

Figure B2: **Distribution of Firm Employment Shares** (left: unweighted; right: employment-weighted), 2007



Notes: Own calculations based on the Chinese Industry Enterprises Database. ‘Firm Employment Share (sfemp)’ is the proportion of the firm’s employment in the total employment in its local labour market. Left-hand-side distribution: All firms carry the same weight, regardless of the number of employees. Right-hand-side distribution: Each firm carries a weight in the histogram that is proportional to its employment level.

Figure B3: Marginal effects by ownership



Notes: Marginal employment effects of MW bite over HHI for firms of different ownership.

Table B1: Effect of Minimum Wages on Log Employment/KL changes

	$\Delta \ln N$ (1)	$\Delta \ln N$ (2)	$\Delta \ln kl$ (3)	$\Delta \ln kl$ (4)
IF x $\Delta \ln mw$	-0.092*** (0.029)		0.122*** (0.041)	
IF x $\Delta \ln mw$ x state		-0.003 (0.048)		0.072 (0.069)
IF x $\Delta \ln mw$ x foreign		-0.247*** (0.089)		0.440*** (0.125)
IF x $\Delta \ln mw$ x private		-0.094*** (0.035)		0.080 (0.053)
$\Delta \ln mw$	0.006 (0.018)		-0.044 (0.029)	
IF	-0.128*** (0.003)		0.139*** (0.005)	
$\Delta \ln mw$ x state		-0.048* (0.026)		-0.018 (0.042)
$\Delta \ln mw$ x foreign		0.028 (0.038)		-0.171*** (0.055)
$\Delta \ln mw$ x private		0.016 (0.022)		-0.022 (0.036)
IF x state		-0.134*** (0.006)		0.139*** (0.008)
IF x foreign		-0.105*** (0.008)		0.108*** (0.011)
IF x private		-0.132*** (0.004)		0.146*** (0.006)
state		0.005 (0.006)		0.011 (0.011)
private		0.010* (0.005)		-0.024*** (0.009)
Constant	0.079*** (0.002)	0.071*** (0.005)	-0.009*** (0.003)	0.007 (0.008)
Firm FE	Yes	Yes	Yes	Yes
Industry x Year FE	Yes	Yes	Yes	Yes
Observations	1,139,700	1,139,700	1,139,700	1,139,700

Notes: This table compares our results with those of Table B2 (Hau et al. 2020)). For the definition and calculation of the impact function (IF), see Table 1. ‘*Industry × YearFE*’ are fixed effects for all combinations of year and two-digit industry. Values in parentheses are robust standard errors adjusted for clustering at the county-year level. Significance levels: * 0.10, ** 0.05, ***0.01.

Table B2: Replication of Original Results of (Hau et al. 2020)

	$\Delta \ln N$ (1)	$\Delta \ln N$ (2)	$\Delta \ln kl$ (3)	$\Delta \ln kl$ (4)
IF x $\Delta \ln mw$	-0.195*** (0.034)		0.352*** (0.046)	
IF x $\Delta \ln mw$ x state		-0.089* (0.050)		0.084 (0.063)
IF x $\Delta \ln mw$ x foreign		-0.424*** (0.076)		0.716*** (0.104)
IF x $\Delta \ln mw$ x private		-0.181*** (0.041)		0.345*** (0.058)
$\Delta \ln mw$	0.032** (0.015)		-0.048** (0.023)	
IF	-0.159*** (0.005)		0.165*** (0.006)	
$\Delta \ln mw$ x state		0.029* (0.015)		-0.026 (0.023)
$\Delta \ln mw$ x foreign		0.031 (0.029)		-0.088** (0.040)
$\Delta \ln mw$ x private		0.038* (0.020)		-0.053* (0.030)
IF x state		-0.135*** (0.008)		0.139*** (0.010)
IF x foreign		-0.138*** (0.010)		0.142*** (0.012)
IF x private		-0.166*** (0.005)		0.171*** (0.007)
state		-0.011* (0.006)		-0.008 (0.009)
private		0.012** (0.006)		-0.002 (0.008)
Constant	0.087*** (0.002)	0.080*** (0.005)	0.020*** (0.003)	0.022*** (0.007)
Firm FE	Yes	Yes	Yes	Yes
Industry x Year FE	Yes	Yes	Yes	Yes
Observations	1,110,189	1,110,189	1,110,189	1,110,189

Notes: Own calculations based on codes and data provided in Hau et al. (2020)'s online appendix ([link](#)).

Table B3: Comparison of Minimum Wage Data

Year	Observations	Mean	StDev	P10	P50	P90
Panel A: Nominal Minimum Wage Changes (in log)						
2001	2,665	0.051	0.068	0.000	0.022	0.143
2002	2,660	0.094	0.084	0.000	0.082	0.203
2003	2,667	0.057	0.057	0.000	0.047	0.136
2004	2,643	0.101	0.083	0.000	0.073	0.223
2005	2,667	0.132	0.089	0.005	0.126	0.255
2006	2,670	0.101	0.088	0.013	0.080	0.223
2007	2,670	0.130	0.076	0.050	0.102	0.255
Panel B: Real Minimum Wage Changes (in log)						
2001	2,687	0.044	0.068	-0.008	0.025	0.132
2002	2,689	0.100	0.086	-0.001	0.087	0.217
2003	2,686	0.043	0.057	-0.016	0.036	0.119
2004	2,678	0.061	0.083	-0.036	0.035	0.200
2005	2,687	0.114	0.089	-0.011	0.102	0.233
2006	2,690	0.086	0.088	-0.003	0.068	0.213
2007	2,673	0.080	0.076	-0.000	0.059	0.197
Panel C: Minimum Wage Changes (in log) in Hau et al. (2020)						
2001	2,773	0.055	0.083	0.000	0.018	0.170
2002	2,772	0.102	0.097	0.000	0.092	0.258
2003	2,779	0.064	0.069	0.000	0.050	0.170
2004	2,761	0.097	0.093	0.000	0.074	0.249
2005	2,785	0.130	0.101	0.000	0.118	0.255
2006	2,788	0.105	0.087	0.013	0.090	0.233
2007	2,743	0.144	0.091	0.035	0.120	0.281

Notes: Panels A and B report the summary statistics for county-level nominal and real MW changes (in logs), respectively. Panel C describes the summary statistics for county-level MW changes (in logs) as in Hau et al. (2020) by using the data provided in the article's online appendix ([link](#)).

Table B4: Robustness: thin market and upper-tail sensitivity

	(1)	(2)	(3)	(4)	(5)
MW bite	-0.020*** (0.003)	-0.020*** (0.003)	-0.021*** (0.003)	-0.020*** (0.003)	-0.020*** (0.003)
Lagged HHI	-0.068* (0.039)	-0.131*** (0.043)	-0.203*** (0.047)	-0.137*** (0.039)	-0.028 (0.031)
MW bite x lagged HHI	0.062** (0.024)	0.072*** (0.028)	0.095*** (0.033)	0.076*** (0.025)	0.056*** (0.020)
(Industry x Province x Year) FEs	Yes	Yes	Yes	Yes	Yes
Firm FEs	Yes	Yes	Yes	Yes	Yes
Time-varying Controls	Yes	Yes	Yes	Yes	Yes
Observations	1,138,787	1,133,308	1,116,793	1,136,192	1,138,751
Adjusted R-squared	0.907	0.907	0.906	0.906	0.907

Notes: Fully specified model as in baseline regressions. Column (1) excludes the monopsonistic labour market ($HHI = 1$). Column (2) requires at least five employers in a labour market. Column (3) requires at least ten employers in a labour market. Column (4) excludes firms with own employment shares above 50%. Column (5) excludes the firm's own employment of the labour market, and recalculate the concentration among remaining employers. Values in parentheses are robust standard errors adjusted for clustering at the labour market level. Significance levels: * 0.10, ** 0.05, *** 0.01.

Table B5: **Robustness: alternative labour market trends**

	(1)	(2)	(3)
MW bite	-0.022*** (0.003)	0.005 (0.014)	-0.020*** (0.003)
Lagged HHI	0.013 (0.008)	0.245*** (0.047)	-0.039 (0.030)
MW bite x lagged HHI	0.021*** (0.007)	0.274*** (0.046)	0.046** (0.023)
Time-varying Controls	Yes	Yes	Yes
Firm FEs	Yes	Yes	Yes
(Industry x Province x Year) FEs	Yes	Yes	Yes
(Labour market x Year) FEs	No	No	No
LM Linear Trend	No	No	Yes
Observations	1139453	1,139,453	1,139,453
Adjusted R-squared	0.907	0.907	0.908

Notes: Fully specified model as in baseline regressions. Column (1) uses the alternative definition of labour market that considers two-digit industries. Column (2) uses the alternative definition of MW bite of the logged value of the prevailing minimum wages over the average wages in the labour market. Column (3) includes labour market-specific linear trends as fixed effects. Values in parentheses are robust standard errors adjusted for clustering at the labour market level. Significance levels: * 0.10, ** 0.05, *** 0.01.

Table B6: **HHI threshold sensitivity test**

	(1) HHI: sales $\geq 5m$	(2) HHI: sales $\geq 10m$	(3) HHI: sales $\geq 20m$
MW bite	-0.019*** (0.003)	-0.020*** (0.003)	-0.022*** (0.003)
Lagged HHI	-0.034 (0.031)	-0.046** (0.022)	-0.027* (0.016)
MW bite x lagged HHI	0.041** (0.018)	0.047*** (0.014)	0.051*** (0.011)
Observations	1,138,546	1,136,565	1,131,377
Adjusted R-squared	0.907	0.907	0.907

Notes: Fully specified model as in baseline regressions. Column (1), (2) and (3) use alternative calculation of HHI by considering only the subsamples of firms with the annual nominal sales revenue of more than CNY 5 million, CNY 10 million and CNY 20 million, respectively. Values in parentheses are robust standard errors adjusted for clustering at the labour market level. Significance levels: * 0.10, ** 0.05, *** 0.01.

Table B7: **Pooled ownership model**

	Log employment
State	0.049*** (0.008)
Foreign	0.025*** (0.007)
MW bite	-0.028*** (0.003)
State x MW bite	0.042*** (0.006)
Foreign x MW bite	0.015*** (0.005)
Lagged HHI	-0.057 (0.043)
State x lagged HHI	0.138*** (0.041)
Foreign x lagged HHI	-0.208** (0.096)
MW bite x lagged HHI	0.102*** (0.028)
State x MW bite x lagged HHI	-0.188*** (0.046)
Foreign x MW bite x lagged HHI	-0.069 (0.118)
(Industry x Province x Year) FEs	Yes
Firm FEs	Yes
Time-varying Controls	Yes
Observations	1,139,453
Adjusted R-squared	0.907

Notes: Domestic private firms as the base group (omitted). Values in parentheses are robust standard errors adjusted for clustering at the labour market level. Significance levels: * 0.10, ** 0.05, *** 0.01.

Table B8: **Minimum Wages and Market Concentration Effects on Firm Exit**

	(1) Absent next year	(2) Absent in next two years
MW bite	0.012*** (0.002)	0.013*** (0.002)
Lagged HHI	-0.002 (0.030)	-0.036 (0.033)
MW bite x lagged HHI	-0.020 (0.021)	-0.029 (0.019)
Observations	826,809	601,890
Adjusted R-squared	0.126	0.167

Notes: ‘MW Bite’ is the ratio of MWs in current year (t) to wages per worker of each firm in previous year (t-1). ‘Lag HHI’ denotes the Herfindahl-Hirschman Index (HHI) of employment for each labour market in year t-1. Control variables as in Table 2 *plus* log employment in year t-1. Values in parentheses are robust standard errors adjusted for clustering at the labour market level. Significance levels: * 0.10, ** 0.05, *** 0.01.

Table B9: Minimum Wages and Market Concentration Effects on Firm Training

	(1)	(2)
	if_training	log(trainingfee+1)
MW bite	-0.016*** (0.003)	-0.091*** (0.011)
Lag HHI	0.053 (0.035)	0.094 (0.119)
MW bite x Lag HHI	-0.018 (0.024)	-0.040 (0.088)
(Industry x Province x Year) FEs	Yes	Yes
Firm FE	Yes	Yes
Controls	Yes	Yes
Observations	840,432	840,432

Notes: 'if_training' is a dummy variable equal to one if the firm reports expenses in training in that year. 'log(training fee+1)' is the log of the training expenses (plus one thousand yuan) in that year'. 'MW Bite' is the ratio of MWs in current year (t) to wages per worker of each firm in previous year (t-1). 'Lag HHI' denotes the Herfindahl-Hirschman Index (HHI) of employment for each labour market in year t-1. Control variables as in Table 2 *plus* log employment in year t-1. Values in parentheses are robust standard errors adjusted for clustering at the labour market level. Significance levels: * 0.10, ** 0.05, *** 0.01.