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Local labour concentration moderates the disemployment effects of minimum wages in China*

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Abstract

Local labour market concentration may influence firms' employment responses to minimum wages. We evaluate this hypothesis using comprehensive 1998-2007 data on China's manufacturing sector and about 1,400 hand-collected county-level minimum wages. We find that, consistently with monopsony views, the negative effects of minimum wages on employment are reduced when labour market concentration is higher. We also find positive employment effects of minimum wages, but only in some specifications and in highly concentrated labour markets (representing a relatively small share of employment). Firms' training provision is also harmed less by minimum wages in more concentrated local markets. Our findings highlight the heterogeneity of policy impacts across local labour markets.

Keywords: Minimum wages, labour market concentration, employment, monopsony, training.

JEL Codes: J31, J38, J42.

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1 Introduction

The degree of employer concentration in local labour markets may influence a firm's response to minimum wages (Manning 2011). For instance, if a firm is one of only a handful of employers in a particular geographical labour market (e.g., a commuting zone), such firm may be able to pay their workers substantially below their productivity. In such case, an increase in the minimum wage (MW, henceforth) may not only not have the disemployment effects that are expected in competitive labour markets – it may even have positive employment effects.

A key recent contribution to test empirically this theoretical hypothesis is Azar et al. (2023), which study low-wage labour markets in the United States. Azar et al. (2023) find that while minimum wage significantly decrease employment in low concentration markets, such MW-induced employment changes become less negative as labour market concentration increases. These employment changes are even estimated to be positive in highly concentrated markets, particularly in the retail labor market. Okudaira et al. (2019), which study the case of Japan, also find less negative employment effects from minimum wage increases in more concentrated local labor markets. These results are more important as they emerge in the context of several recent studies that have uncovered potentially high levels of labour market concentration, in some cases with significantly large negative effects on wages (Azar et al. 2022, 2023, Rinz 2022, Benmelech et al. 2022, Martins & Melo 2024, Bassanini et al. 2024, Dodini et al. 2024, Liu et al. 2024, Amodio & de Roux 2024). Overall, the study of the moderation role of labour market concentration can thus contribute towards the reinterpretation of the large literature on the effects of MW on employment. This latter literature includes, more recently Neumark et al. (2014), Meer & West (2016), Harasztosi & Lindner (2019) and Clemens & Wither (2019). Indeed, while the overall effects of MW can be regarded as mixed, many recent studies tend to find small disemployment effects, which could be explained by increasing levels of labour market concentration or employer power.

Our study contributes to the empirical analysis of this hypothesis, regarding the role of

local labour market concentration in the employment effects of minimum wages. If such moderation effects are detected, we argue that it may be important to consider to a greater extent the characteristics of regional markets when setting policy variables. Specifically, welfare may increase from setting MW depending on the level of concentration of local labour markets, in contrast to the common practice around the world of setting the same statutory MW values for large regions or single countries.

As far as we know, this paper is the first that examines this question in the context of an emerging economy (China, in our case). In these countries, institutions such as employment law or collective bargaining (Bassanini et al. 2024) can all be different, leading to potentially different MW-employment effects. Ultimately, it is an empirical question whether MW disemployment effects may be affected by labour market concentration in emerging economies. If they are, it is also unclear if such interaction effects can be strong enough to lead to positive MW-employment effects as in Azar et al. (2023). China is also of particular interest on its own right, given its large size and potential ripple effects around the world (Autor et al. 2021).[1] In this context, how MW affect employment in China's manufacturing sector – and the potential moderation effect of local labour market concentration – is an important topic both for research and policy.

Our empirical analyses draw on a firm-level data covering both a very large share of the manufacturing sector and hand-collected county-based minimum wage data between 1998 and 2007. As there is no official minimum wage database in China, we collected and collated the monthly minimum wages of nearly 3,000 county-level administrative regions over this period. Drawing on this original and detailed data set, we make a number of contributions. First, consistently with monopsony views and Azar et al. (2023) in their analysis of the U.S., we find that the negative effects of minimum wages on employment in an emerging economy

[1]For instance, China's manufacturing sector, which we study here using near complete data for several years, employed 178 million workers. These workers also exhibit considerable homogeneity, as 120 million of them had at most six years of schooling. They account for a sizable fraction of China's labour market: 23.8% and 35.3% in total employment and urban employment, respectively, as of 2005 (and 28.8% and 37.7%, respectively, in 2022). Moreover, in contrast to developed economies, where low-wage jobs are frequently found in the service sector, a substantial proportion of workers in China's industrial sector are paid minimum wages. This makes it possible to detect MW disemployment effects in manufacturing.

such as China are also reduced when labour market concentration is higher.[2] Second, we find positive employment effects of minimum wages, but only in some specifications and in highly concentrated labour markets (representing a relatively small share of employment). Third, we consider the case of training provision by firms, finding evidence that it can also be less negatively affected by minimum wages in more concentrated local labour markets.

The remaining of this paper is as follows: The next section presents the institutional aspects of China's labour market and its minimum wage setting. Section 3 presents our data and methodology. Section 4 describes 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, minimum wages, also in the context of emerging economies.

2 Institutions and minimum wages in China

Minimum wages in China were first introduced in the 1993 Minimum Wage Regulation for Enterprises (Ministry of Labor and Social Security 1993) which came into force from 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, including the privatization of small- and medium-size state-owned firms, the introduction of flexible wages depending on productivity, and large layoffs. There was a significant higher education expansion since 1999 (Dai & Martins 2024) and the 2001 accession into WTO. Later reforms included changes in employment protection (Yang 2023).

According to the 1993 Minimum wage Regulation (Ministry of Labor and Social Security 1993), provincial governments set several levels of prevailing minimum wage 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 (see more details in Section A.2). Moreover, each locality should decide the effective minimum wages taking

[2] We also extend Hau et al. (2020) to a longer period, different measurement approaches and specifications and again find that minimum wage hikes reduce employment (growth). MW studies in China also include Wang & Gunderson (2011), Lin & Yun (2016) and Mayneris et al. (2018).

into account living expenses, average wages, productivity and employment rate in that same locality. The 1993 Regulation mandated that the value of the minimum wage should also not be adjusted more than once in a year. This policy approach thus allowed regional governments to experiment and choose between minimum wage setting methods depending on local conditions and preferences. In any case, these minimum wages suggested by provincial labour bureaus should be submitted to central labour bureau for feasibility study before they could be published by provincial governments. Local labour bureaus were also accountable to monitor implementation and could impose fines on firm noncompliance. As to coverage, the central labour Bureau, Ministry of Labor and Social Security, mandated that all urban firms were subjected to minimum wages and allowed provincial governments to decide whether village and township enterprises (VTEs) in the rural areas in the jurisdiction would also be subject to wage floors.[3]

We also note that the 1993 minimum wage regulation was updated in 2004, featuring increased coverage and stricter enforcement. The 2004 regulation mandated that wage floors had to be applied to all types of firms. It also required that minimum wages were adjusted at least once every two years; and that minimum wages 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, penalties for firm noncompliance increased considerably, from 20-100% of the wage owed in the 1993 regulation, to 100-500% in the 2004 regulation. Indeed, over the 1998-2007 period, we find a total of 764 different nominal minimum wages and 1374 different real minimum wages across regions and years in China.

As to empirical studies on the effects of minimum wages in China, see Mayneris et al. (2018) for an evaluation of the impact of the 2004 minimum wage law, including large increases in minimum wages and enforcement. They find lower survival rates among exposed firms. Amongst surviving firm, Mayneris et al. (2018) find increases in both wage costs and

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

productivity, which resulted in no change in profitability and limited job loss.[4] In contrast, Hau et al. (2020) find disemployment effects of minimum wage increases across firm ownership types in China. Labour-to-capital substitution is more pronounced among large and foreign-owned firms with a low average wage. This is accompanied by a relative increase in total factor productivity and non-negative output growth.[5]

We also note China's institutional context of some labour market rigidity (e.g., those driven by the presence of state-owned firms and the household registration system). Moreover, the legacy of state-owned firms creates considerable scope for monopsony. Indeed, there are many examples of 'factory towns' across China, such as the the city of Daqing (oil) 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). Notably, the introduction of MW in 1993 and stricter enforcement of minimum wage regulations in 2004 happened as China deepened its market-oriented reform of wage grids.[6]

3 Data and Methodology

3.1 Data

To understand how labour market concentration moderates the employment effect of minimum wages in China, 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,

[4]Ge & Yang (2014) indicates 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.

[5]Disemployment effects of minimum wages are more likely to be found in disadvantaged groups like migrant workers (Wang & Gunderson 2012), female, young and less-educated workers (Fang & Lin 2015). As discussed in Section 1, minimum wages in China and elsewhere may also affect many different dimensions of firms (Du et al. 2022, Fan et al. 2021, Huang et al. 2021, Li et al. 2022).

[6]China's wage grids are a structured system used to determine employee salaries across sectors and job levels. This system aims to standardize wages, ensure fair compensation, and address income disparities. Wage grids typically consist of predefined salary ranges and criteria based on job positions, qualifications, and years of experience. They are part of China's broader labour policies designed to balance economic growth and social equity.

total assets, total 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).[7] Due to missing key variables from 2008 onwards, our analysis is focused on the 1998-2007 period.

The second data set is on minimum wages. As there is no official minimum wage database in China, we collected and collated the monthly minimum wages of nearly 3,000 county-level administrative regions, again from 1998 to 2007. This was done by browsing the websites of provincial and municipal labour and social security bureaus, the Pkulaw website, and consulting policy documents.[8] As monthly minimum wages can change at any time of the year, we computed the annual minimum wage of each county by weighting each wage 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 minimum wage by averaging the annual minimum wage of each county/district. Finally, we match the minimum wage and the firm-level data sets by using the labour market classification code present in both data sets.[9] Our final sample is an unbalanced panel data, consisting of 362,331 unique firms and 1,622,617 firm-year observations. Each (firm-year) observation is matched to the applicable minimum wage in the same year and region, following the steps above.

Table 1 presents the descriptive statistics of the main variables used in our empirical analysis. We find that the ratio of the minimum wage, with respect to the average wage of

[7]These 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 2010, the threshold was increased to 20 million yuan. See Appendix A.1 for more details on the data and our sample selection.

[8]`https://www.pkulaw.com/` provides official legal documents on minimum wages, 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 minimum wages in China and Table A1 for the number of counties, labour markets, and minimum wages per year in our sample data.

[9]To 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 the 'General 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.

the firm, is 53.9% on average across all firms. Moreover, the average minimum wage bite (the same ratio but considering the minimum wage of the next year) is 58.4%. These statistics indicate that minimum wages represent a large share of the wages paid to workers in many of the firms covered in our data set. Indeed, the 90th percentiles of the two distributions above (minimum wage shares and bites) are 82.2% and 88.5%, respectively. Figure 1, which presents the distributions of the minimum wage bite, in one particular year (2007), weighting or not by employment, also highlights the considerable spread in such bites.

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 of this distribution is only 0.1%, a result that highlights the very large skewness of this variable. This can also be seen from Figure B1, which presents the distributions of firms' local labour market employment share in one particular year (2007).

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

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

Here, $I(l,t)$ is the number of firms in that labour market (county or county group) and year; 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 firm operating in the local labour market).[10] Figure 2 presents the distribution of HHI by the number of employees across local labour markets (weighting 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 weighting for

[10]We 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. This is a potential source of measurement error, as the data does not provide information to identify these establishments. However, a firm's subsidiaries (affiliates) are treated as independent business entities and, therefore, as different observations in the data.

employment, the latter cases virtually disappear, indicating that monopsony firms tend to be relatively small. Specifically, the average HHI is 0.133, below the threshold of 0.25 that separates high- and low-concentration labour market in Azar et al. (2023). 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 (Figure 2). We exploit this heterogeneity to identify the effect of labour market concentration, as we explain below.

3.2 Empirical Model

Our interest is in understanding the impacts of the minimum wage and its interaction with labour market concentration on firm employment. We investigate this by estimating the equation below, following Azar et al. (2023):

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

where $lnemp_{it}$ is firm i's log employment in year t; $Bite_{ilt}$ is the annual minimum wage of labour market (county or county group) l (applicable to firm i in year t) divided by the average annual wage per worker of the firm in year $t-1$. $HHI_{l,t-1}$ is the Herfindhal-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 capital to labour ratio, the log total assets, the log inventory to output ratio, the log operating profit to sales ratio, a private-ownership dummy variable, a foreign-ownership dummy variable, the log total employment and the log average wage per worker. τ_i are firm fixed effects and υ_{jt} are the interacted industry, province and year fixed effects, for each combination of the 28 two-digit-industries, the 31 provinces and the ten years covered. Standard errors allow for clustering at the local labour market-year level.

Our main interest is in the coefficients for β_1 and β_3, which indicate how the effect of the minimum wage bite on employment varies depending on local labour market concentration. Under the monopsony hypothesis, 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. In this context, a minimum wage 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 employment effect of minimum wages in competitive labour markets of zero HHI levels, β_3 indicates how the employment effect evolves as the labour market concentration rises. In other words, assuming a negative β_1 coefficient, for positive employment effects to emerge, the β_3 coefficient will have to be positive and of a magnitude larger than β_1 in absolute terms.

Identification is based on the minimum wage changes in each region and year. These changes represent varying shocks to firms depending on their wage levels at the time. As we discuss in Appendix A.2, the determination of minimum wages in China involves different layers of government and different timelines. In this context, it is unlikely that minimum wage changes can be anticipated by firms. The resulting shocks can therefore influence the employment levels of firms. Moreover, these effects can differ depending on the concentration of the local labour market in which they operate. This is our key hypothesis of interest.

4 Results

4.1 Main specifications

Our baseline results are presented in Table 2. We report the employment effects of minimum wages in the odd columns (1, 3, and 5) and the effects of minimum wages, 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 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), ranging between -0.034 and -0.017. Considering our benchmark specifications of columns 4 and 6 (which control for firm and industry-province-year fixed effects; and time-varying firm characteristics in the case of column 6) and also considers the labour concentration interaction, we find a coefficient of -0.039 (column 4) or -0.02 (column 6). This indicates that a 10 percentage-point increase in the MW bite decreases firm employment by 0.2% to 0.4% in a local labour market with zero concentration (as measured by the HHI). These results are consistent with a large part (but certainly not all) of the literature that indicates that MW reduce employment.

When considering the role of the interaction between labour market concentration and the MW bite (even columns), we find that it is statistically significant and positive in our benchmark specifications with coefficients of 0.1 or 0.054. In the same case of a 10 percentage-point increase in the MW bite, as the HHI of labour market concentration increases from 0 to 1, the full effect of the MW bite can therefore change from -0.4% to +0.6% or from -0.2% to +0.34% (specification without or with time-varying controls, respectively).

These results indicate that the threshold level of concentration at which MW effects on employment are positive are at about .39 (0.039/0.1, corresponding to $-\beta_1/\beta_3$, with a very similar value in the case of column 6). The percentage of firms located in such local labour markets is 1.1% while the percentage of workers of workers located in those labour markets is 10.1%. Note that in the alternative specification without firm fixed effects, we do not find positive effects from the MW-concentration interaction.

As an alternative specification to that of equation 2, we consider potential nonlinear effects of the labour market share, by allowing its effect to vary across terciles (Azar et al. 2023).

Specifically, we estimate the following extended version of equation 2:

$$lnemp_{it} = \beta_1 Bite_{ilt} + \beta_{2a} HHImid + \beta_{2b} HHIhigh + \beta_{3a}[Bite_{ilt} \times HHImid] + \\ + \beta_{3b}[Bite_{ilt} \times HHIhigh] + \gamma X_{i,t-1} + \tau_i + \upsilon_{jt} + \varepsilon_{it}, \tag{3}$$

in which all variables are defined as in 2 and the middle and upper HHI terciles, $HHImed$ and $HHIhigh$, are at 0.081 and 0.210, respectively, according to our microdata.

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}, increase with labour market concentration in all specifications. For instance, the increase is from 0.020 (0.019) in the intermediate range to 0.029 (0.022) in the upper range, in column 2 (3). However, in contrast to the main specification that does not allow for non-linearities (equation 2), here the negative effects of the minimum wage bite on employment are not reverted. Even in the upper range category, the interaction effects in both main specifications remain at little more than half of the main $MWBite$ effect. The difference between the two results (Tables 2 and 3) may be driven by the low HHI thresholds at which one moves from low- to mid-HHI and from mid- to high-HHI (0.081 and 0.210, respectively), which follow from the generally low levels of local labour market concentration.[11]

We take from these two main sets of results that local labour market concentration reduces the disemployment effects of minimum wages in China. This result is consistent with earlier evidence from the United States (Azar et al. 2023). However, we also find that the scope for market concentration to invert such disemployment effect is limited and not robust across specifications.[12]

[11] We find similar results when considering an interaction at the 0.25 concentration level, which is typically used by US Department of Justice to determine highly concentrated (product) markets.

[12] We also 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 1997 and 2005. Note that non-state-owned firms also exit from the survey in years when its annual revenue falls below CNY 5 million. In our results, presented in Table C5, 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.

4.2 Heterogeneity: Firm-ownership types

The above discussions are based on the assumption that all firms in China maximise profit 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.[13] Foreign-owned firms also tend to outperform domestic firms 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 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 minimum wages and labour concentration.

In Table 4, we present results separately by firm type, considering the cases of state-owned, private (Chinese), and private (foreign) firms. We consider only specifications with firm fixed effects (with or without additional controls) given their relevance in absorbing firm heterogeneity. In the case of state-owned firms, we find that the estimates of the $MWBite$ and $LagHHI$ interaction are not statistically significant in both specifications (while the estimate of the $MWBite$ isolated effect is either negative significant or insignificant). In contrast, in the case of private firms owned by Chinese nationals, column (3) in Table 4 reports a negative and significant point estimate of -0.049 for $MWBite$ and significant positive estimate of 0.158 for the MW-HHI interaction. In this context, the HHI threshold at which

[13]For example, the corporate income tax rate for all domestic firms is 25%, 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 provided technical and vocational education and training to employees.

MW increase employment is 0.31, which covers 8.4% workers in all medium- and large-size non-state-owned industrial enterprises. Stronger results are found when considering additional firm controls. Finally, for foreign-owned firms, we find a statistically significant MW point estimate of -0.028 in one specification but no significant result on the MW-HHI interaction in either specification.[14]

These results suggest that the MW responses of state-owned firms and foreign-owned firms are not sensitive to labour competition, in contrast to their private-sector (domestic-owned) counterparts. This may be explained by our discussion above regarding the access of the former to government support, their alignment with state objectives (state-owned firms) or higher productivity (foreign-owned firms). These results also indicate that the MW-HHI effects presented in 4.1 come exclusively from private (domestic) firms, exactly those that may be better aligned with the standard model of profit-maximising firms.

4.3 Robustness: 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 minimum wage increase has a non-linear effect on the wage bill, which will depend on the closeness between the minimum wage 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.[15] Specifically, we estimate the following equation, including all interactions

[14]The finding of a smaller coefficient of the MW bite for foreign-owned firms is consistent with Hau et al. (2020), who found that that foreign firms are generally less affected by the policy compared to domestic firms. The reduced impact for foreign firms may be attributable to their higher productivity and ability to absorb wage increases (Karlsson et al. 2009).

[15]See 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 minimum wage 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.

between the three key variables (MW bite, HHI and the impact function):

$$\begin{aligned}\Delta lnemp_{it} = \alpha &+ \theta_1[IF_{it} \times \Delta lnmw_{it}] + \theta_2 HHI_{i,t-1} + \theta_3[IF_{it} \times \Delta lnmw_{it} \times HHI_{i,t-1}] \\ &+ \theta_4 IF_{it} + \theta_5 \Delta lnmw_{it} + \theta_6[\Delta lnmw_{it} \times HHI_{i,t-1}] + \theta_7[IF_{it} \times HHI_{i,t-1}] \\ &+ \gamma X_{ilt} + \tau_i + \upsilon_{jt} + \varepsilon_{it}\end{aligned} \tag{4}$$

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 minimum wages, $\Delta lnmw$, and the heterogeneous firm exposure to minimum wage changes, $IF \times \Delta lnmw$. Based on our research question, we also include the lagged HHI and its interaction with the firm exposure to minimum wages, $IF \times \Delta lnmw \times LagHHI$. This last term captures how labour concentration moderates the employment responses of firms of varied degrees of exposure to the minimum wage.

The panel regression with the fully specified model in Column (6) in Table 5 yields significant point estimates of -0.146 for $IF \times \Delta lnmw$, -0.343 for $\Delta lnmwtimesLagHHI$, and, critically, of 0.618 for $IF \times \Delta lnmw \times LagHHI$. These results again confirm that local labour market concentration can dampen the MW disemployment effect, in this case in the context of employment growth, but only for high values of the impact function. The latter can only arise when the MW bite is high. This is a new insight complementing the results from our main specifications.[16]

4.4 Extension: training effects

In an extension, we investigate how minimum wages and labour market concentration influence firms' provision of training to its employees. We believe this is the first analysis of this question in the literature. However, we regard this interaction between minimum wages and market concentration on training (besides wages) to be an important issue. Indeed, employee training

[16] When considering the specification of 2 but a dependent variable defined as the change in log employment, we again find significant negative employment effects and significant positive MW interactions but excluding the possibility of positive employment effects even if perfectly monopsonistic local labour markets - Table C6.

plays an important role in human capital, economic growth, and public policies: understanding its drivers and interactions is therefore relevant. While the extant literature is limited, some studies suggest that minimum wages 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 (Neumark & Wascher 2008, Baker et al. 2018). 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 studied in detail above. As labour market competition decreases, the gap between productivity and wages may be larger, implying that firms will decrease training investments less for any increase in minimum wages. 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 drawing on a dichotomous training variable available in our data ($if\_training$), which is equal to one if there is a positive level of training investment made by the firm in the year under analysis (and zero otherwise). This variable thus measures the extensive margin of training provision. We then repeat our main specification of equation 2 (and its different sets of control variables) but using this dummy variable as our dependent variable (instead of employment), in the context of a linear probability model.

Table 6 presents the results. First, we find, across all specifications, evidence of a negative relationship between the MW bite and training provision. These coefficients range between -0.11 and -0.18. Second, we find that our measure of concentration (the lag HHI) has a positive relationship with training provision in the first two specifications but a negative relationship in the third. Third, across all three specifications, the coefficients of the interaction variable are positive and statistically significant. These coefficients range between 0.075 and 0.13. These results thus indicate that the negative effects of the MW bite upon training provision

are reduced when firms operate in more concentrated local labour markets. However, similarly to most results regarding employment, the interaction effects are not strong enough to inverse the negative effects of the MW bite except in nearly monopsonistic markets and in one specification. We note that these results may be influenced in part by the employment results above if the employees that are more likely to be trained are also those whose employment is more sensitive to MWs (and its interactions with concentration), such as younger new hires.[17]

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 about 1,400 hand-collected county-level minimum wages between 1998 and 2007. We found that, consistently with monopsony views, the negative effects of minimum wages on employment are reduced when local labour market concentration is higher. While we find instances of positive employment effects of minimum wages, these only arise in highly concentrated local labour market and some specifications.

We also find that the interaction above does not arise in state-owned or foreign firms, coming instead exclusively from domestic-owned private firms. The latter 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 and foreign firms in China may have to follow several other restrictions while also potentially benefiting from additional support (e.g., subsidies). Additionally, we also find evidence that, while training provision by firms is negatively affected by the minimum wage bite, this negative effect is eroded in more concentrated local labour markets. In other words, the interaction effect we document here may go beyond employment outcomes, including other

[17] In addition, we test the intensive margin of training by minimum wage bites and labour market concentration. As this dependent variable, the value of training fee, includes frequent zero values, we draw on Correia et al. (2020), which accommodates multiple high-dimensional fixed effects. We also consider an alternative dependent variable defined as log(1+training fees). The results, available from Tables C6 and C7, do not exhibit evidence of MW-labour concentration interactions. However, we note that in all specifications MWs have negative effects upon training intensity.

variables of economic and policy relevance.

Several policy implications may be drawn from our findings. First, policymakers may need to pay more attention to local labour market structures when setting minimum wages (and possibly other labour market policies). Specifically, policymakers may need to move away from the highly homogeneous minimum wages that still prevail in many countries or large regions. In (sub-)regions with high labour market concentration, minimum wage increases might be less harmful to employment than in more competitive local labour markets. Tailoring minimum wage policies to account for regional labour market conditions can thus better balance the goals of supporting workers' labour incomes and their employment levels. Second, human capital policy (and specifically training provision by firms to their employees) may also benefit from more attention from policy makers with respect to local labour market structures.

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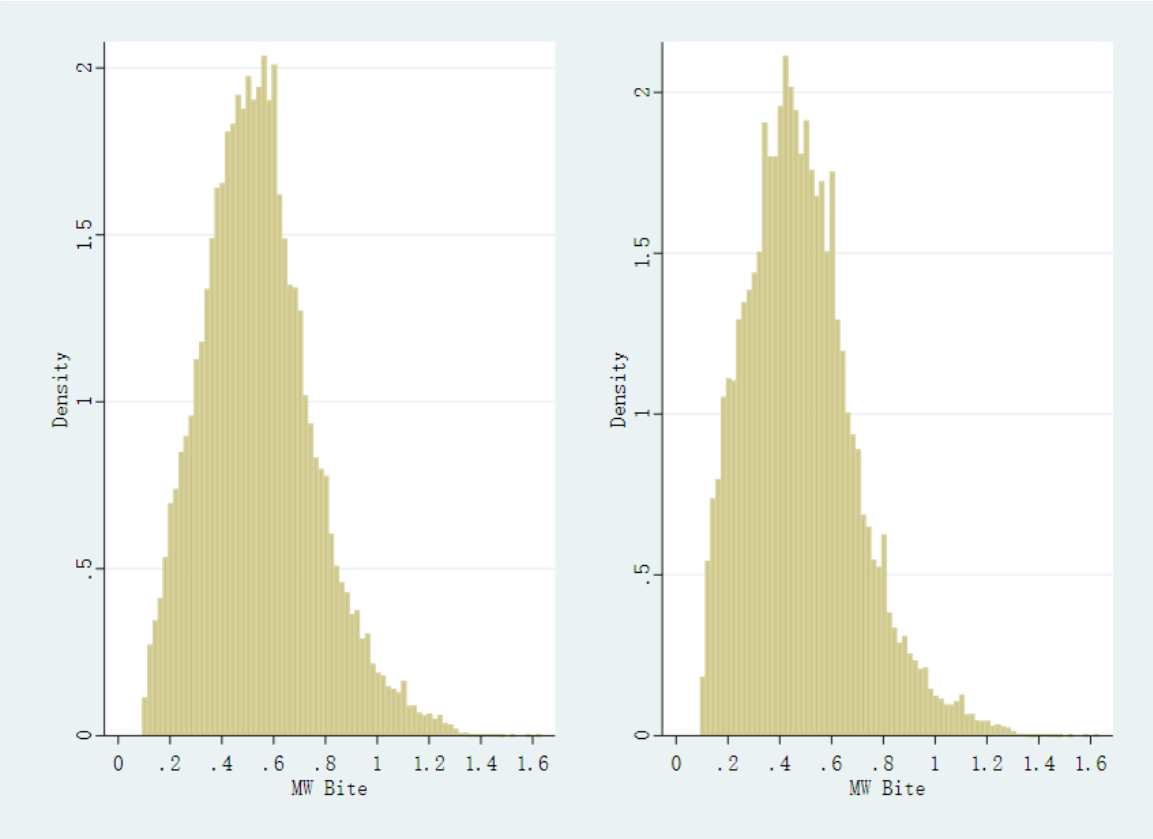
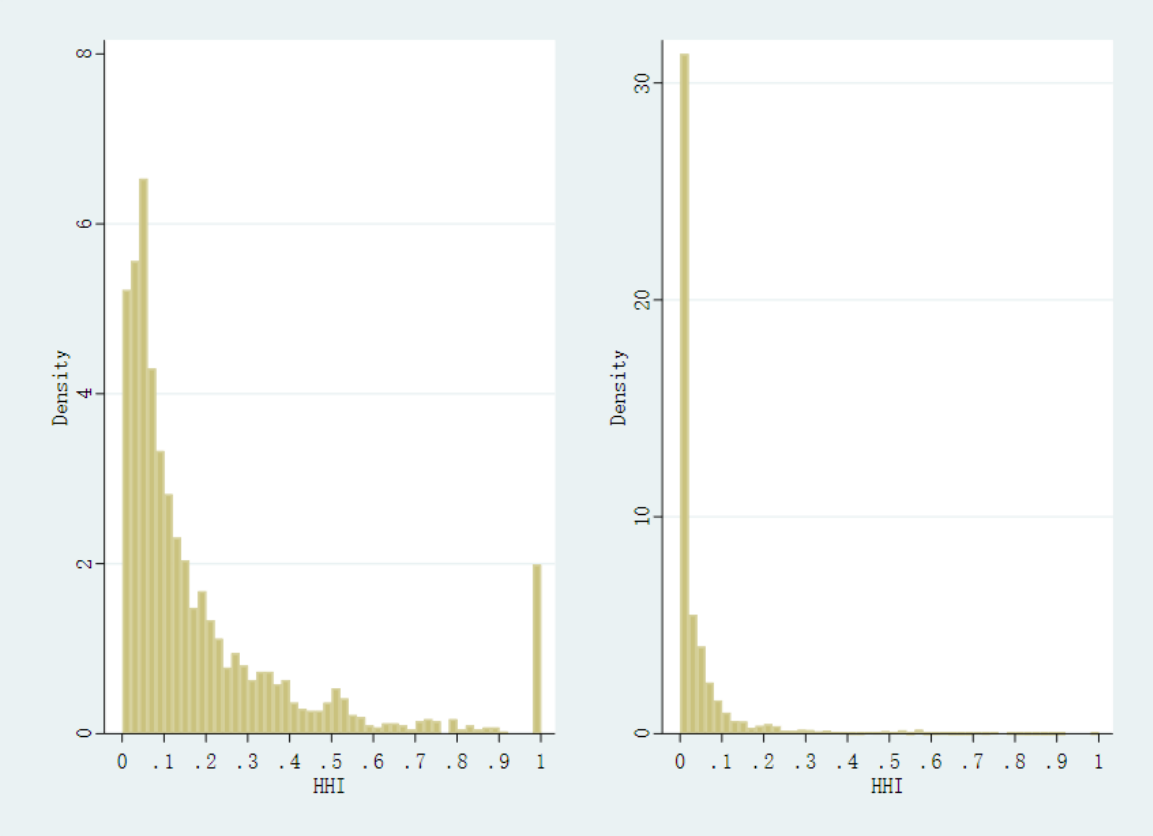
Figures

Figure 1: **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 minimum wage 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 2: **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 Herfindhal-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.

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
Minimum Wage/Wage per worker (mw_t/w_t)	1,622,617	0.539	0.329	0.257	0.486	0.822
MW Bite ($mw_{t+1)}/w_t$)	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 Capital per worker (lnkl)	1,622,617	3.578	1.302	1.960	3.645	5.132
Log total asset (lnasset)	1,622,617	9.781	1.405	8.177	9.612	11.64
Inventory to Output ratio (inventory_output)	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						
Minimum Wage	20,783	3.907	1.166	2.537	3.759	5.511
Minimum Wage/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
Log 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
Minimum Wage Change Rate ($\Delta lnmw$)	18,726	0.084	0.085	-0.008	0.068	0.205

Notes: Own calculations based on the Chinese Industry Enterprises and Minimum Wages databases. All monetary variables converted to 2007 real values using the CPI of each province. Variables presented in thousands of yuan, except for 'Total Profits' (firm's gross profits after the wage bill, measured in millions of yuan, RMB). ΔlnN (Employment Change Rate) is the first difference (annual changes) in the (log) employment of each firm. 'MW Bite' is the ratio of minimum wage 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 minimum wage and is calculated according to Hau et al. (2020): Impact Function (IF)= $(mw/w)^Z$, in which mw/w is the ratio of minimum wage to firm's wage per worker (both in year t-1) and Z is 1.313 for small firms (N≤200), 1.426 for medium firms (200<N≤1000) and 1.391 for large firms (N>1000). 'HHI' denotes the Herfindhal-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**

	Dependent variable: *lnemp*					
	(1)	(2)	(3)	(4)	(5)	(6)
MW Bite	-0.251***	-0.246***	-0.034***	-0.039***	-0.017***	-0.020***
	(0.008)	(0.011)	(0.002)	(0.003)	(0.002)	(0.003)
Lag HHI		-0.098**		-0.109***		-0.039
		(0.048)		(0.027)		(0.032)
MW Bite x Lag HHI		-0.080		0.100***		0.054**
		(0.063)		(0.021)		(0.021)
(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	1,226,897	1,226,897	1,139,453	1,139,453	1,139,453	1,139,453
Adjusted R^2	0.125	0.125	0.898	0.898	0.907	0.907
F statistic	943	559	233	78	743	584

Notes: Dependent variable: Log employment. 'MW Bite' is the ratio of minimum wage in current year (t) to wages per worker of each firm in previous year (t-1). 'Lag HHI' denotes the Herfindhal-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-year unit. Significance levels: * 0.10, ** 0.05, *** 0.01.

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

	Dependent variable: *lnemp*		
	(1)	(2)	(3)
MW Bite	-0.312***	-0.053***	-0.030***
	(0.024)	(0.006)	(0.005)
Mid-HHI	-0.094***	-0.007	-0.006
	(0.018)	(0.007)	(0.006)
High-HHI	-0.098***	-0.023***	-0.004
	(0.017)	(0.007)	(0.006)
MW Bite x Mid-HHI	0.062**	0.020***	0.017***
	(0.025)	(0.007)	(0.006)
MW Bite x High-HHI	0.091***	0.029***	0.018***
	(0.024)	(0.006)	(0.006)
(Industry x Province x Year) FEs	Yes	Yes	Yes
Firm FEs	No	Yes	Yes
Time-varying Controls	No	No	Yes
Observations	1,226,897	1,139,453	1,139,453
Adjusted R^2	0.125	0.898	0.907
F statistic	372	43.6	492

Notes: Dependent variable: Log employment. 'MW Bite' is the ratio of minimum wage in current year (t) to wages per worker of each firm in previous year (t-1). 'Mid-HHI' and 'High-HHI' are dummy variables. 'HHI' denotes the Herfindhal-Hirschman Index (HHI) of employment for each labour market in year t-1. '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-year unit. Significance levels: * 0.10, ** 0.05, *** 0.01.

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

	Dependent variable: *lnemp*					
	State-owned		Private-owned		Foreign-owned	
	(1)	(2)	(3)	(4)	(5)	(6)
MW Bite	-0.018***	-0.011*	-0.049***	-0.030***	-0.028***	-0.006
	(0.007)	(0.007)	(0.003)	(0.003)	(0.005)	(0.005)
Lag HHI	-0.075*	-0.029	-0.164***	-0.124***	0.155	0.217**
	(0.042)	(0.043)	(0.033)	(0.037)	(0.094)	(0.096)
MW Bite x Lag HHI	-0.033	-0.056	0.158***	0.126***	-0.103	-0.113
	(0.039)	(0.040)	(0.028)	(0.027)	(0.118)	(0.118)
(Industry x Province x Year) FEs	Yes	Yes	Yes	Yes	Yes	Yes
Firm FEs	Yes	Yes	Yes	Yes	Yes	Yes
Time-varying Controls	No	Yes	No	Yes	No	Yes
Observations	91,542	91,542	788,858	788,858	232,868	232,868
Adjusted R^2	0.957	0.958	0.885	0.893	0.902	0.911
F statistic	8.24	92.9	88.6	474	15.5	146

Notes: Dependent variable: Log employment. 'MW Bite' is the ratio of minimum wages in current year (year t) to wages per worker of each firm in previous year (year t-1). 'Lag HHI' denotes the Herfindhal-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-year unit. Significance levels: * 0.10, ** 0.05, *** 0.01.

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

	Dependent variable: $lnemp_{i,t} - lnemp_{i,t-1}$					
	(1)	(2)	(3)	(4)	(5)	(6)
IF	-0.103***	-0.105***	-0.129***	-0.132***	-0.132***	-0.134***
	(0.003)	(0.004)	(0.004)	(0.005)	(0.004)	(0.005)
$\Delta lnmw$	0.033	0.049	0.010	0.025	0.002	0.024
	(0.046)	(0.049)	(0.043)	(0.046)	(0.043)	(0.046)
IF x $\Delta lnmw$	-0.080***	-0.120***	-0.091***	-0.131***	-0.099***	-0.146***
	(0.029)	(0.042)	(0.033)	(0.049)	(0.033)	(0.049)
Lag HHI		-0.030*		0.044		0.141***
		(0.017)		(0.029)		(0.038)
IF x Lag HHI		0.047*		0.058		0.061*
		(0.026)		(0.036)		(0.034)
$\Delta lnmw$ x lag HHI		-0.236		-0.205		-0.343**
		(0.148)		(0.154)		(0.154)
IF x $\Delta lnmw$ x Lag HHI		0.509**		0.526*		0.618**
		(0.252)		(0.291)		(0.281)
(Industry x Province x Year) FEs	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	No	Yes	Yes	Yes	Yes
Controls	No	No	No	No	Yes	Yes
Observations	1,226,897	1,226,897	1,139,453	1,139,453	1,139,453	1,139,453
Adjusted R^2	0.125	0.125	0.898	0.898	0.914	0.914
F statistic	283	197	94	40.7	1,399	991

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. '$\Delta lnmw$' denotes annual changes in logged annual minimum wage. 'Lag HHI' denotes the Herfindhal-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 ($\Delta logassets$), 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 ($\Delta logtotalemployment$) and annual changes in the log average wages per worker in the labour market ($\Delta logtotalaveragewages$). '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-year unit. Significance levels: * 0.10, ** 0.05, ***0.01.

Table 6: **Minimum Wages and Market Concentration Effects on Firm Training**

	Dependent variable: *if_training*					
	(1)	(2)	(3)	(4)	(5)	(6)
MW Bite	-0.175***	-0.180***	-0.171***	-0.176***	-0.110***	-0.116***
	(0.006)	(0.007)	(0.006)	(0.007)	(0.005)	(0.006)
Lag HHI		0.092**		0.093**		-0.229***
		(0.041)		(0.041)		(0.039)
MW Bite x Lag HHI		0.075*		0.082**		0.130***
		(0.042)		(0.042)		(0.037)
(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	924,037	924,037	924,037	924,037	924,037	924,037
Adjusted R^2	0.016	0.017	0.018	0.018	0.087	0.087
F statistic	669	619	588	577	1,521	1,561

Notes: Dependent variable: Dummy variable if a firm provided training to its employees in year t. 'MW Bite' is the ratio of minimum wages in current year (t) to wages per worker of each firm in previous year (t-1). 'Lag HHI' denotes the Herfindhal-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-year unit. 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 'General 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 minimum wage 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 minimum wage system in China in 1994, the minimum wage system has been gradually promoted throughout the country. Minimum wage setting is regarded as an important policy to regulate the labour market. According to the Minimum Wage Regulation (Ministry of Labor and Social Security 1993), the political process for determining and adjusting the minimum wage 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 minimum wage 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 minimum wage, 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 minimum wage 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 minimum wage standards. We also note that, as the minimum wage 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 minimum wage of a given county as $(t1 * mw1 + t2 * mw2)/12$, in which $t1$ and $t2$ are the number of months in which minimum wages $mw1$ and $mw2$, respectively, were in force

during the relevant year. For example, if a given county in a given year increases its minimum wages from $mw1$ to $mw2$ in July, then its annual minimum wage 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 minimum wage. In contrast, we regard each county as a different local labour market. Counties usually belong to the rural area, which may have different minimum wages due to their different economic conditions. Table A1 shows the number of counties, labour markets and minimum wages (Real and Nominal) in the data. We find a total of 764 different nominal minimum wages and 1374 different real minimum wages across the period covered.

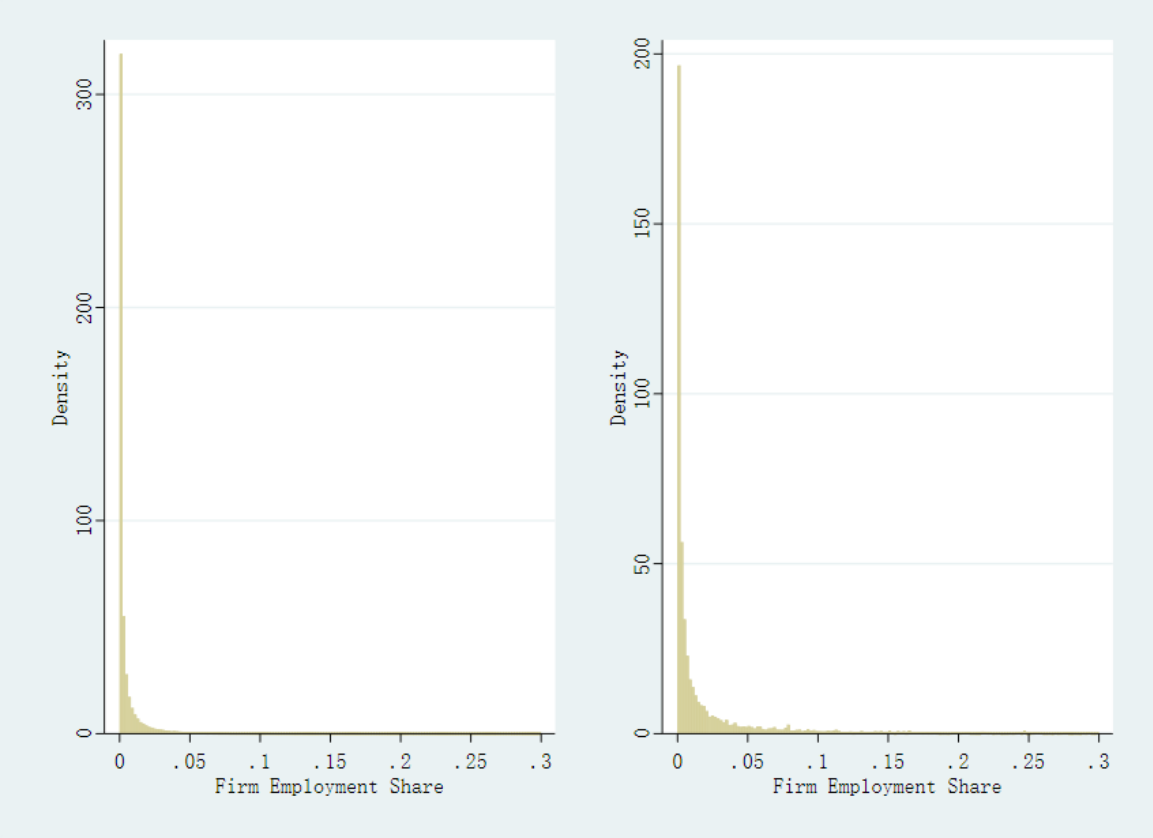
Table A1: Number of Counties, Labour Markets and Minimum Wages per year

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: **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.

Table C1: Effect of Minimum Wages on Log Employment/KL changes

	ΔlnN	ΔlnN	$\Delta lnkl$	$\Delta lnkl$
	(1)	(2)	(3)	(4)
IF x $\Delta lnmw$	-0.092***		0.122***	
	(0.029)		(0.041)	
IF x $\Delta lnmw$ x state		-0.003		0.072
		(0.048)		(0.069)
IF x $\Delta lnmw$ x foreign		-0.247***		0.440***
		(0.089)		(0.125)
IF x $\Delta lnmw$ x private		-0.094***		0.080
		(0.035)		(0.053)
$\Delta lnmw$	0.006		-0.044	
	(0.018)		(0.029)	
IF	-0.128***		0.139***	
	(0.003)		(0.005)	
$\Delta lnmw$ x state		-0.048*		-0.018
		(0.026)		(0.042)
$\Delta lnmw$ x foreign		0.028		-0.171***
		(0.038)		(0.055)
$\Delta lnmw$ x private		0.016		-0.022
		(0.022)		(0.036)
IF x state		-0.134***		0.139***
		(0.006)		(0.008)
IF x foreign		-0.105***		0.108***
		(0.008)		(0.011)
IF x private		-0.132***		0.146***
		(0.004)		(0.006)
state		0.005		0.011
		(0.006)		(0.011)
private		0.010*		-0.024***
		(0.005)		(0.009)
Constant	0.079***	0.071***	-0.009***	0.007
	(0.002)	(0.005)	(0.003)	(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
Adjusted R^2	-0.003	-0.003	-0.078	-0.078

Notes: This table compares our results with those of Table C2 (Hau et al. 2020)). For the definition and calculation of the impact function (IF), see Table 1. '$Industry \times YearFE$' 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 C2: Replication of Original Results of (Hau et al. 2020)

	ΔlnN	ΔlnN	$\Delta lnkl$	$\Delta lnkl$
	(1)	(2)	(3)	(4)
IF x $\Delta lnmw$	-0.195***		0.352***	
	(0.034)		(0.046)	
IF x $\Delta lnmw$ x state		-0.089*		0.084
		(0.050)		(0.063)
IF x $\Delta lnmw$ x foreign		-0.424***		0.716***
		(0.076)		(0.104)
IF x $\Delta lnmw$ x private		-0.181***		0.345***
		(0.041)		(0.058)
$\Delta lnmw$	0.032**		-0.048**	
	(0.015)		(0.023)	
IF	-0.159***		0.165***	
	(0.005)		(0.006)	
$\Delta lnmw$ x state		0.029*		-0.026
		(0.015)		(0.023)
$\Delta lnmw$ x foreign		0.031		-0.088**
		(0.029)		(0.040)
$\Delta lnmw$ x private		0.038*		-0.053*
		(0.020)		(0.030)
IF x state		-0.135***		0.139***
		(0.008)		(0.010)
IF x foreign		-0.138***		0.142***
		(0.010)		(0.012)
IF x private		-0.166***		0.171***
		(0.005)		(0.007)
state		-0.011*		-0.008
		(0.006)		(0.009)
private		0.012**		-0.002
		(0.006)		(0.008)
Constant	0.087***	0.080***	0.020***	0.022***
	(0.002)	(0.005)	(0.003)	(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
Adjusted R^2	0.036	0.036	-0.021	-0.021

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

Table C3: **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 minimum wage changes (in logs), respectively. Panel C describes the summary statistics for county-level minimum wage changes (in logs) as in Hau et al. (2020) by using the data provided in the article's online appendix (`link`).

Table C4: **Minimum Wages and Monopsony Effects on Employment Growth**

	Dependent variable: $lnemp_{i,t} - lnemp_{i,t-1}$					
	(1)	(2)	(3)	(4)	(5)	(6)
MW Bite	-0.160***	-0.166***	-0.216***	-0.224***	-0.221***	-0.230***
	(0.003)	(0.004)	(0.004)	(0.005)	(0.004)	(0.005)
Lag HHI		-0.061***		-0.007		0.082**
		(0.016)		(0.030)		(0.039)
MW Bite x Lag HHI		0.096***		0.141***		0.152***
		(0.024)		(0.036)		(0.036)
(Industry x Province x Year) FEs	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	No	Yes	Yes	Yes	Yes
Controls	No	No	No	No	Yes	Yes
Observations	1,226,897	1,226,897	1,139,453	1,139,453	1,139,453	1,139,453
Adjusted R^2	0.031	0.031	0.007	0.007	0.047	0.047
F statistic	3,316	1,208	2,635	1,003	887	749

Notes: Dependent variable: Changes in log employment between year t and year t-1. 'MW Bite' is the ratio of minimum wages in current year (year t) to wages per worker of each firm in previous year (year t-1). 'Lag HHI' denotes the Herfindhal-Hirschman Index (HHI) of employment for each labour market in year t-1. Control variables as in Table 5. Values in parentheses are robust standard errors adjusted for clustering at the labour market-year unit. Significance levels: * 0.10, ** 0.05, *** 0.01.

Table C5: **Minimum Wages and Market Power Effects on Firm Exit**

	Dependent variable: if_exit					
	(1)	(2)	(3)	(4)	(5)	(6)
MW Bite	0.058***	0.058***	0.050***	0.049***	0.043***	0.043***
	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)
Lag HHI		0.159***		0.146***		0.207***
		(0.018)		(0.017)		(0.022)
MW Bite x Lag HHI		-0.001		0.001		-0.012
		(0.023)		(0.022)		(0.021)
(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	704,453	704,453	704,453	704,453	704,453	704,453
Adjusted R^2	0.004	0.005	0.030	0.031	0.039	0.040
F statistic	347	245	1,106	864	550	513

Notes: Dependent variable: 'if_exit' is a dummy variable that is 1 in year t if a firm exits the sample in year t+1. 'MW Bite' is the ratio of minimum wages in current year (year t) to wages per worker of each firm in previous year (year t-1). 'Lag HHI' denotes the Herfindhal-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-year unit. Significance levels: * 0.10, ** 0.05, *** 0.01.

Table C6: **Minimum Wages and Market Concentration Effects on Firm Training (value)**

	Dependent variable: $training\_fee$					
	(1)	(2)	(3)	(4)	(5)	(6)
MW Bite	-3.377***	-2.938***	-0.130***	-0.119***	-0.122***	-0.107***
	(0.106)	(0.122)	(0.030)	(0.035)	(0.028)	(0.034)
Lag HHI		4.956***		0.630***		0.036
		(0.553)		(0.232)		(0.249)
MW Bite x Lag HHI		-9.660***		-0.271		-0.342
		(1.521)		(0.239)		(0.242)
(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	923,742	923,742	549,479	549,479	549,479	549,479
Pseudo R^2	0.206	0.213	0.824	0.824	0.829	0.829

Notes: Dependent variable: the value of firm's training fee in year t. Poisson model with high dimensional fixed effects estimated using Correia et al. (2020). 'MW Bite' is the ratio of minimum wages in current year (t) to wages per worker of each firm in previous year (t-1). 'Lag HHI' denotes the Herfindhal-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-year unit. Significance levels: * 0.10, ** 0.05, *** 0.01.

Table C7: **Minimum Wages and Market Concentration Effects on Firm Training (logged value)**

	Dependent variable: $training\_fee(logged)$					
	(1)	(2)	(3)	(4)	(5)	(6)
MW Bite	-0.919***	-0.920***	-0.072***	-0.068***	-0.083***	-0.079***
	(0.024)	(0.029)	(0.007)	(0.008)	(0.007)	(0.008)
Lag HHI		0.025		0.031		0.017
		(0.096)		(0.063)		(0.064)
MW Bite x Lag HHI		0.004		-0.073		-0.078
		(0.181)		(0.062)		(0.064)
(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	923,742	923,742	549,479	549,479	549,479	549,479
Pseudo R^2	0.061	0.061	0.228	0.228	0.230	0.230

Notes: Dependent variable: logged value of one plus the firm's training fee in year t. 'MW Bite' is the ratio of minimum wages in current year (t) to wages per worker of each firm in previous year (t-1). 'Lag HHI' denotes the Herfindhal-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-year unit. Significance levels: * 0.10, ** 0.05, *** 0.01.