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Who Pays for the Minimum Wage in the Japanese Manufacturing Sector?*

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Abstract

Employers respond to minimum wage hikes by reducing employment, accepting lower profits, or passing costs on to consumers or suppliers. Identifying which margin dominates is key to understanding who bears the cost of the minimum wage. We examine this incidence in Japan's manufacturing sector, where exporters faced international competition and non-exporters until recently contended with persistently stagnant domestic prices. Using establishment-level data, we find robust evidence of a contraction in factor inputs but no clear cost pass-through to product prices. These results imply that higher labor costs were largely borne by firms and workers, particularly in settings with limited scope for pass-through.

Keywords: minimum wage, price pass-through, exit and entry of firms, product turnover.

JEL classification: J20; J31; J38; K31.

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1 Introduction

Understanding who ultimately bears the cost of minimum wage increases remains a central question in labor economics. Although a substantial body of research has focused on employment effects, a growing number of studies have begun to examine the incidence of minimum wage hikes, that is, the extent to which the resulting cost burden is absorbed by employers, passed on to consumers through higher prices, or mitigated through other firm-level adjustments.¹ One prominent finding in the recent literature is that the cost of the minimum wage is borne primarily by consumers through higher product prices, rather than by workers through reduced employment (Harasztosi and Lindner, 2019). This study contributes to the growing literature by examining the incidence of minimum wage increases in Japan’s manufacturing sector, where exporters face intense international competition and non-exporters until recently had to operate under decades of stagnant domestic prices in a deflationary economy. Building on the framework of Harasztosi and Lindner (2019), we examine how firms adjust to the increased labor costs along various margins, including product prices, in a context where pass-through is severely constrained.

Our empirical strategy relies on detailed establishment-level data from the Census of Manufacture and the Economic Census for Business Activity, which enable us to construct panel data on establishment-level production information, in addition to product-level price and shipment values. To identify the effects of minimum wage changes, we follow the approach proposed by Kawaguchi and Mori (2021) and exploit the exogenous minimum wage increases in regions affected by the 2007 legal revision of the Minimum Wage Act. Specifically, we instrument regional minimum wage changes with the initial gap between regional welfare benefits and minimum wage earnings as of 2006 – just before the policy reform that mandated their convergence. This quasi-experimental variation allows us to estimate the elasticity of a range of outcomes, including total labor costs, revenue, capital investment, operating profit margins, and product turnover, with respect to changes in the minimum wage.

¹Despite some heterogeneity, recent studies report little to no overall disemployment effect of the minimum wage (Dube et al., 2010; Allegretto et al., 2017; Harasztosi and Lindner, 2019; Cengiz et al., 2019). To explain these findings, a growing literature examines firm-side adjustment channels, such as price pass-through (Leung, 2021; Harasztosi and Lindner, 2019; Aaronson and French, 2007), reductions in profits or firm value (Bell and Machin, 2018; Draca et al., 2011), benefit cuts (Clemens et al., 2018), factor substitution (Aaronson et al., 2018; Aaronson and Phelan, 2019; Lordan and Neumark, 2018), and labor reallocation or sorting (Clemens and Wither, 2019; Horton, 2025; Giuliano, 2013). Other mechanisms include productivity gains via intensified worker effort (Coviello et al., 2022; Ku, 2022), exit of low-quality services (Luca and Luca, 2019), and raising hiring standards (Butschek, 2022; Clemens et al., 2021). See Clemens (2021) and Dube and Lindner (2024) for recent reviews.

Our estimations reveal that, in the Japanese manufacturing sector, the costs of minimum wage increases were primarily borne by firms and workers. Part of the increased labor cost was absorbed through reduced profitability. Disemployment effects were more pronounced among full-time workers. We also find a significant decline in material costs, indicating that suppliers may have borne part of the burden, although this may reflect a reduction in production scale. This effect is more prominent among exporting and single-product establishments. Across a range of specifications, we find no clear evidence of cost pass-through to consumers. If anything, minimum wage increases are associated with a revenue decline. Complementary product-level analyses also show a decline in quantities sold and find no significant positive effect on product prices. One important implication of our results concerns the effect of minimum wage increases on product markets when prices are rigid. In a competitive labor market, an increase in the minimum wage is expected to reduce employment, which lowers the supply of goods and thereby raises product prices in the product market (Aaronson and French, 2007). However, our findings suggest that when product prices fail to adjust, the adjustment to minimum wage hikes takes the form of a sharper contraction in production.

We also examine the effects of minimum wage increases on both establishment and product churn by estimating a linear probability model of establishment entry and exit, as well as within-establishment product switching. The results show a significant increase in both establishment and product turnover. Given that the estimated effects on establishment entry and product turnover are positive, the results suggest that potential churning effects may occur through firm exit and entry dynamics, as well as shifts in product mix within a firm.

Our analysis contributes to the literature in several ways. First, to our knowledge, this is the first study to systematically examine the cost incidence of minimum wage increases by applying the approach proposed by Harasztosi and Lindner (2019) to the context of the Japanese manufacturing sector. While existing studies on Japan examine the effects of minimum wage increases on productivity, internal resource allocation, and firms' entry and exit decisions (Fukao et al., 2023; Morikawa, 2022; Izumi et al., 2023), we extend this literature by analyzing a wider set of outcomes, including adjustments through product exit and entry, while employing the instrumental variable strategy proposed by Kawaguchi and Mori (2021).

Second, rather than focusing only on average employer responses, our analysis examines how

the impact of increasing labor costs differs by firm type—specifically between exporters and domestic producers, and between single-product and multi-product establishments. These distinctions allow us to explore how specific margins of adjustment – that is, the various strategies firms employ to cope with higher costs, such as altering their product mix or targeting new markets – mediate the impact of increasing labor costs. Previous studies have shown that minimum wage increases can prompt firms in countries like Chile and Vietnam to switch product types (Alvarez and Navarro, 2019; Nguyen, 2025). In contrast, we find no strong evidence that multi-product firms in Japan were able to offset profit losses by shifting production toward more profitable products, suggesting that product switching offers only limited scope for mitigating the impact of higher labor costs, possibly due to the inherent limits of altering product mix within existing firms.

Finally, this study highlights the importance of understanding the mechanisms underlying the cost incidence of the minimum wage. Our results suggest that both firms and workers shared the burden of minimum wage increases. These findings are broadly consistent with prior evidence showing larger disemployment effects in exporting or tradable sectors, where firms face greater constraints from international price competition (Harasztosi and Lindner, 2019; Gopalan et al., 2021). However, our results also contrast with the findings of Harasztosi and Lindner (2019), which suggest that consumers largely bore the cost of minimum wage increases in Hungary when estimated across all industries—a conclusion that has shaped much of the academic debate. Firms in the Japanese manufacturing sector were likely unable to pass through increased labor costs to product prices due to two key factors: exposure to international competition and prolonged domestic price stagnation. These factors likely amplified the contraction in production following the minimum wage hike, consistent with our empirical findings. Our findings demonstrate that the incidence of minimum wage hikes cannot be generalized from the most commonly cited results alone. Instead, industrial and institutional structures, as well as the degree of market competition, need to be taken into account when evaluating the effects of minimum wage policies, as highlighted in the recent comprehensive review of the literature by Dube and Lindner (2024).

The remainder of the study is organized as follows. Section 2 provides an overview of the institutional background. Sections 3 and 4 introduce the data set and describe the estimation strategy. Section 5 presents the main results. Section 6 offers concluding remarks.

2 Institutional Background

2.1 Minimum Wage System in Japan

A distinctive feature of Japan’s minimum wage system is its reliance on region-specific minimum wages determined at the prefectural level. Under the *Minimum Wage Act*, each of the 47 prefectures has established a Local Minimum Wage Council, and the minimum wage is applied broadly to almost all workers, regardless of employment status (i.e., both regular and non-regular workers). Exceptions are narrowly defined and limited to a small set of groups such as workers in vocational training or persons with disabilities, making the coverage of the system notably extensive compared to that of other countries.²

Minimum wages are determined through a two-tiered decision-making process. First, the Central Minimum Wage Council (CMWC) issues guideline recommendations, which are then deliberated by Local Minimum Wage Councils in each prefecture. Final decisions are made and publicly announced by the respective Prefectural Labour Bureaus, which act under delegated authority from the Minister of Health, Labour and Welfare. Minimum wage revisions typically occur around October each year, with the new wage levels taking immediate effect. The councils are tripartite bodies composed of representatives from industry, labor unions, and public interest groups (e.g., academics and experts). Through deliberations at Local Wage Councils, regional conditions such as economic activity and price levels are taken into account when setting regional minimum wages. This mechanism introduces potential endogeneity in the identification of minimum wage effects, since pre-existing local market conditions may simultaneously affect both firm-level outcomes and minimum wage increases. We address this potential concern by leveraging the 2007 amendment to the Minimum Wage Act, which substantially raised the minimum wages in affected regions.

2.2 Policy Shock for Identification

The 2007 amendment to the Minimum Wage Act (Act No. 89 of 2007) marked a major turning point in the development of Japan’s minimum wage framework. The amendment clarified in

²In addition to regional minimum wages, “industry-specific minimum wages” are also set for certain sectors within each prefecture. By law, these industry-specific minimum wages cannot be set below the corresponding regional minimum wage; in cases where both apply, the higher of the two serves as the effective wage. In practice, however, the number of sectors covered by industry-specific minimum wages is limited, so regional minimum wages generally function as the binding wage floor across most sectors.

law (Article 9, Paragraph 3) that minimum wages should be set at levels not lower than the national public assistance standard (specifically, the livelihood assistance portion). This institutional reform aimed to eliminate the so-called “welfare–work gap,” a situation in which individuals working full-time at the minimum wage could earn less than those receiving public assistance. The amendment compelled prefectures facing such gaps to implement substantial wage increases within a relatively short period. Although one might expect major urban areas such as Tokyo and Osaka to be most affected, large hikes were also mandated in regions such as Hokkaido and Akita, where region-specific public assistance benefits, including heating allowances, were relatively high. Thus, the increases in the minimum wage following the amendment to the Minimum Wage Act can be regarded as a quasi-exogenous policy shock.

Previous studies have used the 2007 amendment to examine the effects of minimum wage increases on a variety of outcomes, including training (Hara, 2017), housing rents (Yamagishi, 2021), manufacturing employment (Okudaira et al., 2019), labor market outcomes for less-educated workers (Kawaguchi and Mori, 2021), hiring standards and recruiting channels (Izumi et al., 2025), and shifts toward short-hour jobs induced by institutional earnings cutoffs (Mori and Okudaira, 2025). Following Kawaguchi and Mori (2021), we use the target values assigned by the CMWC—recommended increases equivalent to the 2006 welfare–work gap—as *instruments* for the actual log change in minimum wages after the amendment. Because these targets are not directly related to short-term regional economic conditions or local labor demand, they provide a valid source of exogenous variation.

In sum, the 2007 legislative reform constitute a unique policy experiment in the Japanese context. By exploiting the resulting heterogeneity in wage growth across prefectures, this study aims to identify the causal effects of minimum wage increases on firm-level behavior, including productivity-enhancing investments, employment adjustments, and firm performance metrics.

3 Data

3.1 Data Sources

We mainly use the establishment- and establishment-and-product-level data in the Census of Manufacture (CM) published by the Ministry of Economy, Trade and Industry (METI) for 2002–

2016. Before 2010, in years ending with 0, 3, 5, and 8, the CM covers all establishments that are located in Japan (excluding those owned by the government) and fall into the manufacturing sector. In other years, the CM covers establishments with four or more employees. For 2011 and 2015, we use the Economic Census for Business Activity (Manufacturing), referred to as the EC hereafter, conducted by METI and the Statistics Bureau of Japan, covering establishments with 10 employees or more.³ From these sources, we obtain information on establishments' industry (at the 4-digit level), shipments, number of regular and non-regular employees, total wages, costs of raw materials and energy, export status, and number of products, as well as establishment entry and exit. We further obtain establishment and product level information on products at the 6-digit level and the price, quantity, and value of goods sold.

We obtain information on prefecture-level minimum wages from the *Saitei Chingin Kettei Yoran* (Overview of Minimum Wage Determination) for each fiscal year published by the Rodo Chosakai, and the gap between the minimum wage and welfare benefits from the website of the CMWC.

3.2 Sample Selection

In our main analysis we restrict our sample to establishments with 30 or more employees, since the CM provides information on tangible fixed assets only for such establishments.⁴ Furthermore, to examine the impact of the minimum wage increases prompted by the revision of the Minimum Wage Act in 2007, we focus on establishments that were recorded in the CM during at least one year in the pre-revision period from 2002 to 2006. We track the outcomes of these establishments up to 2016, so that our observation period runs from 2002 to 2016. The total number of establishment-year-level observations is 590,130. Table 1 presents the summary statistics for the main outcome variables used in this study.

When conducting analyses at the establishment-product level, we focus on establishments and products that are observed at least once between 2002 and 2006 and for which the CM and ES report price and quantity data. Since such data are only available for a subset of establishments

³Although the data are at the establishment level and not the firm level, single establishment firms own most of the establishments. For example, in 2008, single-establishment firms owned 84.4% of establishments (222,145 out of 263,061). A negligible number of establishments changed their prefecture ID in the 2011 and 2015 census years. When observed in adjacent years, we aligned their census-year prefecture IDs to match those years. This procedure ensures consistent estimation of prefecture-specific linear trends.

⁴The CM consists of Part A (Kou hyo) and Part B (Otsu hyo). Part A covers establishments with 30 or more employees, while Part B covers establishments with between 4 and 29 employees. Only Part A provides information on tangible fixed assets.

Table 1: Summary Statistics (Establishment-level)

Variable	N	Mean	SD	p25	p50	p75
ln(MW)	590,130	6.54	0.08	6.48	6.53	6.58
ln(Wage Bill)	590,130	10.30	1.00	9.61	10.11	10.81
ln(Revenue)	590,130	11.97	1.35	11.06	11.79	12.72
ln(Material costs)	590,130	11.21	1.65	10.22	11.14	12.18
ln(Capital)	590,130	10.16	1.65	9.20	10.12	11.10
Operating profit	590,130	0.24	0.21	0.14	0.24	0.35
ln(Average wage)	590,130	5.93	0.42	5.67	5.96	6.21
ln(Revenue per employee)	590,130	7.60	0.88	7.07	7.56	8.10
ln(Total number of employees)	590,130	4.37	0.81	3.76	4.17	4.78
ln(Full-time employees)	521,451	3.97	0.97	3.40	3.85	4.48
ln(Part-time employees)	521,451	2.68	1.32	1.79	2.71	3.56

Note: The dataset combines manufacturing establishment records from the Census of Manufacture (METI) with data from the Establishment and Enterprise Census (MIC). The sample is restricted to establishments that were observed at least once between 2002 and 2006, as described in the main text.

and products, the number of establishment-product-year observations is 202,724.

4 Estimation Method

4.1 Main Model

In our main analysis, we estimate the effect of the minimum wage on establishment-level outcomes. Specifically, we estimate the following equation:

$$Y_{isrt} = \beta \ln MW_{rt-1} + \iota_i + \tau_{st} + \zeta_r \cdot \text{Year}_t + u_{isrt}, \quad (1)$$

where Y_{isrt} denotes the outcome of establishment i , operating in industry s and located in prefecture r in year t , and $\ln MW_{rt-1}$ is the logarithm of the minimum wage applicable in prefecture r in year $t - 1$. ι_i and τ_{st} denote establishment fixed effects and industry-by-year fixed effects, respectively. $\zeta_r \cdot \text{Year}_t$ captures prefecture-specific linear time trends. Standard errors are clustered at the prefecture level. Regional minimum wages in Japan are typically revised around October each year. To reflect this timing, we use the minimum wage that came into effect in October of year $t - 1$ to explain outcomes in year t .

We use this model to assess a variety of outcome variables, focusing particularly on those that capture how firms adjust to increased labor costs. Specifically, we examine the effects of the minimum wage on the same set of firm-level outcomes analyzed by Harasztosi and Lindner (2019,

Table 3), as well as additional outcomes relevant in the Japanese context. These include the logarithms of total wage bills ($\ln(Wage\ bill)$), sales revenue ($\ln(Revenue)$), raw materials and energy ($\ln(Material\ Costs)$) (i.e., the total cost of materials, fuels, electricity, contract manufacturing, outsourcing of manufacturing, and purchase of resold items), tangible fixed assets ($\ln(Capital)$), total number of employees ($\ln(Total\ Employees)$), number of regular workers ($\ln(Full-time)$), number of non-regular workers ($\ln(Part-time)$), and a proxy for operating profit ($Operating\ profit$), defined as the ratio of revenue net of wage bills and raw materials and energy to revenue.⁵ When using $\ln(Full-time)$ and $\ln(Part-time)$ as outcome variables, we restrict our sample to establishments employing both regular and non-regular workers each year.

To identify the above model, we assume that the minimum wage is determined exogenously, independent of pre-existing trends in outcome variables. As discussed in Section 2, however, this assumption may be violated, as Local Minimum Wage Councils typically take local economic conditions into account. To address this potential endogeneity, we exploit the 2007 amendment to the Minimum Wage Act as a quasi-natural experiment, following the approach widely used in previous studies (Hara, 2017; Okudaira et al., 2019; Kawaguchi and Mori, 2021; Yamagishi, 2021; ?). Specifically, building on Kawaguchi and Mori (2021), we estimate two-stage least squares (2SLS) models, using the gap between monthly welfare benefits and the monthly earnings of minimum wage workers as an instrument for $\ln MW$ in the main equation. The first-stage equation is specified as follows:

$$\ln MW_{isrt} = \sum_{y=2003}^{2016} \delta_y \cdot \max \left\{ \ln \left(\frac{WB}{MWE} \right)_{r,2006}, 0 \right\} \cdot \mathbf{1}(\text{Year}_t = y) + \nu_i + \mu_{st} + \xi_r \cdot \text{Year}_t + v_{isrt}, \quad (2)$$

where WB denotes monthly welfare benefits and MWE the monthly earnings of minimum wage workers. Thus, we identify the main model in equation (1) by exploiting pre-policy variation in the gap between these two variables across prefectures. As discussed in Section 2, prefectures with a larger gap in 2006 experienced greater increases in the minimum wage following the amendment, generating variation that can be plausibly considered exogenous to contemporaneous economic outcomes. We assess the validity of this approach by examining the magnitude and

⁵Here, regular workers are those employed on an indefinite basis, while non-regular workers include fixed-term employees with contracts of one month or longer, as well as temporary workers hired for less than one month.

statistical significance of the estimated δ_y before and after the policy change.

We also carefully examine the sensitivity of our results across different model specifications. Particular attention is paid to the potential issue of overcontrolling for regional (i.e., prefecture-specific) linear trends. A recent study in the U.S. minimum wage literature highlights the importance of this concern by demonstrating that the findings of Dube (2019) overstate the poverty-reducing effects of the minimum wage due to the problem of “bad controls” (Burkhauser et al., 2025). Specifically, Burkhauser et al. (2025) showed that the inclusion of low-skilled unemployment trends as a control variable overstated the estimated effects. In the context of Japan, we control for regional (i.e., prefecture-level) linear trends to enhance the comparability of policy-affected and less-affected regions by accounting for pre-existing local economic conditions. However, including such linear trends may either overstate or understate the estimated impact of the minimum wage, since the trends are identified using data from both the pre- and post-policy periods. To address this concern, we estimate our models both with and without regional linear trends.

In the Appendix, we further assess the robustness of our results by controlling for potential time-varying confounders specific to each industry–prefecture combination. Specifically, we condition on two industry–prefecture-level variables at $t - 1$: the logarithm of the Revealed Comparative Advantage (RCA) index, $\ln(RCA_{srt-1})$, and the logarithm of the number of establishments at the industry–prefecture level, $\ln(N_{srt-1})$. The RCA index is defined as follows:

$$RCA_{srt} = \frac{S_{srt} / \sum_s S_{srt}}{\sum_r S_{srt} / \sum_{r,s} S_{srt}},$$

where S_{srt} denotes the total sales of industry s in prefecture r in year t , calculated by aggregating establishment-level data to the prefecture level. A higher RCA_{srt} value indicates that prefecture r had a comparative advantage in industry s in year t , which may have influenced how firms responded to the minimum wage increases in local markets. For example, firms in industry–prefecture combinations with a higher RCA_{srt} may have been more likely to pass increased labor costs on to prices. L_{irt} denotes the number of employees at establishment i in year t , where establishment i is located in prefecture r and belongs to industry s . Although these variables may also reflect firms’ endogenous responses to the minimum wage, they may partially account for

pre-existing differences in market-level competitiveness.⁶ As shown in Table A2 in the Appendix, our main results are robust to the inclusion of these variables. In the main specifications below, however, we exclude them to avoid potential endogeneity bias arising from their inclusion.

4.2 Complementary Analyses

Prices and Shipment Volumes at the Establishment–Product Level

One advantage of our data is that it allows us to construct panel data on establishment–product-level prices and shipment volumes for a subset of our main sample. To complement our main analysis on price pass-through to consumers, we estimate an instrumental variables (IV) model similar to the establishment-level specification described above. Specifically, we estimate the following second-stage equation:

$$Y_{pirt} = \beta \ln MW_{rt-1} + \tau_{pi} + \tau_{pt} + \zeta_r \cdot \text{Year}_t + u_{pirt}, \quad (3)$$

where Y_{iprt} denotes one of the outcome variables described below for product p produced by establishment i in prefecture r in year t . The dummies τ_{pi} and τ_{pt} represent product–establishment and product–year fixed effects, respectively, while $\zeta_r \cdot \text{Year}_t$ captures prefecture-specific linear time trends. Outcome variables include the logarithms of sales revenue ($\ln(\text{Revenue})$), quantity sold ($\ln(\text{Quantity})$), and price of goods sold ($\ln(\text{Price})$). Standard errors are clustered at the prefecture level. We identify this second-stage model by instrumenting $\ln MW_{rt-1}$ with the gap variable, as in equation (2).

Impact on Establishment and Product Churn

To interpret the underlying mechanisms behind our main results, we also estimate the impact of minimum wage increases on the probability of entry or exit of establishments, in addition to entry and exit of products within establishments. We adopt the same specifications as in equations (1) and (3), replacing the outcome variables with indicators of entry and exit, except that we exclude establishment fixed effects from equation (1) and product–establishment fixed effects from equation (3). This approach follows the specification used in Aaronson et al. (2018), who

⁶See, for example, Bellone et al. (2022) for related applications of these variables.

show that capital reallocation in response to minimum wage increases occurs primarily through establishment entry and exit.

More specifically, for establishment entry and exit, the exit dummy takes the value of one if an establishment is observed in year t but not in year $t + 1$ in either the CM or EC. Conversely, the entry dummy takes the value of one if an establishment is not observed in year $t - 1$ but observed in year t in either the CM or EC. To accurately define establishment entry and exit, we supplement our analysis with another panel from the CM, the *Otsu* Panel (for establishments with 4 to 29 employees), in addition to *Kou* Panel used in the main analysis (for establishments with 30 or more employees). The supplementary information allows us to avoid incorrectly recording some existing establishments as having exited when in fact their number of employees fell below 30. For product entry and exit, we use product entry and exit dummies. The entry dummy equals one if product p is observed in year t but not in $t - 1$, while the exit dummy equals one if product p is observed in year t but no longer observed in $t + 1$.

5 Main Results

5.1 Margins of Adjustment in the Japanese Manufacturing Sector

We begin by presenting the main estimation results on who paid for the cost of minimum wage increases in the Japanese manufacturing sector by analyzing firm responses across multiple margins of adjustment. We estimate the elasticity of various establishment-level outcomes with respect to the log of the regional minimum wage, employing an IV strategy that leverages regional variation in the initial gap between minimum wage earnings and welfare benefits as our preferred specification. First-stage estimation results are presented in Appendix Table A1. The estimates are broadly consistent with prior studies including Kawaguchi and Mori (2021).⁷ The effect of the initial gap between regional welfare benefits and minimum wage earnings on regional minimum wage levels peaked around 2014 and 2015, which aligns with the institutional timeline—namely, the 2007 legal revision that mandated prefectures to close this gap. Moreover, the coefficient on the initial gap is statistically insignificant and close to zero for the pre-reform period, supporting the validity of the instrumental variable approach.

⁷Similar identification variations have been used in studies published in the international journals (Hara, 2017; Okudaira et al., 2019; Yamagishi, 2021; Kawaguchi and Mori, 2021).

Table 2 presents the estimated effects of minimum wage increases across different specifications. Each cell reports the coefficient on the log of the minimum wage from a separate regression. Focusing on the baseline specification in column (1) of Table 2, we find that the costs of minimum wage increases in the Japanese manufacturing sector were borne primarily by firms and workers. In particular, the estimates in column (1) indicate a substantial contraction in input factors following the minimum wage hike. First, the employment level declined. The relatively large elasticity estimate for employment is consistent with prior evidence on the disemployment effects of the minimum wage in Japan (Kawaguchi and Mori, 2021; Okudaira et al., 2019). Second, the increase in the minimum wage led to significant declines in material costs. The significant reduction in material costs suggests two potential mechanisms: firms may have reduced their production level, or upstream firms may have been unable to pass through increased labor costs into the prices of intermediate goods. Third, the estimated effect on capital investment is relatively large and negative but not statistically significant. Finally, the total wage bill declined, primarily driven by the significant reduction in employment levels. Overall, the evidence here suggests that the cost of minimum wage increases was borne primarily by firms and workers in the Japanese manufacturing sector.

In their analysis of Hungary, Harasztosi and Lindner (2019) examined the incidence of minimum wage increases by analyzing their effect on firm revenue, based on the idea that revenue—as the product of prices and quantities sold—reflects whether higher labor costs are ultimately passed on to consumers. In column (1) of Table 2, we find that the minimum wage increases significantly reduced total revenue, suggesting that they lowered either the quantity sold, the product price, or both. Given the substantial reduction in input factors, the decline in total revenue suggests that at a minimum, the quantity sold fell. However, it also implies that firms were unable to pass on the increased labor costs to consumers in the form of higher product prices. In fact, despite the substantial reductions in production inputs, we also observe a decline in operating profits. Taken together, these findings indicate that the cost of the minimum wage increases was shared between firms and workers rather than being passed on to consumers through higher prices.

These findings are robust and consistent across a range of alternative specifications. As previously discussed, controlling for regional linear trends helps account for pre-existing economic

Table 2: Minimum Wage and Margins of Adjustment

	(1) IV with trend	(2) OLS with trend	(3) IV no trend	(4) OLS no trend
ln(Wage bill)	-0.683*** (0.131)	-0.668*** (0.100)	-0.699*** (0.124)	-0.676*** (0.0925)
ln(Revenue)	-0.630*** (0.161)	-0.658*** (0.107)	-0.676*** (0.141)	-0.686*** (0.0926)
ln(Material costs)	-0.507** (0.199)	-0.612*** (0.122)	-0.590*** (0.167)	-0.675*** (0.100)
ln(Capital)	-0.375 (0.273)	-0.360 (0.235)	-0.425 (0.253)	-0.383* (0.224)
Operating profit	-0.0879*** (0.0288)	-0.0801*** (0.0231)	-0.0936*** (0.0288)	-0.0839*** (0.0246)
ln(Total number of employees)	-0.527*** (0.0981)	-0.487*** (0.0810)	-0.577*** (0.0880)	-0.529*** (0.0738)
ln(Average wage)	-0.156 (0.0957)	-0.181** (0.0827)	-0.122 (0.0985)	-0.147* (0.0812)
ln(Revenue per employee)	-0.103 (0.108)	-0.171** (0.0698)	-0.0992 (0.102)	-0.157** (0.0691)
ln(Full-time employees)	-0.551*** (0.113)	-0.489*** (0.0986)	-0.585*** (0.0999)	-0.528*** (0.0903)
ln(Part-time employees)	-0.489* (0.263)	-0.441* (0.228)	-0.631** (0.269)	-0.597** (0.231)
N (rows 1 to 8)	590,130	590,130	590,130	590,130
N (rows 9 and 10)	521,451	521,451	521,451	521,451
Regional linear trends	yes	yes	no	no
Establishment FE	yes	yes	yes	yes
Industry-year FE	yes	yes	yes	yes

Note: Each cell presents the coefficient estimate of the log minimum wage from a separate estimation. Columns (1) and (3) report the second-stage estimates from the IV specifications, where we instrumented the logarithm of the regional minimum wage with the initial gap. The initial gap is defined as the log difference between the regional minimum wage earnings and welfare benefits as of 2006. The initial gap is set to zero in regions with no positive gap in that year. The dataset combines manufacturing establishment records from the Census of Manufacture (METI) with data from the Establishment and Enterprise Census (MIC). Regional linear trends refer to prefecture-specific linear trends. The sample is restricted to establishments observed at least once between 2002 and 2006. Standard errors are clustered at the regional level.

differences across prefectures, but such controls may introduce over-controlling and absorb part of the policy effect, potentially biasing the estimates. This concern aligns with recent findings from the United States, where Burkhauser et al. (2025) show that the poverty-reducing effects reported by Dube (2019) may have been overstated due to a similar “bad control” problem. Meer and West (2016) also highlights potential issues with controlling for region-specific trends in DID specifications, especially when the minimum wage effects evolve dynamically. To assess the potential bias

introduced by such controls, we re-estimated the model without regional (i.e., prefecture) linear trends and also employed OLS as an alternative estimation strategy. The results of these alternative estimations are presented in columns (2) to (4) and are very similar to those in column (1), indicating that our baseline findings are robust. The relatively stable estimates across specifications suggest that regional linear trends do not have a strong influence on the outcome variables, nor do they appear to bias the estimated effects of the minimum wage increases. In addition, a comparison between the OLS and IV estimates suggests that, at least within our observation period, variations in the minimum wage can reasonably be regarded as exogenous.

In Appendix Table A2, we further assess the sensitivity of our results to the inclusion of time-varying proxies for market structure specific to each industry–prefecture combination: the logarithm of an industry-prefecture-level Revealed Comparative Advantage index and the logarithm of the number of establishments aggregated at the industry-prefecture level. Again, the results after controlling for these industry-prefecture characteristics are qualitatively and quantitatively similar to the baseline results in column (1) of Table 2. In the analyses that follow, we focus on the results from the IV specification that includes regional linear trends.

5.2 Impact on Establishment and Product Churn

Table 3 presents the estimation results on the entry and exit of establishments and products. Following Aaronson et al. (2018), our estimations do not include establishment-level fixed effects. All columns represent estimation results from linear probability models. In column (1), establishment exit is a dummy that takes a value of one if an establishment is absent in our data in $t + 1$, and zero otherwise. In column (2), establishment entry is a dummy that takes a value of one if an establishment is observed in year t but not in years up to $t - 1$ (see section 4.2).

The estimates in Table 3 indicate that higher minimum wages significantly raised probabilities of both entry and exit at the establishment level, suggesting an increased establishment-level churning effect. These results are consistent with earlier findings for Japan (Izumi et al., 2023; Morikawa, 2022; Fukao et al., 2023). We further extend these earlier studies by exploiting product-level information. Columns (3) and (4) examine the impact of minimum wage increases on product turnover within existing establishments. The magnitudes are larger for product turnover than for establishment turnover, implying that firms are more likely to respond by adjusting their

Table 3: Effects on Establishment and Product Churn

	(1)	(2)	(3)	(4)
	Establishment		Product	
	Exit	Entry	Exit	Entry
$\ln(MW_{r,t-1})$	0.338*** (0.100)	0.394*** (0.116)	0.698** (0.259)	0.792*** (0.309)
Observations	600,079	596,952	221,546	218,360
Other controls	yes	yes	yes	yes
Method	IV	IV	IV	IV
Establishment FE	no	no	no	no
Product-establishment FE	no	no	no	no
Industry-year FE	yes	yes	no	no
Region FE	yes	yes	yes	yes
Regional linear trends	yes	yes	yes	yes

Note: All columns present estimation results from linear probability models. Each cell shows the coefficient estimate of the log minimum wage obtained from the IV specifications. In columns (1) and (2), following Aaronson et al. (2018), our estimations do not include establishment-level fixed effects. In columns (3) and (4), our estimations do not include product-establishment level fixed effects. Region FE and regional linear trends refer to prefecture fixed effect and prefecture-specific linear trends, respectively. In column (1), establishment exit is a dummy that takes a value of one if an establishment is absent in our data in $t + 1$, and zero otherwise. In column (2), establishment entry is a dummy that takes a value of one if an establishment is observed in year t but not in years up to $t - 1$. To accurately define establishment entry and exit, we use the information from *Otsu* Panel (Form B, for establishments with 4 or more employees), although the observations in Form B are not included in the estimations here. Note that we do not apply the sample restriction used in the main estimation, which limits the sample to establishments observed at least once between 2002 and 2006. The dataset combines manufacturing establishment records from the Census of Manufacture (METI) with data from the Establishment and Enterprise Census (MIC). Regional linear trends refer to prefecture-specific linear trends.

product mix than by exiting the market altogether. This pattern is consistent with the view that minimum wage hikes trigger internal reallocation and product-line adjustments among incumbent establishments. Thus, our findings indicate that minimum wage increases may generate significant churning effects, characterized by increased probabilities of firm entry and exit alongside notable shifts in product mix among incumbent establishments.

It is important to note, however, that information on product entry and exit is only available for a subset of establishments. Thus, the samples used in the establishment-level analysis and product-level analyses do not completely overlap. Moreover, since the estimations in Table 2 are based on an unbalanced panel and we observe significant establishment turnover, the results presented in Table 2 may in part reflect changes in the composition of establishments.

Table 4: Heterogeneity in the Margins of Adjustment by Establishment Type

	(1)	(2)	(3)	(4)
	Single-product	Multi-product	Exporter	Non-exporter
ln(Wage bill)	-0.647*** (0.182)	-0.674*** (0.130)	-0.704*** (0.166)	-0.597*** (0.134)
ln(Revenue)	-0.720*** (0.172)	-0.485** (0.188)	-1.007*** (0.314)	-0.516*** (0.157)
ln(Material costs)	-0.702*** (0.257)	-0.200 (0.252)	-1.032*** (0.282)	-0.399* (0.205)
ln(Capital)	-0.575* (0.287)	0.127 (0.318)	-0.828* (0.461)	-0.280 (0.296)
Operating profit	-0.0538 (0.0465)	-0.144*** (0.0306)	-0.188* (0.100)	-0.0679** (0.0316)
ln(Total employees)	-0.519*** (0.107)	-0.426*** (0.137)	-0.567*** (0.162)	-0.444*** (0.0952)
ln(Average wage)	-0.128 (0.139)	-0.248*** (0.0575)	-0.137 (0.146)	-0.152 (0.101)
ln(Revenue per employee)	-0.200 (0.139)	-0.0586 (0.0895)	-0.440 (0.304)	-0.0719 (0.108)
ln(Full-time employees)	-0.605*** (0.147)	-0.281* (0.160)	-0.429* (0.241)	-0.469*** (0.105)
ln(Part-time employees)	-0.480 (0.372)	-0.0844 (0.402)	-0.468 (0.594)	-0.377 (0.283)
N (rows 1 to 8)	320,911	268,617	79,527	509,576
N (rows 9 and 10)	282,083	238,644	70,132	450,252
Method	IV	IV	IV	IV
Regional linear trends	yes	yes	yes	yes
Establishment FE	yes	yes	yes	yes
Industry-year FE	yes	yes	yes	yes

Note: Each cell presents the coefficient estimate of the log minimum wage obtained from the IV specifications. We instrumented the logarithm of the regional minimum wage with the initial gap. The initial gap is defined as the log difference between the regional minimum wage earnings and welfare benefits as of 2006. The initial gap is set to zero in regions with no positive gap in that year. The dataset combines manufacturing establishment records from the Census of Manufacture (METI) with data from the Establishment and Enterprise Census (MIC). Regional linear trends refer to prefecture-specific linear trends. The sample is restricted to establishments observed at least once between 2002 and 2006. Establishments that produced multiple products in at least one year between 2002 and 2006 are classified as multi-product establishments and the remaining establishments are classified as single-product establishments. Establishments that exported in at least one year between 2002 and 2006 are classified as exporting establishments. Standard errors are clustered at the regional level.

5.3 Heterogeneity

To explore heterogeneity in the margins of adjustment following minimum wage increases, we examine differences by export status and product scope at the establishment level. First, we investigate whether multi-product establishments exhibit different responses than single-product establishments, based on their product scope prior to the policy change. Establishments produc-

ing a broader range of products may have more flexibility in adjusting their product mix, which could allow for more options in responding to rising labor costs. This is consistent with the mechanism proposed by Alvarez and Navarro (2019) and Nguyen (2025), where product switching enables firms to maintain flexibility in the allocation of their resources. Second, we distinguish between exporters and domestic establishments based on their export status in at least one year between 2002 and 2006. Establishments operating in tradable sectors may face greater constraints in passing on higher costs to output prices due to global market competition (Harasztosi and Lindner, 2019; Gopalan et al., 2021).

Table 4 presents the results of this examination of heterogeneity in firms' responses to minimum wage increases by comparing multi-product and single-product establishments, as well as exporters and non-exporters. The results indicate that single-product establishments exhibited stronger responses in material costs, capital investment, and employment than multi-product establishments. While single-product establishments experienced a larger decline in total revenue, their decrease in operating profit was smaller and not statistically significant.

These patterns are informative for the emerging literature showing that firms adjust to minimum wage hikes by altering their product mix. In particular, firms may shift production toward products with higher profit margins. Nguyen (2025) finds that minimum wage hikes in Vietnam reduced employment, with no evidence of price pass-through, but with a shift from existing to new product sales. Similarly, Alvarez and Navarro (2019) show that minimum wage increases in Chile affected product turnover by reducing the entry and increasing the exit of unskilled labor-intensive products. On the other hand, a comparison between columns (1) and (2) in Table 4 suggests that although firms reallocated production inputs through product mix adjustments, these efforts were not sufficient to offset the decline in profit margins, at least within the Japanese manufacturing sector. This implies that product switching provides only a limited margin of adjustment, likely due to inherent constraints that restrict the extent to which firms can alter their product mix in response to minimum wage increases.

Turning to the comparison of exporting and non-exporting establishments in columns (3) and (4), we find that the contrasts between these two types of establishments are more pronounced than those between single- and multi-product establishments. Exporters experienced larger declines in revenue, material costs, capital investment, and employment, suggesting a limited ca-

capacity to pass on increased labor costs due to exposure to international market competition. In contrast, non-exporters showed much smaller reductions in revenue and material costs, which is consistent with greater cost pass-through to domestic consumers and suppliers. These heterogeneous responses reinforce the findings of prior studies indicating that domestic-oriented firms are more likely to pass on cost increases, whereas exporters face tighter constraints from global pricing pressures (Harasztosi and Lindner, 2019; Gopalan et al., 2021).

Finally, Table 5 presents estimation results on the impact of minimum wage increases on product prices and quantities, using shipment-level data that contain revenue and quantity information for each product. We calculate unit prices by dividing revenue by quantity. It is important to note that the establishments covered in this sample differ substantially from those in the main sample, as the analysis is limited to product-level observations for which both prices and quantities are available.

	(1) All	(2) Single-product	(3) Multi-product	(4) Exporter	(5) Non-exporter
$\ln(\text{Revenue})$	-0.884** (0.394)	-0.913*** (0.263)	-0.933* (0.500)	-1.802* (0.923)	-0.717** (0.349)
$\ln(\text{Quantity})$	-1.045** (0.461)	-0.280 (0.667)	-1.188** (0.515)	-0.986 (1.109)	-0.946** (0.468)
$\ln(\text{Price})$	0.160 (0.215)	-0.633 (0.698)	0.255 (0.246)	-0.816* (0.414)	0.229 (0.286)
N	202,724	29,831	171,062	46,338	154,013
Method	IV	IV	IV	IV	IV
Product-establishment FE	yes	yes	yes	yes	yes
Product-year FE	yes	yes	yes	yes	yes
Regional linear trends	yes	yes	yes	yes	yes

Note: Each cell presents the coefficient estimate of the log minimum wage obtained from the IV specifications. We instrumented the outcome variable with the initial gap. The initial gap is defined as the log difference between the regional minimum wage earnings and welfare benefits as of 2006. The initial gap is set to zero in regions with no positive gap in that year. Exporters are defined as establishments that reported exporting in at least one year during the pre-policy period (2002–2006). Non-exporters are those that did not report any export activity during the same period. Establishments that produced multiple products in at least one year between 2002 and 2006 are classified as multi-product establishments and the remaining establishments are classified as single-product establishments. The dataset combines manufacturing establishment records from the Census of Manufacture (METI) with data from the Establishment and Enterprise Census (MIC). Regional linear trends refer to prefecture-specific linear trends. The sample is restricted to establishments and products that are observed at least once between 2002 and 2006 and for which prices and quantities are reported. Standard errors are clustered at the regional level.

Across all establishment types, we find a consistent pattern: minimum wage increases significantly reduce revenue at the product level. This effect is driven primarily by a decline in quantity

sold, suggesting a contraction in production. The results also point to potential heterogeneity in price responses. Although statistically insignificant, the estimated price effects are positive and relatively large for multi-product and non-exporting establishments. This suggests that a broader product scope might afford firms greater flexibility in managing rising labor costs. Likewise, non-exporters may have partially offset higher labor costs through price adjustments, indicating some degree of cost pass-through to consumers. Another possible reason for the insignificant price effects lies in how unit prices are measured. Some firms may have reduced product quantities (i.e., downsized) without changing nominal prices—an approach commonly referred to in Japan as stealth price increases.⁸ In such cases, measured unit prices remain unchanged, even though consumers effectively face higher prices per unit. Although the patterns presented in this table are suggestive, the relatively small sample size limits the precision of these estimates.

5.4 Why Were Firms Unable to Pass on Increased Labor Costs to Product Prices?

It is important to emphasize that our results are consistent with a somewhat understated but important strand of prior evidence on exporting and tradable sectors, highlighting that firms in these sectors face greater constraints in passing increased costs on to consumers (Cengiz et al., 2019; Harasztosi and Lindner, 2019; Gopalan et al., 2021). For instance, Figure 6 in Harasztosi and Lindner (2019) reports a significantly negative elasticity of employment with respect to labor costs for these sectors, identified from a substantial minimum wage hike in Hungary. Similarly, the elasticity of revenue with respect to labor costs is also significantly negative—findings that align with our results in Table 2. These results suggest that firms in exporting and tradable sectors in Hungary were also unable to pass on cost increases to product prices.

Why were firms unable to pass on increased labor costs to product prices in these sectors? One explanation is that firms exposed to international competition in the product market have limited scope to raise product prices in response to increased labor costs. In other words, the structure of the product market—specifically the output demand elasticity faced by individual firms—determines the extent to which they can pass on cost increases. Harasztosi and Lindner (2019) developed a partial equilibrium model with monopolistically competitive firms to support this point, as well as to illustrate additional channels through which firms might adjust to

⁸Imai and Watanabe (2014) examine the extent to which product downsizing occurred during the deflationary period from 2000 to 2012 in Japan and show that approximately one-third of product replacements were accompanied by a reduction in size or weight.

increased labor costs.

Another possible explanation specific to the Japanese context is the prolonged period of price stagnation over the past few decades. Aaronson and French (2007) show that under a competitive labor market, a minimum wage increase reduces employment, which in turn lowers the quantity of goods supplied and may lead to higher product prices in the product market. Applying this framework to the Japanese context means that, when it was difficult for firms to pass increased labor costs on to product prices, the equilibrium quantity in the product market was likely to contract substantially.⁹ This interpretation is consistent with our finding that the minimum wage increase reduced production scale.¹⁰

Although we are unable to pinpoint these mechanisms precisely, the findings in this study underscore the importance of considering sectoral and institutional contexts when evaluating the effects of minimum wage policies. Structural differences in product market competition across countries and sectors can shape firms' adjustment mechanisms in response to minimum wage increases—a point also emphasized in the recent comprehensive review by Dube and Lindner (2024). The current study also suggests that price rigidity may play a role in shaping how firms adjust to higher labor costs.

6 Conclusion

This paper investigated the incidence of minimum wage increases in Japan's manufacturing sector by applying the empirical framework of Harasztosi and Lindner (2019), allowing a comprehensive examination of how rising labor costs affect firms across multiple margins of adjustment. Leveraging a quasi-experimental design based on regional variation in pre-reform gaps between welfare benefits and minimum wages, we estimated elasticities of outcomes such as to-

⁹Scholars have proposed a number of reasons why prices were sticky and it was difficult for firms to pass on cost increases during this period in Japan, including menu costs (Watanabe and Watanabe, 2017), deflationary expectations (Nishizaki et al., 2014) and market concentration (Matsuoka, 2011), among others.

¹⁰In contrast, in a monopsonistic labor market, minimum wage hikes may instead lower product prices through increases in employment (Aaronson and French, 2007). Aoki et al. (2024) shows that since 1995, price markups in Japan's manufacturing sector have declined substantially, while wage markdowns have increased, suggesting that firms have maintained profitability by exerting greater bargaining power over wages. In a monopsonistic setting, however, price rigidity is less likely to bind the product market, as minimum wage increases are expected to *lower* product prices (Aaronson and French, 2007). Using the same manufacturing dataset as this study, Okudaira et al. (2019) estimated wage markdowns and found that minimum wage increases did not reduce employment among establishments with high wage markdowns. However, the share of such establishments was relatively small (12.3%), implying that this mechanism was not dominant in our study.

tal wage bills, revenue, capital investment, profit margins, and product turnover. Consistent with the institutional context of Japan's manufacturing sector—where exporters face intense global competition and non-exporters during our sample period from 2002 to 2016 operated under decades of stagnant domestic prices in a deflationary economy, severely constraining price pass-through—we find that the burden of minimum wage increases was borne primarily by firms and workers, rather than consumers. While part of the increased labor cost was absorbed through reduced profit margins, we find no clear evidence of price pass-through to consumers. Instead, we observe a consistent decline in revenues and quantities sold across a range of specifications, pointing to a potential contraction in production.

These results stand in contrast to the widely cited findings of Harasztosi and Lindner (2019), which suggest that in Hungary the cost of minimum wage increases was largely borne by consumers—a conclusion that has shaped much of the academic and policy debate. However, Harasztosi and Lindner (2019) also report sizable disemployment and revenue effects in exporting and tradable sectors, which is consistent with our findings. Taken together, our evidence highlights that the incidence of minimum wage hikes cannot be universally inferred from earlier studies. Instead, it is crucial to account for the industrial structure and degree of market competition when evaluating the effects of minimum wage policies. The case of Japan also highlights the importance of taking product prices into account, since rigidity in product prices appears to have played a large part in the contraction in production following the minimum wage increases. Accordingly, future research and policy assessments should pay closer attention to how institutional and structural factors shape firm responses across different contexts.

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Appendix A. Supplementary Tables

Table A1: First-stage estimates

	(1) Establishment-level	(2) Product-level
Year dummy ($t = 2003$) $\times$ Initial gap	-0.00194 (0.00572)	-0.000663 (0.00572)
Year dummy ($t = 2004$) $\times$ Initial gap	-0.00106 (0.00539)	-0.0000204 (0.00483)
Year dummy ($t = 2005$) $\times$ Initial gap	-0.00279 (0.00313)	-0.00362 (0.00303)
Year dummy ($t = 2006$) $\times$ Initial gap	-0.00197 (0.00213)	-0.00354 (0.00220)
Year dummy ($t = 2008$) $\times$ Initial gap	0.0551** (0.0214)	0.0508** (0.0242)
Year dummy ($t = 2009$) $\times$ Initial gap	0.179*** (0.0364)	0.167*** (0.0428)
Year dummy ($t = 2010$) $\times$ Initial gap	0.378*** (0.0397)	0.361*** (0.0464)
Year dummy ($t = 2011$) $\times$ Initial gap	0.473*** (0.0562)	0.443*** (0.0658)
Year dummy ($t = 2012$) $\times$ Initial gap	0.583*** (0.0628)	0.554*** (0.0696)
Year dummy ($t = 2013$) $\times$ Initial gap	0.642*** (0.0561)	0.616*** (0.0621)
Year dummy ($t = 2014$) $\times$ Initial gap	0.662*** (0.0666)	0.637*** (0.0723)
Year dummy ($t = 2015$) $\times$ Initial gap	0.663*** (0.0719)	0.638*** (0.0778)
Year dummy ($t = 2016$) $\times$ Initial gap	0.645*** (0.0727)	0.619*** (0.0791)
N	590,130	202,724
Establishment FE	yes	yes
Industry-year FE	yes	yes
Regional linear trends	yes	yes
Kleibergen-Paap F	189.5	159.1

Note: The table reports the first-stage estimates from the IV specifications presented in the main analysis. The dataset combines manufacturing establishment records from the Census of Manufacture (METI) with data from the Establishment and Enterprise Census (MIC). Regional linear trends refer to prefecture-specific linear trends. The sample is restricted to establishments observed at least once between 2002 and 2006. The instrument, labeled “Initial gap,” is defined as the log difference between the regional minimum wage earnings and welfare benefits as of 2006. The initial gap is set to zero in regions with no positive gap in that year. Standard errors are clustered at the regional level.

Table A2: Minimum Wages and Margins of Adjustment: Sensitivity to Industry-Region Controls

	(1) IV with trend	(2) OLS with trend	(3) IV no trend	(4) OLS no trend
ln(Wage bill)	-0.672*** (0.145)	-0.671*** (0.109)	-0.689*** (0.134)	-0.674*** (0.0988)
ln(Revenue)	-0.606*** (0.182)	-0.669*** (0.117)	-0.661*** (0.160)	-0.695*** (0.103)
ln(Material costs)	-0.465** (0.221)	-0.610*** (0.130)	-0.570*** (0.188)	-0.683*** (0.110)
ln(Capital)	-0.360 (0.281)	-0.361 (0.237)	-0.425 (0.257)	-0.394* (0.224)
Operating profit	-0.0932*** (0.0292)	-0.0908*** (0.0239)	-0.0955*** (0.0284)	-0.0893*** (0.0248)
ln(Total number of employees)	-0.524*** (0.103)	-0.501*** (0.0814)	-0.577*** (0.0909)	-0.539*** (0.0728)
ln(Average wage)	-0.148 (0.0949)	-0.169** (0.0823)	-0.112 (0.0980)	-0.135* (0.0801)
ln(Revenue per employee)	-0.0817 (0.121)	-0.168** (0.0799)	-0.0846 (0.116)	-0.155* (0.0792)
ln(Full-time employees)	-0.549*** (0.115)	-0.500*** (0.0981)	-0.589*** (0.103)	-0.540*** (0.0901)
ln(Part-time employees)	-0.485* (0.263)	-0.470** (0.230)	-0.638** (0.271)	-0.627** (0.235)
N (rows 1 to 8)	580,557	580,557	580,557	580,557
N (rows 9 and 10)	513,180	513,180	513,180	513,180
Regional linear trends	yes	yes	no	no
Establishment FE	yes	yes	yes	yes
Industry-year FE	yes	yes	yes	yes

Note: Each cell presents the coefficient estimate of the log minimum wage from a separate estimation. Columns (1) and (3) report the second-stage estimates from the IV specifications, where we instrumented the logarithm of the regional minimum wage with the initial gap. The initial gap is defined as the log difference between the regional minimum wage earnings and welfare benefits as of 2006. The initial gap is set to zero in regions with no positive gap in that year. The dataset combines manufacturing establishment records from the Census of Manufacture (METI) with data from the Establishment and Enterprise Census (MIC). Regional linear trends refer to prefecture-specific linear trends. “Industry-region controls” include the Revealed Comparative Advantage index and the logarithm of the number of establishments aggregated at the industry-prefecture level. The sample is restricted to establishments observed at least once between 2002 and 2006. Standard errors are clustered at the regional level.