

Firms' Risk Adjustments to Minimum Wage: Financial Leverage and Labor Share Trade-off

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Introduction

- In addition to traditional capital structure determinants, labor market frictions influence corporate financial decisions.
- Labor is associated with high adjustment costs and is subject to regulatory constraints.
- Higher wages and adjustment costs increase risks during financial distress, accelerating financial difficulties.
- Research on minimum wage policy and financial leverage remains notably scarce.

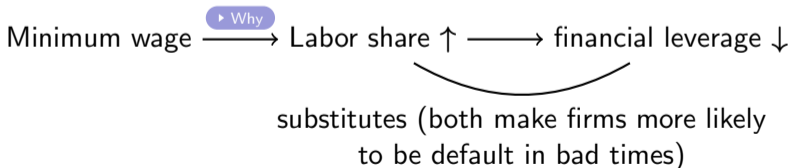
Introduction

- **This study examines how the German minimum wage affects firms' capital structure.**
- It provides evidence of risk substitution behavior that may enhance firm resilience, shape economic decision-making, and carry broader implications for credit market stability.
- The findings contribute to explaining the deleveraging trend observed among German firms over the past decade.

Theoretical background

- Leverage substitution theory (Mandelker and Rhee, 1984; Favilukis et al., 2020): both labor leverage (labor share) and financial leverage amplify firms business risk and the expected costs of financial distress. Firms trade off these two leverages.
- **Labor share**: In response to macroeconomic changes, labor costs cannot be adjusted fully flexibly. Higher labor share and labor rigidity make profits more sensitive to shocks.
- **Financial leverage**: With higher coupon/interest payment, firms are more vulnerable to financial distress. ▶ Definition

Hypothesis:



Institutional background

- Germany implemented its first statutory minimum wage on January 1st, 2015, setting the minimum hourly wage at 8.5 €.
- A small share of employees are exempted and several industries are allowed a transitional phase.
- Anticipation effect is possible in late 2013 or 2014. ▶ Anticipation of MW
- The minimum wage has been increased in subsequent years.

Data

- A linked dataset consisting of
 - Firm level: financial information, Amadeus (BvD),
 - Establishment level: establishment attributes, BeH (IAB)
 - Employee level: employment records of the German social security system, BeH (IAB)
- The dataset merges firm information and administrative employment records in Germany on a large scale. The full workforce of a firm is observed.

Data

- The final sample under analysis is an unbalanced panel, covering years 2011-2018, comprising 184,831 firm-year observations from 27,488 distinct firms.
- Most firms are private firms.
- 70.6% of firms hire at least one minimum wage worker.
- Average treatment intensity ($Bite_j$) is 10.2%.
- $Bite_j$: treatment intensity, defined as the proportion of minimum wage workers in firm j in 2013 (before the policy implementation).

▸ Representativeness of the sample

Identification: Difference in Differences

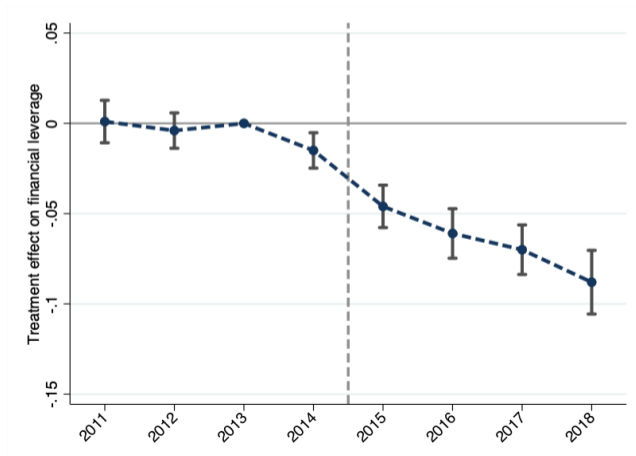
$$y_{jt} = \delta_0 + \sum_{k \neq 2013} \delta_k * Bite_j * Year_{k,t} + \sum_{k \neq 2013} \gamma_k * Year_{k,t} + \phi * Bite_j \quad (1)$$
$$+ \alpha_j + \theta_{c,t} + \lambda_{s,t} + \epsilon_{jt},$$

- where y_{jt} represents the firm-level outcome variables, and a predetermined bite-specific trend is subtracted from all y_{jt} . [▶ Why detrend](#)
- $Bite_j$ is the proportion of minimum wage workers in firm j in 2013.
- The coefficients of interest is $\hat{\delta}_k$.
- α_j denotes the firm-fixed effects, $\theta_{c,t}$ is county \times year fixed effects, and $\lambda_{s,t}$ is industry \times year fixed effects.

Main results

- A 10-p.p increase in bite leads to firms' financial leverage decrease by about 0.5 to 0.9 percentage points.

Figure 2: Minimum wage effect on firms' financial leverage



Examinations on financial leverage changes

Table 1: Minimum wage effects on log total debts and log assets

	Log total debts (1)	Log total assets (2)	Log fixed assets (3)	Log current assets (4)	Log cash (5)
Bite*Post	-0.079** (0.027)	0.081*** (0.015)	-0.001 (0.027)	0.088*** (0.019)	0.271*** (0.058)
Observations	184,702	184,702	184,702	184,702	184,702

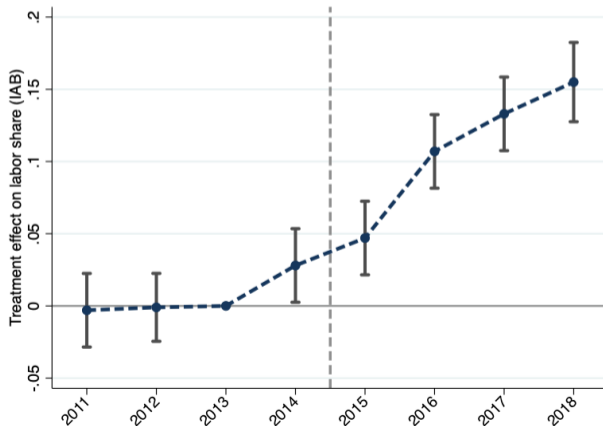
► Where cash from

► Robustness checks

Mechanism : Labor share

- A 10-p.p increase in bite leads to firms' labor share increase by about 0.5 to 1.6 percentage points.

Figure 3: Minimum wage effect on labor share



Production inputs and capital-labor substitution

- The direction of the labor share changes depending on how large the elasticity of substitution between labor and capital (σ) is.
 - Under the scenario where the marginal product equals wages, the minimum wage increases labor share if σ is smaller than 1, indicating that labor and capital are complements.

$$\sigma = \frac{d \ln(\frac{K}{L})}{d \ln(\frac{w}{r})} = \frac{0.059}{0.212} = 0.28.$$

Table 2: Minimum wage effects on employment and capital-labor ratio

	Log employment (1)	Log (fixed assets/empl.) (2)	Log (labor costs/empl.) (3)
<i>Bite * Post</i>	-0.082*** (0.020)	0.059* (0.028)	0.212*** (0.014)
Observations	184,702	184,702	184,702

Production outputs and distribution

- Labor share: =total labor costs/value added.
- Value added: =total labor costs + EBITDA.
- Minimum wage leads to a larger pie (increased value added)
- and more distribution of the pie towards labor, meaning that there are decreased return to capital (EBITDA) and increased return to the labor force (total labor costs).

Table 3: Minimum wage effects on employment and capital-labor ratio

	Log value added (1)	Log EBITDA (2)	Log total labor costs (3)
<i>Bite * Post</i>	0.090*** (0.019)	-0.172*** (0.032)	0.130*** (0.025)
Observations	183,037	169,645	184,702

Firms' likelihood of survival

$$D(\text{Exit}_j = 1) = \beta_0 + \beta_1 * \text{Bite}_j + \beta_2 * \text{Avg. fin. leverage}_j + \beta_3 * \text{Bite}_j * \text{Avg. fin. leverage}_j + \mathbf{X}'_j \gamma + \varepsilon_j,$$

Table 4: Minimum wage bite and firm exit

	Exit (=1) (1)	Exit (=1)(without covariates) (2)
<i>Bite</i>	0.046** (0.015)	0.078*** (0.015)
<i>Avg. fin. leverage</i>	0.020*** (0.006)	0.042*** (0.005)
<i>Avg. fin. leverage * Bite</i>	-0.048* (0.023)	-0.070** (0.023)
Covariates	Yes	No
Observations	26,033	26,033

Main findings

- Firms' financial leverage decreases by about 0.5 to 0.9 pp, corresponding to 25%–45% of the observed decline in average financial leverage in the last decade.
- The mechanism analysis focuses on the leverage substitution channel and finds a 0.5 to 1.6 percentage point increase in the labor share.
- Production inputs: No significant capital–labor substitution observed; the estimated elasticity of substitution is 0.28, indicating labor and capital are complements.
- Production outputs and distribution: Total value added increases, with rising labor costs and falling profits, suggesting redistribution of outputs from capital to the labor force.
- As a result of risk substitution, firms become more resilient in later years.

Conclusion

- Corporate decisions of firms are responsive to labor market policies.
- The minimum wage benefits employees overall, with increased returns shifted to the labor force.
- For firms, the minimum wage makes them less flexible in adjusting costs and imposes larger operating burdens.
- Consequently, they exhibit more conservative behavior to offset the associated risks, which enhances their resilience in later years.

Thank you for your attention!

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A: Minimum wage and the labor share

The theoretical framework follows Bentolila and Saint-Paul (2003) and fits in the minimum wage intervention. Firms face an increasing wage level due to the minimum wage, and they have the option to adjust employment so that the equilibrium condition still holds that the wage is equal to the marginal product. The CES (constant elasticity of substitution) production function is defined as

$$Y_j = [\alpha(A_j K_j)^\epsilon + (1 - \alpha)(B_j L_j)^\epsilon]^{\frac{1}{\epsilon}}$$

Labor share is defined as the share of total labor income to output:

$$LS_j = \frac{w_j L_j}{Y_j p_j}$$

A: Minimum wage and the labor share cont'd

Firms solve the profit maximization problem:

$$\max \pi_i = Y_j p_j - w_j L_j - r_j K_j$$

w_j and r_j are prices of labor and capital, namely wage and interest. p_j is the price of output. Take partial derivative with respect to L_j and the F.O.C implies:

$$\frac{w_j}{p_j} = B_i^\epsilon (1 - \alpha) \left(\frac{L_j}{Y_j} \right)^{\epsilon-1}$$

A: Minimum wage and the labor share cont'd

Then

$$\frac{L_j}{Y_j} = \left(\frac{w_j}{p_j}\right)^{\frac{1}{\epsilon-1}} B_i^{\frac{\epsilon}{(1-\epsilon)}} (1-\alpha)^{\frac{1}{1-\epsilon}} \quad (2)$$

Insert equation 2 to the definition of labor share:

$$LS_j = \frac{w_j L_j}{Y_j p_j} = \left(\frac{w_j}{p_j}\right)^{\frac{\epsilon}{\epsilon-1}} B_i^{\frac{\epsilon}{(1-\epsilon)}} (1-\alpha)^{\frac{1}{1-\epsilon}} \quad (3)$$

A: Minimum wage and the labor share cont'd

Take the partial derivative of labor share with respect to real wage:

$$\frac{\partial LS_j}{\partial \frac{w_j}{p_j}} = \frac{\epsilon}{\epsilon - 1} \left(\frac{w_j}{p_j} \right)^{\frac{1}{\epsilon-1}} B_i^{\frac{\epsilon}{1-\epsilon}} (1 - \alpha)^{\frac{1}{1-\epsilon}} \quad (4)$$

The direction of the partial derivative depends on $\frac{\epsilon}{\epsilon-1}$. The elasticity of substitution between labor and capital is $\sigma = \frac{1}{1-\epsilon}$. If $\epsilon \in (0, 1)$, $\sigma > 1$ and labor and capital are substitutes. In this case, the increase in wage leads to decreased labor share. If $\epsilon \in (-\infty, 0)$, $\sigma < 1$ and labor and capital are complements. Therefore, the increased wage results in increased labor share.

A: Minimum wage and the labor share cont'd

However, if firms are not able to adjust employment fully, then there would be a wedge between the marginal product of labor and real wages. In this case, employment is set such that the marginal product of labor is equal to its opportunity cost ($\frac{\bar{w}_j}{p_j}$):

$$\frac{\bar{w}_j}{p_j} = B_j^\epsilon (1 - \alpha) \left(\frac{L_j}{Y_j} \right)^{\epsilon-1}$$

Assume workers' bargaining power is θ , with a Nash-bargaining model, the real wage is then the weighted average of opportunity costs and the average labor product:

$$\frac{w_j}{p_j} = \theta \frac{Y_j}{L_j} + (1 - \theta) \left(B_j^\epsilon (1 - \alpha) \left(\frac{L_j}{Y_j} \right)^{\epsilon-1} \right)$$

A: Minimum wage and the labor share cont'd

Denote the labor share in equation 3 as LS_j and the new labor share in bargaining set-up as LS_{new} ,

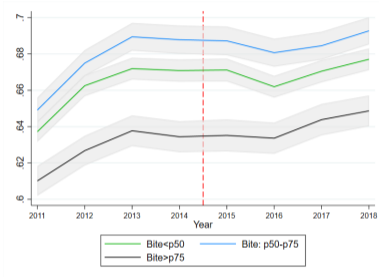
$$LS_{new} = \theta + (1 - \theta)LS_j = LS_j + (1 - LS_j)\theta$$

Labor share becomes larger if workers bargain employment with firms. Moreover, introducing the bargaining power of workers over employment does not affect the conclusion from equation 4 that the effect's direction of increase in real wages on labor share depends on σ .

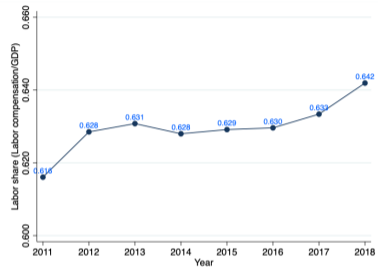
Related literature

- Labor market frictions' effect on firm's capital structure: Favilukis et al. (2020), Simintzi et al. (2015); Serfling (2016), Kim (2020), and Matsa (2018).
- Minimum wage and firms responses: Draca et al. (2011); Gustafson and Kotter (2023); Leung (2021); Bossler et al. (2020).

Appendix Figure B1: Labor share development



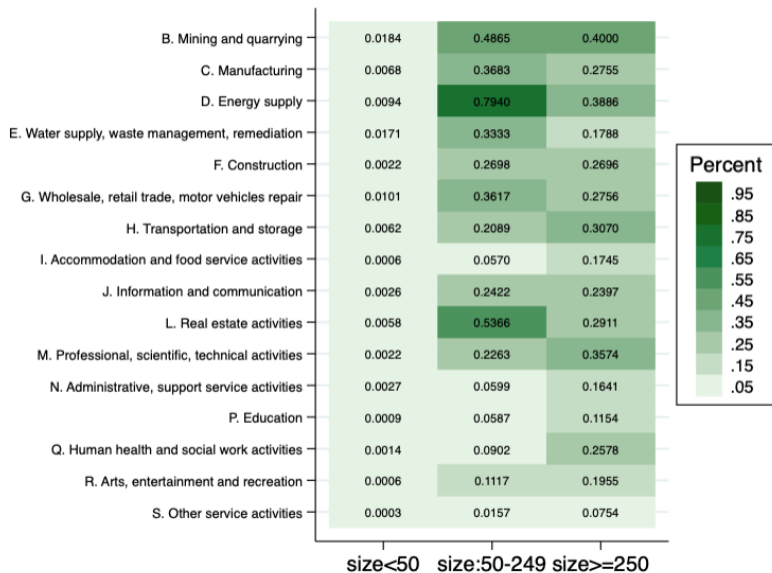
(a) Mean labor share in the sample



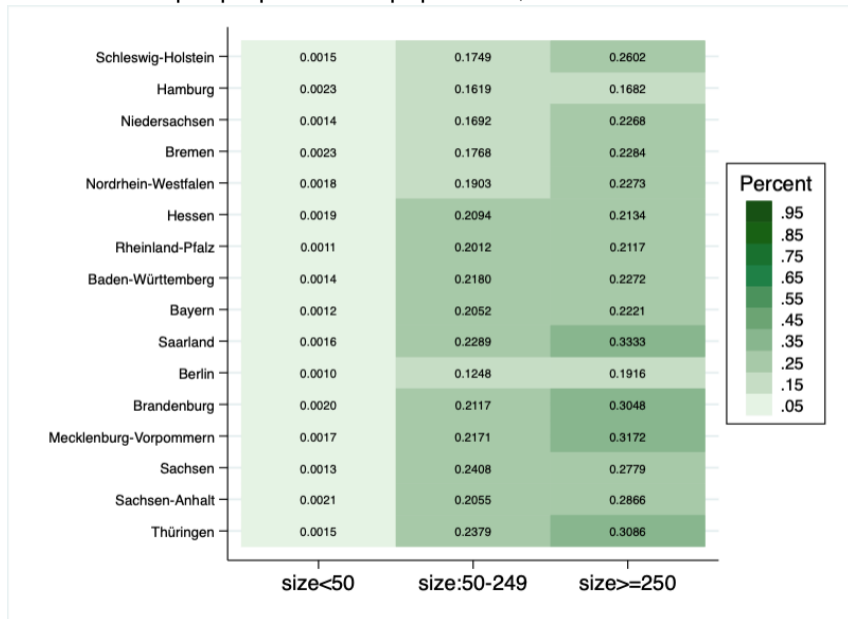
(b) Aggregate labor share in Germany

Notes: The figure displays Germany's aggregate labor share (labor compensation/GDP). All industries are included. Data: Penn World Table version 10.01.

Sample proportion to population, in sector-size cells, 2018



Sample proportion to population, in state-size cells



B: Variables definition

- **Labor share**=Total labor costs/Value Added
 - is a form of operating risks, also known as labor-induced operating leverage (Donangelo et al., 2019).
 - Firms with higher operating leverage are more sensitive to economic shocks.
- **Financial leverage**=(Long-term debts+short-term liabilities)/Total Assets
 - measures firm capital structure.

Other channels

- Collateral Channel: Higher labor costs may induce capital–labor substitution, increasing firms' tangible assets. These assets can serve as collateral, facilitating higher debt levels. → Financial leverage ↑
- Pecking Order Theory: The minimum wage reduces profitability. According to the pecking order theory, firms turn to external debt after exhausting retained earnings. → Financial leverage ↑
- Loan Supply: Greater tangible assets may enhance collateral value, but lower profitability and higher operating risk may restrict credit supply. → Financial leverage ?

B: Variables definition cont'd

Appendix Table B1: Variables definitions and sources

Variable	Definition	Original variables used	Source
Financial leverages			
Financial leverage	$\frac{(\text{long-term debts} + \text{short-term liabilities})}{\text{total assets}}$	$\frac{(\text{LTDB} + \text{CULI})}{\text{TOAS}}$	BvD
Broader fin. leverage	$\frac{(\text{long-term liabilities} + \text{short-term liabilities})}{\text{total assets}}$	$\frac{(\text{NCLI} + \text{CULI})}{\text{TOAS}}$	BvD
Long-term leverage	$\frac{(\text{long-term debts})}{\text{total assets}}$	$\frac{(\text{LTDB})}{\text{TOAS}}$	BvD
Net leverage	$\frac{(\text{long-term debts} + \text{short-term liabilities} - \text{cash})}{\text{total assets}}$	$\frac{(\text{LTDB} + \text{CULI} - \text{CASH})}{\text{TOAS}}$	BvD
Labor related variables			
Labor share	total labor costs/value-added	$\frac{(\text{TLC})}{\text{TLC} + \text{EBTA}}$	BvD, IAB
Total labor costs per worker	total labor costs/employment		IAB
Total labor costs(TLC)	total annual gross wages		IAB
Employment	number of workers		IAB
value-added	total labor costs + EBITDA	$\text{TLC} + \text{EBTA}$	BvD, IAB
Capital-labor ratio	fixed assets/employment	$\frac{(\text{FIAS})}{\text{number of workers}}$	BvD, IAB
Outsourceable occupations	food, cleaning, security, and logistics occupations (Goldschmidt and Schmieder, 2017)		IAB
Bite	share of sub-minimum wage workers, based on gross hourly wages		IAB
Gap	$\frac{\sum_{i \in j} h_{i,2013} \text{Max}\{0, 8.5 - \text{wage}_{i,2013}\}}{\sum_{i \in j} h_{i,2013} \text{wage}_{i,2013}}$		IAB

Notes: Total labor costs, total labor costs per worker, employment, bite, outsourceable occupations, and gap variables are self-calculated from the IAB data.

Summary statistics

- $Bite_j$: treatment intensity, measures the proportion of minimum wage workers in firm j in 2013 (before the policy implementation).

Appendix Table B2: Cross-sectional summary statistics, year 2013

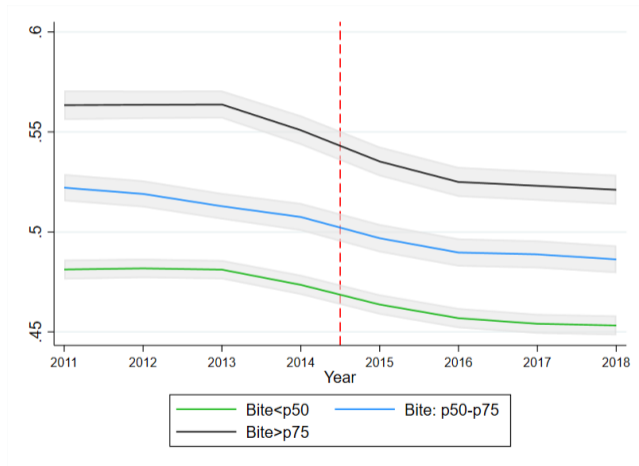
	mean
Treatment intensity	
- Bite	0.102
- Minimum wage affected firm ($Bite > 0$)	0.706
Firm located in Eastern Germany	0.191
Single-establishment firm	0.779
Firm size: < 50	0.309
Firm size: $50 - 249$	0.566
Firm size: ≥ 250	0.125
Observations	27,488

Notes: Except for the variable *Bite*, all variables are dummy variables. The standard deviation for *Bite* is 0.174.

Data: Linked data of BeH, BHP, and Amadeus, 2013.

Summary statistics

Appendix Figure B2: Development of financial leverage over time



B: Variables definition cont'd

Appendix Table B3: Variable's definitions and sources, cont'd

Variable	Definition	Original variables used	Source
Other variables			
Total debt	Long-term debts and short-term liabilities	LTDB+CULI	BvD
Long-term liabilities	long-term debts and provisions	NCLI	BvD
Short-term liabilities	short-term debts, trade payables, and other current liabilities	CULI	BvD
Total assets	fixed assets+current assets	TOAS	BvD
Fixed assets	tangible assets+intangible assets	FIAS	BvD
Tangible assets	physical assets, such as property, equipment, and inventory	IFAS	BvD
Intangible assets	non-physical assets, such as patents and trademarks	TFAS	BvD
Current assets	cash, trade receivables and other current assets	CUAS	BvD
Cash	cash-in-hand, central Bank balances, bank balances and cheques	CASH	BvD
EBITDA	earnings before interest, taxes, depreciation and amortization	EBTA	BvD
Net income	profit/loss - minority interest	PL	BvD
EBIT	earnings before interest and taxes	EBIT	BvD
ROA	EBIT/total assets	$\frac{\text{EBIT}}{\text{TOAS}}$	BvD

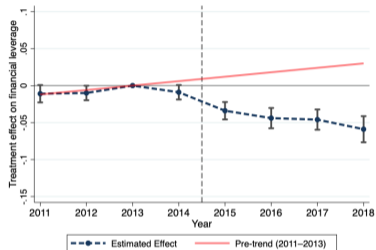
Notes: Total labor costs, total labor costs per worker, employment, bite, and gap variables are self-calculated from the IAB data.

Appendix Table B4: B: Summary Statistics

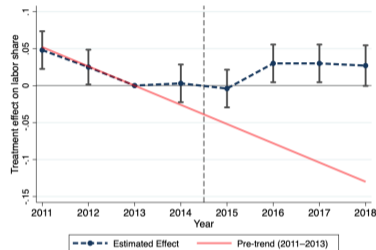
	Pre-period: 2011-2014					Post-period: 2015-2018				
	mean	sd	p25	p50	p75	mean	sd	p25	p50	p75
Financial Leverage variables										
Financial leverage	0.508	0.274	0.286	0.507	0.720	0.482	0.272	0.258	0.473	0.690
Financial leverage (broad def.)	0.629	0.264	0.434	0.650	0.830	0.604	0.268	0.399	0.616	0.808
Long-term leverage	0.154	0.211	0.000	0.056	0.238	0.132	0.188	0.000	0.038	0.202
Net leverage	0.376	0.354	0.126	0.403	0.648	0.346	0.352	0.097	0.368	0.614
Labor-related variables										
Labor share	0.657	0.320	0.469	0.669	0.826	0.667	0.320	0.480	0.679	0.833
Log average annual labor costs per employee worker	10.365	0.498	10.124	10.396	10.656	10.427	0.467	10.189	10.447	10.704
Log total annual labor costs	14.686	1.363	14.123	14.800	15.440	14.898	1.294	14.335	14.982	15.613
Log employment (IAB)	4.321	1.222	3.761	4.431	5.030	4.471	1.179	3.951	4.544	5.147
Log value-added (IAB) [†]	15.264	1.164	14.712	15.297	15.905	15.454	1.103	14.897	15.462	16.076
Log capital-labor ratio	10.357	1.820	9.246	10.330	11.319	10.432	1.793	9.363	10.427	11.358
Share of outsourceable workers	0.227	0.247	0.051	0.135	0.308	0.241	0.256	0.058	0.146	0.333
Other variables										
Log total debt	15.392	1.497	14.638	15.435	16.215	15.532	1.457	14.759	15.560	16.354
Log long-term debts	9.407	6.860	0.000	13.032	14.822	9.153	6.966	0.000	12.855	14.832
Log short-term liabilities	14.302	3.450	14.028	14.992	15.823	14.861	2.474	14.265	15.158	15.980
Log total assets	16.292	1.314	15.657	16.190	16.944	16.503	1.232	15.839	16.380	17.114
Log fixed assets	14.678	2.026	13.531	14.821	15.903	14.901	1.961	13.824	15.034	16.075
Log tangible assets	14.275	2.166	13.020	14.489	15.638	14.480	2.118	13.284	14.702	15.812
Log intangible assets	8.915	4.345	7.690	10.032	11.712	9.235	4.205	8.042	10.297	11.938
Log current assets	15.715	1.297	15.103	15.725	16.413	15.925	1.228	15.300	15.904	16.579
Log cash	13.072	2.316	11.865	13.476	14.719	13.309	2.316	12.182	13.758	14.928
Log EBITDA [†]	14.117	1.423	13.398	14.155	14.954	14.290	1.382	13.560	14.314	15.110
Log EBIT [†]	13.702	1.520	12.903	13.779	14.642	13.871	1.497	13.059	13.940	14.803
ROA [†]	0.087	0.123	0.025	0.067	0.136	0.084	0.119	0.023	0.064	0.120
Log net income	13.126	1.660	12.299	13.303	14.181	13.342	1.617	12.534	13.509	14.362
Observations	95,239					89,592				

C: Detect pre-event trends

Appendix Figure C1: Coefficients of $bite \times year$ dummies in non-detrended regressions



(a) Financial leverage



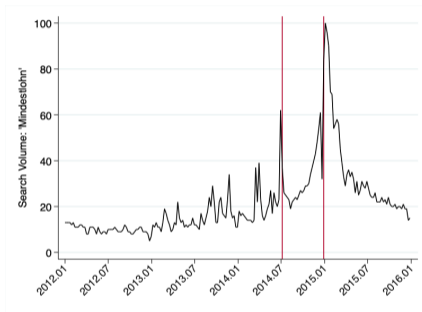
(b) Labor share

Notes: The figure displays the non-detrended difference-in-differences (DiD) regression coefficients of $bite \times year$ dummies with a 95% confidence interval. The dependent variables include firms' financial leverage and labor share, with the year 2013 serving as the reference year.

Data Source: Linked data from BeH, BHP, and Amadeus, 2011-2018.

C: Evidence of potential anticipation effect

Appendix Figure C2: Search volume of "Mindestlohn" (Minimum wage) in Germany from Google Trends, 2012.01-2016.01



Data: Google Trends, 2012-2016.

- According to the IAB Establishment Panel of 2014, around 7 percent of companies stated that they had already made wage adjustments in advance (Bellmann et al., 2015). [▶ Method](#)

Potential source of increased cash

Appendix Table C1: Minimum wage effects on owner equity injection

	Log owner injection (1)	Injection/Pre- asset level (2)
<i>Bite * Year₂₀₁₁</i>	0.037 (0.033)	0.003 (0.011)
<i>Bite * Year₂₀₁₂</i>	-0.012 (0.030)	-0.001 (0.009)
<i>Bite * Year₂₀₁₃</i>	Reference	
<i>Bite * Year₂₀₁₄</i>	0.026 (0.027)	0.009 (0.009)
<i>Bite * Post</i>	0.093** (0.031)	0.043** (0.014)
<i>Constant</i>	15.094*** (0.02)	0.364*** (0.001)
Observations	155,437	159,955

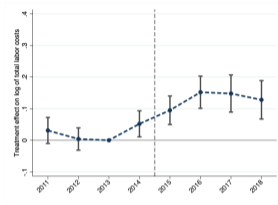
Mechanisms- Labor costs

Appendix Table C2: Minimum wage effects on labor-related variables

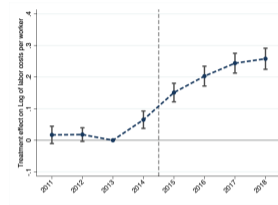
	Labor share (1)	Labor share(BvD) (2)	Log total labor costs (3)	Log labor costs/worker (4)
<i>Bite * Year</i> ₂₀₁₁	-0.003 (0.013)	0.002 (0.008)	0.031 (0.021)	0.017 (0.014)
<i>Bite * Year</i> ₂₀₁₂	-0.001 (0.012)	-0.004 (0.007)	0.004 (0.018)	0.018 (0.011)
<i>Bite * Year</i> ₂₀₁₃	Reference			
<i>Bite * Year</i> ₂₀₁₄	0.028* (0.013)	0.013* (0.007)	0.052* (0.021)	0.065*** (0.014)
<i>Bite * Year</i> ₂₀₁₅	0.047*** (0.013)	0.031*** (0.008)	0.095*** (0.023)	0.151*** (0.015)
<i>Bite * Year</i> ₂₀₁₆	0.107*** (0.013)	0.050*** (0.008)	0.152*** (0.026)	0.203*** (0.016)
<i>Bite * Year</i> ₂₀₁₇	0.133*** (0.013)	0.066*** (0.008)	0.148*** (0.030)	0.244*** (0.016)
<i>Bite * Year</i> ₂₀₁₈	0.155*** (0.014)	0.072*** (0.009)	0.128*** (0.031)	0.258*** (0.017)
<i>Constant</i>	0.667*** (0.001)	0.719*** (0.000)	14.776*** (0.002)	10.386*** (0.001)
Observations	184,702	160,140	184,702	184,702

Mechanisms: Labor share

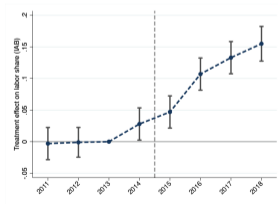
Appendix Figure C3: Minimum wage effect on labor costs variables



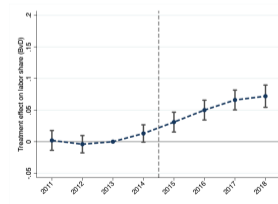
(a) Log total labor costs



(b) Log labor costs per worker



(c) Labor share (IAB)












(d) Labor share (BvD)

Appendix Table C3: Robustness checks: other measures of treatment

	Gap		Average Bite		Average Gap		Binary Bite	
	Financial leverage (1)	Labor share (2)	Financial leverage (3)	Labor share (4)	Financial leverage (5)	Labor share (6)	Financial leverage (7)	Labor share (8)
<i>Treatment * Year₂₀₁₁</i>	0.013 (0.023)	0.021 (0.047)	-0.001 (0.007)	0.003 (0.013)	-0.002 (0.008)	0.006 (0.021)	0.001 (0.002)	0.000 (0.004)
<i>Treatment * Year₂₀₁₂</i>	-0.018 (0.017)	0.020 (0.042)	-0.003 (0.005)	-0.005 (0.011)	-0.017* (0.008)	-0.007 (0.011)	0.001 (0.002)	-0.006 (0.004)
<i>Treatment * Year₂₀₁₃</i>	Reference							
<i>Treatment * Year₂₀₁₄</i>	-0.044** (0.015)	0.078 (0.042)	-0.016** (0.005)	0.035** (0.012)	-0.020* (0.008)	0.050* (0.020)	-0.003* (0.002)	-0.001 (0.004)
<i>Treatment * Year₂₀₁₅</i>	-0.138*** (0.018)	0.095* (0.041)	-0.045*** (0.006)	0.044*** (0.012)	-0.048*** (0.010)	0.041*** (0.011)	-0.004* (0.002)	-0.002 (0.004)
<i>Treatment * Year₂₀₁₆</i>	-0.209*** (0.022)	0.224*** (0.040)	-0.062*** (0.007)	0.096*** (0.012)	-0.070*** (0.012)	0.084*** (0.011)	-0.006** (0.002)	0.010* (0.004)
<i>Treatment * Year₂₀₁₇</i>	-0.240*** (0.025)	0.267*** (0.043)	-0.065*** (0.008)	0.114*** (0.013)	-0.075*** (0.012)	0.097*** (0.013)	-0.006* (0.002)	0.010* (0.005)
<i>Treatment * Year₂₀₁₈</i>	-0.306*** (0.029)	0.296*** (0.050)	-0.083*** (0.009)	0.125*** (0.013)	-0.097*** (0.015)	0.101*** (0.012)	-0.007** (0.003)	0.005 (0.005)
<i>Constant</i>	0.495*** (0.000)	0.663*** (0.000)	0.496*** (0.000)	0.667*** (0.001)	0.494*** (0.000)	0.664*** (0.000)	0.497*** (0.001)	0.665*** (0.002)
Observations	184,702	184,702	180,063	180,063	180,063	180,063	184,702	184,702

Robustness Checks

- Using alternative measures of bite: 
 - Gap variable: $gap_{j,2013} = \frac{\sum_{i \in j} h_i \text{Max}\{0, 8.5 - wage_i\}}{\sum_{i \in j} h_i wage_i}$
 - Binary treatment measure
- Using alternative measures of financial leverage 
- Alternative sample restrictions
 - Restriction on unsuccessful matching 
 - Private firms only 
 - Separate analyses for eastern and western Germany 
 - Non-imputed wages 
 - Other specifications 
 - Spillover effects 
 - Concurrent policies 

Appendix Table C4: Robustness checks: Alternative measure for financial leverage

	Total liabilities/ total A. (1)	Total debt/ total A. (2)	(Long-term debts-cash)/ total A. (3)
<i>Bite * Year</i> ₂₀₁₁	0.002 (0.006)	-0.006 (0.008)	-0.000 (0.008)
<i>Bite * Year</i> ₂₀₁₂	-0.004 (0.005)	-0.005 (0.007)	-0.003 (0.007)
<i>Bite * Year</i> ₂₀₁₃		Reference	
<i>Bite * Year</i> ₂₀₁₄	-0.012* (0.005)	-0.012 (0.007)	-0.016* (0.007)
<i>Bite * Year</i> ₂₀₁₅	-0.042*** (0.006)	-0.025*** (0.007)	-0.034*** (0.008)
<i>Bite * Year</i> ₂₀₁₆	-0.056*** (0.007)	-0.027** (0.008)	-0.038*** (0.009)
<i>Bite * Year</i> ₂₀₁₇	-0.066*** (0.007)	-0.040*** (0.008)	-0.043*** (0.009)
<i>Bite * Year</i> ₂₀₁₈	-0.086*** (0.008)	-0.033* (0.009)	-0.053*** (0.011)
<i>Constant</i>	0.618*** (0.000)	0.145*** (0.000)	0.365*** (0.000)
Observations	184,702	184,702	184,702

Appendix Table C5: Robustness checks: alternative sample restrictions, drop if the linking rate < 0.3

	Financial leverage (1)	Labor share (2)	Log total labor costs (3)	Log labor costs/worker (4)
<i>Bite * Year</i> ₂₀₁₁	0.002 (0.007)	-0.001 (0.013)	0.031 (0.021)	0.016 (0.014)
<i>Bite * Year</i> ₂₀₁₂	-0.003 (0.005)	0.002 (0.012)	0.010 (0.017)	0.019 (0.011)
<i>Bite * Year</i> ₂₀₁₃			Reference	
<i>Bite * Year</i> ₂₀₁₄	-0.015** (0.005)	0.031* (0.013)	0.067** (0.021)	0.066*** (0.014)
<i>Bite * Year</i> ₂₀₁₅	-0.049*** (0.006)	0.054*** (0.013)	0.184*** (0.023)	0.198*** (0.016)
<i>Bite * Year</i> ₂₀₁₆	-0.070*** (0.007)	0.115*** (0.013)	0.184*** (0.026)	0.198*** (0.016)
<i>Bite * Year</i> ₂₀₁₇	-0.077*** (0.008)	0.145*** (0.014)	0.170*** (0.029)	0.224*** (0.016)
<i>Bite * Year</i> ₂₀₁₈	-0.097*** (0.009)	0.174*** (0.014)	0.160*** (0.030)	0.247*** (0.017)
<i>Constant</i>	0.497*** (0.000)	0.674*** (0.001)	14.802*** (0.001)	10.387*** (0.001)
Observations	178,745	178,745	178,745	178,745

Appendix Table C6: Robustness checks: alternative sample restrictions, private firms only

	Financial leverage (1)	Labor share (2)	Log total labor costs (3)	Log labor costs/worker (4)
<i>Bite * Year</i> ₂₀₁₁	0.001 (0.006)	-0.003 (0.013)	0.031 (0.021)	0.016 (0.014)
<i>Bite * Year</i> ₂₀₁₂	-0.004 (0.005)	-0.001 (0.012)	0.003 (0.018)	0.018 (0.011)
<i>Bite * Year</i> ₂₀₁₃			Reference	
<i>Bite * Year</i> ₂₀₁₄	-0.015** (0.005)	0.029* (0.013)	0.052* (0.021)	0.065*** (0.014)
<i>Bite * Year</i> ₂₀₁₅	-0.046*** (0.006)	0.049*** (0.013)	0.096*** (0.024)	0.151*** (0.015)
<i>Bite * Year</i> ₂₀₁₆	-0.061*** (0.007)	0.108*** (0.013)	0.153*** (0.026)	0.203*** (0.015)
<i>Bite * Year</i> ₂₀₁₇	-0.069*** (0.007)	0.133*** (0.013)	0.148*** (0.030)	0.243*** (0.016)
<i>Bite * Year</i> ₂₀₁₈	-0.087*** (0.009)	0.156*** (0.014)	0.128*** (0.031)	0.257*** (0.017)
<i>Constant</i>	0.497*** (0.000)	0.667*** (0.001)	14.777*** (0.002)	10.385*** (0.001)
Observations	184,313	184,313	184,313	184,313

Appendix Table C7: Robustness checks: alternative sample restrictions, Western Germany only

	Financial leverage (1)	Labor share (2)	Log total labor costs (3)	Log labor costs/worker (4)
<i>Bite * Year</i> ₂₀₁₁	0.001 (0.008)	-0.008 (0.016)	0.023 (0.026)	0.018 (0.017)
<i>Bite * Year</i> ₂₀₁₂	-0.003 (0.006)	-0.010 (0.014)	0.006 (0.021)	0.025 (0.013)
<i>Bite * Year</i> ₂₀₁₃			Reference	
<i>Bite * Year</i> ₂₀₁₄	-0.009 (0.006)	0.039* (0.015)	0.065** (0.025)	0.084*** (0.017)
<i>Bite * Year</i> ₂₀₁₅	-0.040*** (0.007)	0.045** (0.016)	0.101*** (0.028)	0.160*** (0.018)
<i>Bite * Year</i> ₂₀₁₆	-0.049*** (0.008)	0.115*** (0.016)	0.153*** (0.030)	0.210*** (0.018)
<i>Bite * Year</i> ₂₀₁₇	-0.062*** (0.009)	0.149*** (0.017)	0.166*** (0.037)	0.252*** (0.020)
<i>Bite * Year</i> ₂₀₁₈	-0.082*** (0.010)	0.174*** (0.017)	0.153*** (0.038)	0.276*** (0.021)
<i>Constant</i>	0.500*** (0.000)	0.674*** (0.001)	14.822*** (0.002)	10.426*** (0.001)
Observations	150,013	150,013	150,013	150,013

Appendix Table C8: Robustness checks: alternative sample restrictions, Eastern Germany only

	Financial leverage (1)	Labor share (2)	Log total labor costs (3)	Log labor costs/worker (4)
<i>Bite * Year</i> ₂₀₁₁	0.001 (0.012)	0.001 (0.024)	0.040 (0.038)	0.011 (0.023)
<i>Bite * Year</i> ₂₀₁₂	-0.006 (0.009)	0.018 (0.023)	-0.001 (0.034)	0.005 (0.020)
<i>Bite * Year</i> ₂₀₁₃			Reference	
<i>Bite * Year</i> ₂₀₁₄	-0.032*** (0.009)	0.005 (0.022)	0.021 (0.037)	0.017 (0.026)
<i>Bite * Year</i> ₂₀₁₅	-0.064*** (0.011)	0.054* (0.023)	0.066 (0.043)	0.125*** (0.028)
<i>Bite * Year</i> ₂₀₁₆	-0.089*** (0.013)	0.088*** (0.022)	0.141** (0.054)	0.189*** (0.031)
<i>Bite * Year</i> ₂₀₁₇	-0.089*** (0.014)	0.101*** (0.021)	0.087 (0.048)	0.221*** (0.029)
<i>Bite * Year</i> ₂₀₁₈	-0.110*** (0.017)	0.112*** (0.023)	0.051 (0.052)	0.213*** (0.026)
<i>Constant</i>	0.479*** (0.001)	0.638*** (0.002)	14.574*** (0.003)	10.211*** (0.002)
Observations	34,316	34,316	34,316	34,316

Appendix Table C9: Robustness checks: alternative sample restrictions, no wage imputation

	Labor share (1)	Log total labor costs (2)	Log labor costs/worker (3)
<i>Bite * Year</i> ₂₀₁₁	-0.003 (0.014)	0.031 (0.021)	0.017 (0.013)
<i>Bite * Year</i> ₂₀₁₂	0.005 (0.013)	0.003 (0.018)	0.016 (0.011)
<i>Bite * Year</i> ₂₀₁₃		Reference	
<i>Bite * Year</i> ₂₀₁₄	0.026 (0.014)	0.055** (0.020)	0.062*** (0.014)
<i>Bite * Year</i> ₂₀₁₅	0.055*** (0.014)	0.105*** (0.023)	0.157*** (0.015)
<i>Bite * Year</i> ₂₀₁₆	0.113*** (0.013)	0.159*** (0.026)	0.204*** (0.016)
<i>Bite * Year</i> ₂₀₁₇	0.138*** (0.014)	0.161*** (0.030)	0.249*** (0.016)
<i>Bite * Year</i> ₂₀₁₈	0.161*** (0.015)	0.142*** (0.031)	0.257*** (0.016)
<i>Constant</i>	0.653*** (0.001)	14.705*** (0.001)	10.313*** (0.001)
Observations	184,702	184,702	184,702

Appendix Table C10: Minimum wage effect on financial leverage and labor share, other specifications

	Financial leverage				Labor Share			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Bite * Year</i> ₂₀₁₁	-0.002 (0.006)	0.000 (0.006)	0.001 (0.006)	0.000 (0.006)	-0.002 (0.012)	-0.002 (0.013)	0.000 (0.013)	0.001 (0.012)
<i>Bite * Year</i> ₂₀₁₂	-0.005 (0.005)	-0.005 (0.005)	-0.003 (0.005)	-0.004 (0.005)	0.005 (0.011)	-0.006 (0.011)	0.003 (0.012)	-0.002 (0.011)
<i>Bite * Year</i> ₂₀₁₃	Reference							
<i>Bite * Year</i> ₂₀₁₄	-0.017*** (0.005)	-0.016** (0.005)	-0.015** (0.005)	-0.016** (0.005)	0.016 (0.012)	0.023* (0.012)	0.025* (0.012)	0.023* (0.012)
<i>Bite * Year</i> ₂₀₁₅	-0.051*** (0.006)	-0.042*** (0.006)	-0.046*** (0.006)	-0.043*** (0.006)	0.031** (0.012)	0.047*** (0.012)	0.044*** (0.013)	0.045*** (0.012)
<i>Bite * Year</i> ₂₀₁₆	-0.072*** (0.007)	-0.063*** (0.007)	-0.059*** (0.007)	-0.063*** (0.007)	0.071*** (0.012)	0.108*** (0.012)	0.103*** (0.012)	0.105*** (0.012)
<i>Bite * Year</i> ₂₀₁₇	-0.086*** (0.007)	-0.072*** (0.007)	-0.067*** (0.007)	-0.072*** (0.007)	0.071*** (0.012)	0.135*** (0.013)	0.120*** (0.013)	0.126*** (0.012)
<i>Bite * Year</i> ₂₀₁₈	-0.106*** (0.008)	-0.090*** (0.008)	-0.086*** (0.008)	-0.090*** (0.008)	0.092*** (0.013)	0.165*** (0.013)	0.143*** (0.014)	0.159*** (0.013)
<i>Constant</i>	0.401*** (0.048)	0.496*** (0.000)	0.496*** (0.000)	0.504*** (0.001)	2.158*** (0.001)	0.668*** (0.001)	0.666*** (0.001)	0.674*** (0.001)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	No	No	No	Yes	No	No	No
County-year FE	Yes	Yes	No	No	Yes	Yes	No	No
Industry-year FE	Yes	No	Yes	No	Yes	No	Yes	No
Observations	184,702	184,703	184,702	184,703	184,702	184,703	184,702	184,703

Appendix Table C11: Rule out potential effects from concurrent policies

	Control Pre – leverage * Year		Control Pre – size * Year		Control both		Placebo test	
	Financial leverage (1)	Labor share (2)	Financial leverage (3)	Labor share (4)	Financial leverage (5)	Labor share (6)	Financial leverage (7)	Labor share (8)
<i>Bite</i> * Year ₂₀₁₁	0.001 (0.006)	-0.003 (0.013)	0.002 (0.006)	-0.004 (0.006)	0.001 (0.012)	-0.003 (0.013)	0.001 (0.005)	-0.000 (0.011)
<i>Bite</i> * Year ₂₀₁₂	-0.006 (0.005)	-0.002 (0.012)	-0.003 (0.005)	-0.002 (0.012)	-0.005 (0.005)	-0.003 (0.012)	Reference	
<i>Bite</i> * Year ₂₀₁₃	Reference						0.004 (0.005)	0.014 (0.011)
<i>Bite</i> * Year ₂₀₁₄	-0.008 (0.005)	0.031* (0.012)	-0.013** (0.005)	0.030* (0.012)	-0.008 (0.005)	0.030* (0.012)	-0.007 (0.006)	0.056*** (0.013)
<i>Bite</i> * Year ₂₀₁₅	-0.035*** (0.006)	0.051*** (0.013)	-0.044*** (0.006)	0.048*** (0.013)	-0.034*** (0.006)	0.048*** (0.013)	-0.035*** (0.006)	0.070*** (0.013)
<i>Bite</i> * Year ₂₀₁₆	-0.048*** (0.007)	0.098*** (0.012)	-0.061*** (0.007)	0.096*** (0.012)	-0.047*** (0.007)	0.094*** (0.012)	-0.048*** (0.007)	0.139*** (0.013)
<i>Bite</i> * Year ₂₀₁₇	-0.054*** (0.007)	0.129*** (0.013)	-0.070*** (0.007)	0.127*** (0.013)	-0.053*** (0.007)	0.124*** (0.013)	-0.053*** (0.008)	0.163*** (0.013)
<i>Bite</i> * Year ₂₀₁₈	-0.065*** (0.008)	0.150*** (0.014)	-0.086*** (0.008)	0.150*** (0.014)	-0.064*** (0.018)	0.146*** (0.014)	-0.069*** (0.009)	0.188*** (0.013)
<i>Constant</i>	0.495*** (0.000)	0.666*** (0.000)	0.495*** (0.000)	0.666*** (0.001)	0.495*** (0.001)	0.666*** (0.001)	0.497*** (0.000)	0.669*** (0.001)
Pre lvg quartile-year FE	Yes	Yes	No	No	Yes	Yes	No	No
Size-year	No	No	Yes	Yes	Yes	Yes	No	No
Other FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	179,473	179,473	179,473	179,473	179,473	179,473	182,459	182,459

Appendix Table D1: Minimum wage effect on financial leverage and labor costs, controlling for spillover effects

	Financial leverage (1)	Labor share (2)	Log total labor costs (3)	Log labor costs/worker (4)
<i>Regional Bite * Year</i> ₂₀₁₁	-0.012 (0.015)	-0.037 (0.026)	0.068 (0.040)	-0.039* (0.019)
<i>Regional Bite * Year</i> ₂₀₁₂	0.002 (0.013)	-0.044 (0.026)	0.064 (0.034)	-0.005 (0.016)
<i>Regional Bite * Year</i> ₂₀₁₃			Reference	
<i>Regional Bite * Year</i> ₂₀₁₄	-0.013 (0.012)	-0.044 (0.025)	0.089** (0.032)	-0.006 (0.017)
<i>Regional Bite * Year</i> ₂₀₁₅	-0.006 (0.014)	-0.009 (0.028)	0.074* (0.037)	-0.006 (0.018)
<i>Regional Bite * Year</i> ₂₀₁₆	-0.006 (0.016)	0.010 (0.028)	0.095* (0.041)	-0.030 (0.019)
<i>Regional Bite * Year</i> ₂₀₁₇	-0.000 (0.017)	-0.053 (0.030)	0.112* (0.047)	-0.020 (0.021)
<i>Regional Bite * Year</i> ₂₀₁₈	-0.008 (0.019)	-0.043 (0.031)	0.159** (0.050)	0.025 (0.020)
Constant	0.496*** (0.001)	0.660*** (0.002)	14.776*** (0.003)	10.380*** (0.002)
Observations	184702	184702	184702	184702

Other measures of Profitability

Appendix Table E1: Minimum wage effect on profitability

	EBITDA/Revenue (1)	EBIT/Revenue (2)	Net Income/Revenue (3)
<i>Bite * Year</i> ₂₀₁₁	0.002 (0.005)	0.001 (0.005)	0.002 (0.005)
<i>Bite * Year</i> ₂₀₁₂	0.005 (0.004)	0.003 (0.004)	0.007 (0.004)
<i>Bite * Year</i> ₂₀₁₃		Reference	
<i>Bite * Year</i> ₂₀₁₄	-0.032*** (0.004)	-0.026*** (0.004)	-0.023*** (0.004)
<i>Bite * Year</i> ₂₀₁₄	-0.006 (0.005)	-0.002 (0.005)	-0.003 (0.005)
<i>Bite * Post</i>	-0.030*** (0.005)	0.025*** (0.004)	-0.020*** (0.004)
<i>Constant</i>	0.093*** (0.000)	0.051*** (0.000)	0.031*** (0.000)
Observations	91,252	91,252	79,265

Regional level employment regression

Appendix Table E2: Minimum wage effect on employment

	Log employment (IAB bite)	Log employment (SES bite)
	(1)	
<i>Bite * Year</i> ₂₀₁₁	-0.000 (1.331)	-0.000 (0.862)
<i>Bite * Year</i> ₂₀₁₂	-0.006 (1.331)	-0.059 (0.862)
<i>Bite * Year</i> ₂₀₁₃		Reference
<i>Bite * Year</i> ₂₀₁₄	0.059 (1.331)	0.005 (0.862)
<i>Bite * Post</i>	0.015 (1.052)	0.148 (0.681)
<i>Constant</i>	9.125*** (0.121)	9.073*** (0.094)
Observations	3,200	3,200

Weighted regression

Appendix Table E3: Minimum wage effect on financial leverage, weighted regression

	Financial leverage (1)
<i>Bite * Year</i> ₂₀₁₁	0.032 (0.023)
<i>Bite * Year</i> ₂₀₁₂	-0.023 (0.0242)
<i>Bite * Year</i> ₂₀₁₃	Reference
<i>Bite * Year</i> ₂₀₁₄	-0.057** (0.015)
<i>Bite * Year</i> ₂₀₁₅	-0.132*** (0.019)
<i>Bite * Year</i> ₂₀₁₆	-0.190*** (0.024)
<i>Bite * Year</i> ₂₀₁₇	-0.252*** (0.025)
<i>Bite * Year</i> ₂₀₁₈	-0.333*** (0.031)
<i>Constant</i>	0.482*** (0.002)
Observations	184,702

Nonlinear effects

Appendix Table E4: Descriptive statistics for subsamples: flexibility in adjusting labor

	Low-skilled jobs		Fixed-term jobs		Outsourceable jobs	
	High share (1)	Low share (2)	High share (3)	Low share (4)	High OS (5)	Low OS (6)
Bite	0.123	0.064	0.105	0.082	0.116	0.064
Financial leverage	0.502	0.506	0.500	0.507	0.512	0.489

Notes: The table above presents the mean of pre-policy financial leverage and bite in different subsamples as denoted in each column.

Data: Linked data of BeH, BHP, and Amadeus, 2011-2018.

Appendix Table E5: Descriptive statistics for subsamples: market power

	Firm Size			Tradable Sector	
	Small (1)	Medium (2)	Large (3)	Tradable (4)	Non-tradable (5)
Bite	0.114	0.085	0.091	0.088	0.095
Financial leverage	0.540	0.504	0.440	0.542	0.495

Notes: The table above presents the mean of pre-policy financial leverage and bite in different subsamples as denoted in each column.

Data: Linked data of BeH, BHP, and Amadeus, 2011-2018.

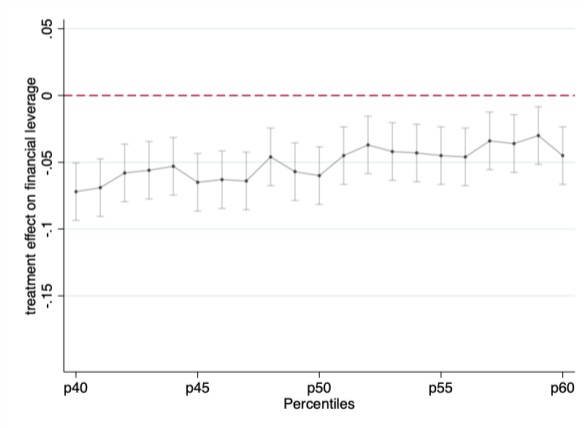
Nonlinear effects

Appendix Table E6: Minimum wage effect on financial leverage

	Financial leverage (1)
<i>Bite dummy 1 (0 – 0.1) * Post</i>	-0.004* (0.002)
<i>Bite dummy 2 (0.1 – 0.3) * Post</i>	-0.008* (0.0033)
<i>Bite dummy 3 (0.3 – 0.7) * Post</i>	-0.020*** (0.004)
<i>Bite dummy 4 (0.7 – 1) * Post</i>	-0.082*** (0.008)
Observations	184,702

Unconditional quantile regressions

Appendix Figure E1: Unconditional quantile regressions on financial leverage, the 40th to 60th percentiles



Notes: The figure displays the detrended RIF difference-in-differences (DiD) regression coefficients of $Bite * Post$ with 95% confidence intervals.
Data: Linked data of BeH, BHP, and Amadeus, 2011-2018.

Other channels: tangible assets and profitability

- Increased tangible assets provide more collateral, enabling firms to borrow more: no supporting evidence.
- Decreased profitability leads to increased debt borrowing (pecking order theory): does not dominate the leverage substitution channel.

Appendix Table E7: Minimum wage effects on log tangible assets and profitability

	Log tangible assets (1)	EBITDA / Total A. (2)	EBIT /Total A. (3)	Net Income /Total A. (4)
<i>Bite * Post</i>	-0.032 (0.030)	-0.035*** (0.004)	-0.033*** (0.004)	-0.026*** (0.004)
Observations	184702	184702	184702	167535

Heterogeneities: long-term debts

- Long-term debt is particularly risky because it is more likely that firms will encounter negative shocks over the long term.
- In contrast, firms face less uncertainty in the short run.
- To substitute potential risks, firms would tend to reduce more long-term debts.

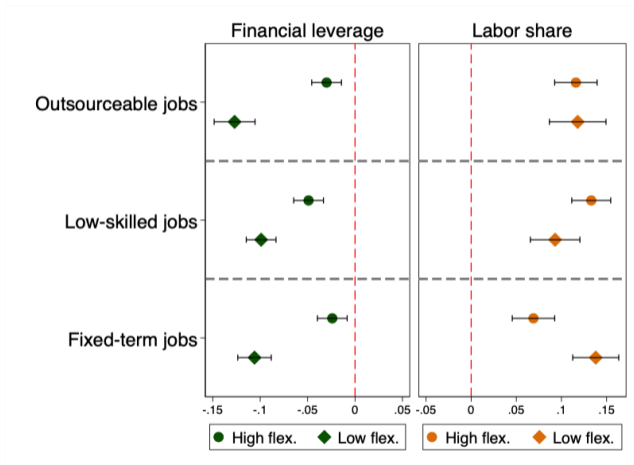
Appendix Table E8: Minimum wage effects on long/short term liabilities

	Log long-term debts (1)	Log short-term liabilities (2)
<i>Bite * Post</i>	-0.735*** (0.187)	0.161 (0.130)
Observations	184,702	184,702

Heterogeneities: firms flexibility in adjusting labor

- Ability to adjust labor more flexibly may counteract the operating risks brought about by the minimum wage.
- For the same level of the minimum wage impact, firms with a higher share of outsourceable/low-skilled/fixed-term jobs engage in less deleveraging.

Appendix Figure E2: Minimum wage effects on financial leverage and labor share, regarding different labor flexibility



Heterogeneities: market power

- Firms with greater market power can pass higher labor costs onto prices, minimizing the impact on EBITDA.
- As a result, they may see a smaller rise in labor share and a modest reduction in financial leverage.
- However, their disemployment effects may be moderate, potentially leading to larger increases in total labor costs.
- It remains unclear whether their labor share increase and financial leverage reduction will indeed be smaller.

Appendix Figure E3: Minimum wage effects on financial leverage, labor share and log EBITDA, regarding different market power

