The Impact of Oregon's Tiered Minimum Wage System on Firms' Credit Default

Richard Acquah-Sarpong, Yong Chen & Paul Lewin

Background - state-level minimum wage laws

- Many states have MW higher than the federal level.
- State variations reflect the cost of living and local economic conditions.
- State MW differ in level and coverage (industry, firm size, rural-urban, etc).



Figure 1: States (in grey) with MW higher than the federal level of \$7.25 per hour Source: National Employment Law Project

Background - Geographically tiered MW in Oregon

Implemented in 2016

Intent of the tiered system

- recognition to the different economic conditions among regions.
- less burdensome for rural employers



Background - Creation of tiered MW in Oregon



Spatial impacts of geographically tiered MW

- Tiered minimum wage temporarily disrupts the spatial equilibrium.
- Higher wages act as an agglomeration force.
- Workers and firms behavior change.
 - Workers prefer high wage
 - Firms prefer low-wage
- In the short run, worker effect dominates firm effect.

Research question

- Tackling regional inequalities necessitates a comprehensive strategy.
- Will this policy narrow or potentially exacerbate these disparities?
- What is the impact of geographically tiered minimum wage on firms?
 How does the tiered wage affect firms' credit default?

Tiered minimum wage and firm credit default



Existing literature on MW

- Employment & wages (Neumark et al. 2004, Dube et al. 2010, Cengiz et al. 2019, Dustmann et al. 2022)
- Prices and profitability (Draca et al. 2011, Allegretto & Reich 2018)
- Productivity (Riley & Bondibene 2017)
- Entry and exit (Aaronson et al. 2018, Luca & Luca 2019, Dharmasankar & Yoo 2022)
- Consumer defaults and bankruptcy (Dettling & Hsu 2021, Legal & Young 2024)
- Firm credit default (Chava et al. 2023)

Study area - Portland Metro

- Treatment group Two tiers (Portland UGB & Standard urban).
- Spatial dependence between tiers.
- Control group Two tiers in Idaho.



■ National Establishments Time Series (NETS) Database

- ➤ Census of all firms from 1990 to 2022
- Annual establishment-level information on the detailed industry, employment, sales, credit scores and ratings, and other variables
- ➤ Includes geographic variables.

Firm credit score (PayDex) - measures payment timeliness.

Pavdex score	Payment practices
- ayuex score	i ayment practices
100	Anticipate (payments are received before the date of invoice)
90	Discount (payments are received within the trade discount period)
80	Prompt (payments are received within the trade of terms granted)
70	Payments are received 15 days beyond terms
60	Payments are received 22 days beyond terms
50	Payments are received 30 days beyond terms
40	Payments are received 60 days beyond terms
30	Payments are received 90 days beyond terms
20	Payments are received 120 days beyond terms
0-19	Payments are received 120+ days beyond terms
NA	Unavailable

A higher score reflects timely or early payments, while a lower score suggests delayed or missed payments.

Sample

- Data spans 2012 and 2022.
- Exclude firms that have moved, entered or closed within the sample period.
- Comparable firms (nearest neighbor and exact matching).
- 17,046 firms in matched sample

➡ summary of data

Graphical Results



Difference-in-differences-in-differences (DDD)

- Difference in treatment and control group.
- Difference in tiers.
- Difference in time.

Identifying assumption

- No tiered minimum wage in control group
- Prior to policy, firms in control group behave similarly to treated firms



Results - Average treatment effect

 $\label{eq:table_transform} \begin{array}{l} \mbox{Table 1: Difference-in-differences-in-differences estimates of the tiered minimum wage policy on firm credit default \\ \mbox{default} \end{array}$

	(1)	(2)	(3)	(4)	(5)
$\overline{treat imes tier imes post}$	0.020** (0.009)	0.029*** (0.010)	0.030*** (0.010)	0.032*** (0.010)	0.034*** (0.010)
log population		0.187*** (0.057)	0.201*** (0.059)	0.252*** (0.067)	0.263*** (0.070)
log % high school		-0.015^{*} (0.009)	-0.016^{*} (0.009)	-0.011 (0.009)	-0.013 (0.009)
firm FE year FE	yes yes	yes yes	yes	yes	yes
year $ imes$ tier FE year $ imes$ state FE			yes	yes	yes yes
se cluster Observations	zip 187,506	zip 187,506	zip 187,506	zip 187,506	zip 187,506

Effect by distance to urban growth boundary



Figure 3: Effect by distance to the Portland UGB

Effect by firm type



Figure 4: Heterogenous Treatment Effect.

The figure plots the estimated DDD coefficient (vertical axis) for each subgroup (horizontal axis), with points representing coefficient estimate and vertical lines representing 95% confidence intervals.



Effect by firm size



Figure 5: Heterogenous Treatment Effect.

The figure plots the estimated DDD coefficient (vertical axis) for each subgroup (horizontal axis), with points representing coefficient estimate and vertical lines representing 95% confidence intervals.



Conclusion

- What happens to firms when two adjacent regions with historically same minimum wage experience a divergence in minimum wage?
- Our analysis reveals that firms located in areas with a higher minimum wage become better off.
- The wage difference results in a 3% increase in firm credit scores.
- Reduced default duration by 3.7 days from an average of 7 days.
- Significant effects on small, independent, private and high wage industries.
- This potentially presents a situation where regional inequalities in firm performance could be exacerbated.

How should policy makers think about...

- **O** Policy tradeoffs. e.g. consumer vs producer welfare.
- Onintended consequences. e.g widening regional gaps.
- Spatial relationships and the interdependent nature of neighboring regions.
- Spatial spillovers.

Thank You

Richard Acquah-Sarpong (acquahsr@oregonstate.edu)

Appendix

Schedule for increasing the minimum wage

Table 3: Six-year schedule for increasing the minimum wage

Effective Date	Rural	Urban	Portland Metro
7/2016 - 6/2017	9.50	9.75	9.75
7/2017 - 6/2018	10.00	10.25	11.25
7/2018 - 6/2019	10.50	10.75	12.00
7/2019 - 6/2020	11.00	11.25	12.50
7/2020 - 6/2021	11.50	12.00	13.25
7/2021 - 6/2022	12.00	12.75	14.00
7/2022 - 6/2023	12.50	13.50	14.75
7/2023 and beyond	\$1 less than the		\$1.25 over the standard
	standard minimum wage		minimum wage
	Adjusted annually.		
	based on the US CPI		

Tiered minimum wage and firm credit default



Employment



Figure 6



Figure 7

Productivity



Figure 8

Pre-treatment Balance Check (full sample)

▶ return

	Panel A Treated group		1	el B group		
			standardized			standardized
variable	tier 1	tier 2	mean difference	tier 1	tier 2	mean difference
no of firms	17,284	4,423		4449	7,703	
paydex 2012	72.638	73.204	-0.045	70.329	71.539	-0.086
paydex 2013	72.638	73.204	-0.045	70.327	71.539	-0.086
paydex 2014	73.025	73.735	-0.058	70.412	71.802	-0.097
paydex 2015	73.365	73.789	-0.035	70.399	71.924	-0.106
paydex 2016	73.020	73.806	-0.063	70.332	71.596	-0.087
Sales 2012	2.311	0.958	0.065	3.027	1.828	0.029
Sales 2013	2.383	0.991	0.063	3.070	1.992	0.027
Sales 2014	2.475	1.011	0.061	3.095	1.996	0.031
Sales 2015	2.463	1.015	0.065	3.153	2.023	0.031
Sales 2016	2.542	1.037	0.064	3.248	2.211	0.029
Employment 2012	13.755	8.238	0.098	16.576	12.641	0.050
Employment 2013	14.009	8.402	0.099	16.746	12.998	0.048
Employment 2014	14.187	8.523	0.099	16.892	13.072	0.048
Employment 2015	14.276	8.526	0.100	17.013	13.106	0.050
Employment 2016	14.400	8.536	0.100	17.078	13.209	0.049
Male CEO	0.674	0.729	-0.117	0.733	0.742	-0.022
Standalone establishment	0.902	0.953	-0.170	0.878	0.907	-0.087
Private establishment	0.975	0.994	-0.123	0.972	0.987	-0.088
low-wage establishment	0.739	0.544	0.445	0.671	0.602	0.148
Government contract	0.016	0.013	0.019	0.031	0.033	-0.010
Women owned	0.083	0.071	0.041	0.082	0.08	0.008

Table 4: Pre-treatment summary of firm characteristics before matching

Note: Table presents descriptive statistics for firms within the two tiers for treatment (Portland metro) and control (Boise metro) groups. Sales values are in millions. A standardized mean difference of <0.05 indicates grood balance

Pre-treatment Balance Check (matched sample)

	Panel A Treated group		Panel B Control group			
			standardized			standardized
variable	tier 1	tier 2	mean difference	tier 1	tier 2	mean difference
no of firms	10,136	2482		3,034	2,833	
Paydex 2012	73.065	72.85	0.017	70.446	70.897	-0.031
Paydex 2013	73.065	72.85	0.017	70.446	70.897	-0.031
Paydex 2014	73.384	73.253	0.001	70.528	71.116	-0.040
Paydex 2015	73.794	73.588	0.017	70.644	71.194	-0.038
Paydex 2016	73.477	73.523	-0.004	70.485	70.983	-0.034
Sales 2012	0.894	0.840	0.011	1.463	1.352	0.015
Sales 2013	0.908	0.883	0.005	1.522	1.363	0.020
Sales 2014	0.921	0.895	0.006	1.585	1.379	0.024
Sales 2015	0.930	0.890	0.009	1.599	1.374	0.027
Sales 2016	0.925	0.900	0.006	1.630	1.383	0.032
Employment 2012	6.527	7.248	-0.047	10.240	10.483	-0.010
Employment 2013	6.644	7.385	-0.048	10.344	10.573	-0.010
Employment 2014	6.740	7.504	-0.05	10.378	10.554	-0.008
Employment 2015	6.795	7.501	-0.046	10.432	10.519	-0.004
Employment 2016	6.799	7.483	-0.044	10.502	10.569	-0.003
Male CEO	0.671	0.710	-0.082	0.735	0.723	0.027
Standalone establishment	0.944	0.952	-0.035	0.907	0.917	-0.036
Private establishment	0.989	0.993	-0.042	0.983	0.988	-0.035
Low-wage establishment	0.690	0.592	0.212	0.620	0.605	0.030
Government contract	0.008	0.012	-0.044	0.022	0.025	-0.020
Women owned	0.075	0.081	-0.019	0.079	0.080	-0.004

Table 5: Pre-treatment summary of firm characteristics after matching

Note: Table presents descriptive statistics for firms within the two tiers for treatment (Portland metro) and control (Boise metro) groups. Sales values are in millions. A standardized mean difference of < 0.05 indicates good balance.

PayDex trends



Estimation equation

$$Y_{ijt} = \alpha(\textit{state}_i \times \textit{tier}_j \times \textit{post}_t) + \delta_i + \gamma' X_{it} + \phi_{ts} + \omega_{tj} + \epsilon_{ijt}$$

- Y_{ijt} is firm *i* in state *s* and tier *j*'s credit score in year *t*
 - state_i × tier_j × post_t is a dummy for treatment status
- α is the average DDD treatment effect.
- $\blacksquare \ \delta_i \text{ is firm fixed effects}$
- X_{it} is time-varying firm and county characteristics.
- ϕ_{ts} , the interaction of year and state dummies, and ω_{tj} , the interaction of year and tier dummies
 - \bullet_{ijt} is the error term clustered at the zip level

Event-Study - Dynamic Triple DID

$$Y_{ijt} = \sum_{\substack{\tau \in \{2012, \dots, 2022\}\\ \tau \neq 2015}} \alpha_{\tau} \mathbb{1}\{y = \tau\} \times (state_i \times tier_j) + \gamma' X_{it} + \delta_i + \phi_{ts} + \omega_{tj} + \epsilon_{ijt}$$

\blacksquare Y_{ijt} is firm *i* in state *s* and tier *t*'s credit score in year *t*

 $\blacksquare \ \mathbb{1}\{t = \tau\} \times (state_i \times tier_j \text{ creates a set of treatment dummies for each year}$

- α_{τ} estimates the yearly treatment effect of the difference in credit default between firms in Portland UGB and standard urban
- All other terms remain the same
- Identification: We allow for tier and state-specific time effects (ω_{tj} and ϕ_{ts}), which controls for state and tier differences that could be correlated with the difference in credit default. This allows us to estimate the difference only coming from the TMP implemented in 2016

	No of Est	estimate	CI	p-value
empl <20	7,919	0.030	[0.018, 0.043]	***
empl >= 10	3, 225	-0.040	[-0.137, 0.057]	
branch	425	-0.010	[-0.072, 0.051]	
standalone	12,403	0.031	[0.018, 0.044]	***
private	12,746	0.031	[0.018, 0.043]	***
public	82	-0.046	[-0.126, 0.035]	
low_wage	7,933	0.033	[0.01, 0.055]	***
non_low_wage	4,895	0.031	[0.017, 0.045]	***

Table 6: Robustness of Treatment Effect: Difference-in-discontinuities estimates and DDD estimate

	Calonico (2014)	I.K (2012)	DDD
	(1)	(2)	(3)
β	0.030**	0.033**	0.029***
	(0.013)	(0.014)	(0.010)
opt. bandwidth	(4.8 , 20.3)	(3.2 , 8.3)	NA
mean	74.2	74.2	73.4
Observations	81,928	64,944	128,953

Spillover effects

- Washington implements Initiative 1433 in 2016 (treatment year)
- Itighly likely spillover impact in WA



NAICS Industry Classification

	Industry Group	freq		Industry Group	freq
1	Residential Building Construction	974	36	Roofing, Siding, and Sheet Metal Work	96
2	Miscellaneous Business Services	545	37	Miscellaneous Personal Services	93
3	Legal Services	528	38	Hotels and Motels	90
4	Automotive Repair Shops	494	39	Services to Buildings	82
5	Religious Organizations	449	40	Computer and Data Processing Services	65
6	Offices and Clinics of Dentists	446	41	Individual and Family Services	57
7	Real Estate Operators and Lessors	446	42	Concrete Work	56
8	Offices of Other Health Practitioners	424	43	Subdividers and Developers	56
9	Management and Public Relations	420	44	New and Used Car Dealers	54
10	Plumbing, Heating, Air-Conditioning	351	45	Commercial Printing	51
11	Eating and Drinking Places	319	46	Millwork, Plywood & Structural Members	51
12	Real Estate Agents and Managers	319	47	Lumber and Other Building Materials	50
13	Electrical Work	225	48	Misc. Nondurable Goods	48
14	Landscape and Horticultural Services	222	49	Highway and Street Construction	45
15	Accounting, Auditing, & Bookkeeping	221	50	General Farms, Primarily Crop	44
16	Misc. Special Trade Contractors	221	51	Misc. Amusement, Recreation Services	44
17	Insurance Agents, Brokers, & Service	220	52	Used Car Dealers	42
18	Offices & Clinics of Medical Doctors	183	53	Machinery, Equipment, and Supplies	39
19	Engineering & Architectural Services	172	54	Photographic Studios, Portrait	39
20	Veterinary Services	163	55	Miscellaneous Manufactures	38
21	Trucking & Courier Services, Ex. Air	147	56	Security and Commodity Services	37
22	Masonry, Stonework, and Plastering	140	57	Misc. Equipment Rental & Leasing	36
23	Painting and Paper Hanging	127	58	Automotive Services, Except Repair	34
24	Elementary and Secondary Schools	125	59	Electrical Goods	34
25	Carpentry and Floor Work	120	60	Animal Services, Except Veterinary	32
26	Miscellaneous Repair Shops	119	61	Laundry, Cleaning, & Garment Services	32
27	Beauty Shops	115	62	Lumber and Construction Materials	32
28	Grocery Stores	110	63	Motor Vehicles, Parts, and Supplies	32
29	Miscellaneous Investing	108	64	Mailing, Reproduction, Stenographic	31
30	Furniture and Homefurnishings Stores	106	65	Civic and Social Associations	30
31	Auto and Home Supply Stores	105	66	Liquor Stores	29
32	Nonresidential Building Construction	103	67	Paint, Glass, and Wallpaper Stores	29
33	Retail Stores, NEC	103	68	Radio, Television, & Computer Stores	29
34	Miscellaneous Shopping Goods Stores	101	69	Child Day Care Services	26
35	Industrial Machinery, NEC	97	70	Field Crops, Except Cash Grains	26

References

- Aaronson, D., French, E., Sorkin, I. & To, T. (2018), 'Industry dynamics and the minimum wage: a putty-clay approach', *International Economic Review* 59(1), 51–84.
- Allegretto, S. & Reich, M. (2018), 'Are local minimum wages absorbed by price increases? estimates from internet-based restaurant menus', *ILR Review* 71(1), 35–63.
- Cengiz, D., Dube, A., Lindner, A. & Zipperer, B. (2019), 'The effect of minimum wages on low-wage jobs', *The Quarterly Journal of Economics* 134(3), 1405–1454.
- Chava, S., Oettl, A. & Singh, M. (2023), 'Does a one-size-fits-all minimum wage cause financial stress for small businesses?', *Management Science* **69**(11), 7095–7117.
- Dettling, L. J. & Hsu, J. W. (2021), 'Minimum wages and consumer credit: Effects on access and borrowing', *The Review of Financial Studies* **34**(5), 2549–2579.
- Dharmasankar, S. & Yoo, H. (2022), 'Assessing the main and spillover effects of seattle's minimum wage on establishment decisions', *Regional Science and Urban Economics* p. 103865.
- Draca, M., Machin, S. & Van Reenen, J. (2011), 'Minimum wages and firm