Unpacking the Reallocation Channel of a Minimum-Wage Shock

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Roadmap

Minimum Wage & Reallocation Effects

Motivation

- Debates now ask not only "*Are jobs destroyed?*" but also "*Does the MW push workers toward better jobs?*"

What we know

- **Dustmann et al. (QJE 2022, Germany)**
  - MW adoption $\Rightarrow$ no job loss; low-wage workers flow to larger, higher-pay firms.
  - Mechanism: monopsonistic market with commuting costs—higher MW lets workers accept a longer commute for a better wage.

What we do (Korea, 2015-2020)

- Document both sizeable job loss and strong reallocation to firms with higher **observed** revenue/worker.
- **Suggest new mechanism**: search frictions—an unemployment spell often precedes a leap to a higher-productivity job.

Minimum Wage Trends (2015–2020)

Year	Minimum Wage (KRW)	1-Year Growth Rate
2015	5,580	7.1%
2016	6,030	8.1%
2017	6,470	7.3%
2018	7,530	16.4%
2019	8,350	10.9%
2020	8,590	2.9%

Note: Sharp increases in 2018–2019 followed by a slowdown in minimum wage growth.

Project Overview

- **Research Question:** How large is the reallocation effect of minimum wage increases, and which mechanisms drive it?
- **Data:** Employer–employee matched administrative records (2015–2020)
- **Research Design:** TWFE regression using 5-year worker-firm panel
  Identification via variation in MW exposure (bite)
- **Preliminary Findings:** Evidence of reallocation and suggest potential mechanism
  MW Increase $\Rightarrow$ firm exit $\Rightarrow$ involuntary job loss $\Rightarrow$ search/training period $\Rightarrow$ re-employment at larger, more productive firms

Data & Build Process

Step	N(Observation)
All workers (2015–2019)	150,234,320
Exclude special employment types (특고/자영업자/일용직 제외)	94,235,247
Exclude public sector workers	89,744,394
Restrict age to 20–65	85,053,752
Drop missing in individual characteristics	79,176,933
Exclude disabled workers	77,222,816
Exclude high-income (above 100M KRW/year)	68,141,168
Keep only those employed in next year (for reallocation)	59,510,480
Drop missing in firm characteristics	42,148,067
Exclude outliers in any outcome variable	32,098,779

Note: Unit of observation is worker-year. Outliers defined using top/bottom 1% within industry-year cells.

Identification Strategy

Model Specification (Individual & Year FE)

$$y_{i,t+1} = \beta \, \text{bite}_{it} + X_{it}\Gamma + \alpha_i + \tau_t + \varepsilon_{it} \qquad \text{where} \quad \text{bite}_{it} = \mathbf{1}\{w_{i,t} < MW_{t+1}\}$$

- **Fixed Effects:** Individual (α_i) and Year (τ_t)
- **Outcome Variables:**
  - *Individual-level:* Wage Growth, Same Firm, Industry Change, Months worked, # of Jobs
  - *Firm-level:* Δ Revenue per Worker, Δ Average Wage, Δ Employment Size
- **Firm-level outcome definition:**

$$\Delta\text{FirmOutcome}_i = \frac{\text{FirmOutcome}_{B,t} - \text{FirmOutcome}_{A,t}}{\text{FirmOutcome}_{A,t}}$$

where A is the origin firm and B is the destination firm at year t.

Key Definitions and Sample Summary

Key Classification for Further Analysis

- **Unemployed-to-Job Transition (UE2J):**

$$UE2J_{it} = \mathbf{1}\{\text{gap\_months}_{it} > 1\}$$

Gap Months	Share (%)
0 months	18.7
1 month	27.7
Within 1 month (J2J)	**46.4**
2–9 months	39.9
10+ months	13.7
More than 1 month (UE2J)	**53.6**

- **Involuntary Mover:**

$$involuntary_{it} = \mathbf{1}\left\{\Delta emp_{jt} \leq -30\% \quad \text{or} \quad \text{closure}_{j,t\vee t+1} = 1\right\}$$

  - **Worker flows:** 80% stay, 14% move voluntarily, 6% move involuntarily

Where do workers move after the minimum wage increase?

	Mover&Stayer	Mover Only
Wage Growth	0.241***	0.363***
(S.E.)	(0.0004)	(0.0013)
Same Firm	-0.023***	–
(S.E.)	(0.0006)	–
Months Worked	0.594***	0.927***
(S.E.)	(0.0073)	(0.0243)
# of Jobs	-0.033***	-0.108***
(S.E.)	(0.0011)	(0.0063)

	Mover&Stayer	Mover Only
Δ Revenue per Worker	0.025***	0.268***
(S.E.)	(0.0015)	(0.0427)
Δ Average Wage	0.010***	0.084***
(S.E.)	(0.0002)	(0.0022)
Δ Total Employment	0.149***	1.370***
(S.E.)	(0.0145)	(0.499)
N	30,064,548	3,177,699

- Following MW hikes, workers tend to transition into firms that are larger, more productive, and more stable.
- They work longer: months worked ↑, job spells ↓, wage growth ↑.
- Destination firms also show gains in revenue per worker, average wages, and employment size.
- *Next: Do these gains depend on the type of transition path?*

Taking time off leads to better outcomes

Outcome	Stayer	J2J	UE2J
Wage Growth	0.228***	0.275***	0.328***
(S.E.)	(0.0004)	(0.0015)	(0.0012)
Industry Change	-	0.018***	0.066***
(S.E.)	-	(0.003)	(0.0025)
Months Worked	0.531***	0.786***	0.850***
(S.E.)	(0.0076)	(0.0315)	(0.0293)
# of Jobs	-0.033***	-0.018**	-0.043***
(S.E.)	(0.0009)	(0.0084)	(0.006)

Outcome	J2J	UE2J
Δ Revenue per Worker	-0.030**	0.035***
(S.E.)	(0.0127)	(0.0104)
Δ Average Wage	0.047***	0.072***
(S.E.)	(0.002)	(0.0016)
Δ Total Employment	1.127***	1.881***
(S.E.)	(0.1186)	(0.1104)
N	1,452,536	1,674,215

- Workers who experienced an unemployment spell (UE2J) had higher gains than those who switched jobs directly.
- Suggests that search or retraining periods may improve job match quality.
- Stronger improvements in wage, firm size, and productivity after UE2J.
- *Next: Are these gains truly driven by MW-induced displacement?*

Productivity gains are concentrated among involuntary movers

Outcome	Stayer	Voluntary	Involuntary
Wage Growth	0.229***	0.306***	0.303***
(S.E.)	(0.0004)	(0.001)	(0.0002)
Industry Change	-	0.053***	0.061***
(S.E.)	-	(0.0022)	(0.0041)
Months Worked	0.531***	0.864***	0.658***
(S.E.)	(0.0076)	(0.0247)	(0.0465)
# of Jobs	-0.033***	-0.048***	0.004
(S.E.)	(0.0009)	(0.0055)	(0.0103)

Outcome	Voluntary	Involuntary
Δ Revenue per Worker	-0.005	0.044**
(S.E.)	(0.009)	(0.0182)
Δ Average Wage	0.059***	0.069***
(S.E.)	(0.0014)	(0.0027)
Δ Total Employment	1.659***	1.549***
(S.E.)	(0.0926)	(0.1784)
N	2,436,389	690,362

- Only involuntary movers (displaced due to firm closure/contraction) show productivity gains in new firms.
- Suggests that MW-induced firm exits push workers into better-matched, higher-productivity firms.
- Voluntary movers enjoy wage gains but do not experience productivity upgrading.
- *Next: Do firms with high MW exposure actually exit more?*

Do firms with high MW exposure actually exit more?

Firm exit regression (LPM with WLS, firm & time FE)

$$Exit_{j,t+1} = \delta \, \text{bite}_{jt}^{firm} + X_{jt}\Theta + \phi_j + \tau_t + \varepsilon_{jt} \quad \text{(weighted least squares)}$$

- bite_{jt}^{firm}: Share of workers at firm j in year t with wage below next year's minimum wage ($w_{i,t} < \text{MW}_{t+1}$).
- *Baseline:* firm revenue (rev_{jt}), employment size (emp_{jt})
- *Full control:* + share of female, junior, 20s workers, avg. tenure

	Baseline	Full Control
Exit	0.033***	0.031***
(S.E.)	(0.0004)	(0.007)
N	4,945,391	4,945,391

Takeaways:

- Firms with higher bite are significantly more likely to exit.
- Confirms MW-induced cleansing effect.

Who gains the most from this reallocation?

Outcome	Total	Female	Male	Junior	Senior	Young	Old
Real Wage Growth	0.24***	0.23***	0.25***	0.35***	0.23***	0.30**	0.23***
(S.E.)	(0.0004)	(0.0005)	(0.0006)	(0.0017)	(0.0003)	(0.0010)	(0.0004)
Same Firm	-0.02***	-0.03***	-0.02***	-0.07***	-0.00	-0.08***	-0.01***
(S.E.)	(0.0006)	(0.0008)	(0.0009)	(0.0025)	(0.0005)	(0.0020)	(0.0006)
Industry Change	0.016***	0.019***	0.013***	0.040***	0.004***	0.057***	0.010***
(S.E.)	(0.0005)	(0.0007)	(0.0007)	(0.0029)	(0.0004)	(0.0017)	(0.0005)
Diff Worked Months	0.59***	0.61***	0.51***	0.52***	0.46***	1.62***	0.35***
(S.E.)	(0.0073)	(0.0101)	(0.0103)	(0.0295)	(0.0073)	(0.0214)	(0.0074)
Diff # of Jobs	-0.03***	-0.04***	-0.02***	-0.01*	-0.03***	-0.05***	-0.03***
(S.E.)	(0.0011)	(0.0015)	(0.0016)	(0.0074)	(0.0009)	(0.0035)	(0.0011)
Δ Revenue per Worker	0.02***	0.02***	0.03***	0.11***	0.00***	0.14***	0.01***
(S.E.)	(0.0015)	(0.0021)	(0.0068)	(0.0255)	(0.0009)	(0.0141)	(0.0011)
Δ Average Wage	0.01***	0.01***	0.01***	0.05***	0.00***	0.03***	0.01***
(S.E.)	(0.0002)	(0.0003)	(0.0004)	(0.0025)	(0.0002)	(0.0011)	(0.0002)
Δ Total Employment	0.15***	0.16***	0.11***	1.86***	0.02***	0.68***	0.09***
(S.E.)	(0.0145)	(0.0201)	(0.0215)	(0.638)	(0.0056)	(0.133)	(0.0091)
N	30,064,548	12,909,447	17,120,069	1,326,928	28,214,426	6,391,392	23,485,151

Young and Junior workers were affected the most

Outcome	Total	Female	Male	Junior (<1Y)	Senior (≥1Y)	Young (20s)	Old
Still Employed	-0.025***	-0.025***	-0.026***	-0.052***	-0.014***	-0.042***	-0.0195***
(S.E.)	(0.0004)	(0.0006)	(0.0006)	(0.0014)	(0.0004)	(0.0010)	(0.0005)
N	60,543,518	27,802,152	32,741,341	4,927,370	52,784,744	12,795,126	46,809,478

Note: All estimates are from TWFE regressions with individual and year fixed effects. Standard errors are clustered in individual level.

- Reallocation effects strongest among Junior (low tenure) and Young (age 20s).
- These groups faced largest employment losses, but also gained the most.
- Suggests: They are most vulnerable, but also most mobile/adaptable.

Summary of Mechanisms

- MW Shock $\rightarrow$ Low-productivity firm exit $\rightarrow$ Involuntary displacement.
- Displaced workers experience reallocation toward better firms—especially those who took time to search.
- Gains most concentrated among Junior and Young workers.

Conclusion & Open Questions

Next steps

- **Net welfare balance** – Do productivity gains outweigh income lost during unemployment spells?
- **Productivity metric** – Is *revenue per worker* reliable across industries?
  - Cross-industry price / capital-intensity differences may distort comparisons.
  - Plan: re-estimate within-industry or with a simple TFP residual as a robustness check.
- **Search-friction mechanism** – Test whether longer *gap months* (unemployment spells) lead to larger productivity jumps.
  - Estimate reallocation effects separately for 0–1, 2–6, and 7 + month gaps.
  - If longer spells $\nearrow$ upgrade size $\Rightarrow$ evidence that search time improves matching.

Specifications (Baseline & Interaction Extensions)

Baseline:

$$\Delta y_{it} = \beta \, \text{bite}_{it} + X_{it}\Gamma + \alpha_i + \tau_t + \varepsilon_{it}$$

Path × Bite Interaction:

- Construct `path` variable: 0 = stayer, 1 = J2J, 2 = UE2J

$$\Delta y_{it} = \beta_0 \, \text{bite}_{it} + \beta_1 \, (\text{bite}_{it} \times J2J_{it}) + \beta_2 \, (\text{bite}_{it} \times UE2J_{it}) + \gamma_1 \, J2J_{it} + \gamma_2 \, UE2J_{it} + X_{it}\Gamma + \alpha_i + \tau_t + \varepsilon_{it}$$

Type × Bite Interaction:

- Construct `type` variable: 0 = stayer, 1 = voluntary, 2 = involuntary

$$\Delta y_{it} = \beta_0 \, \text{bite}_{it} + \beta_1 \, (\text{bite}_{it} \times Vol_{it}) + \beta_2 \, (\text{bite}_{it} \times Invoc_{it}) + \gamma_1 \, Vol_{it} + \gamma_2 \, Invol_{it} + X_{it}\Gamma + \alpha_i + \tau_t + \varepsilon_{it}$$

Estimation and Interpretation:

- Estimate conditional marginal effects using `margins`, visualize with `marginsplot`.
- Tests heterogeneity in bite effect by transition path or type.

Desc. Stats for employment sample

Variable	2015	2016	2017	2018	2019
Hourly Wage (KRW)	13,257	13,693	14,317	16,314	17,858
(SD)	(6,539)	(6,619)	(6,822)	(7,351)	(7,641)
Female Share	0.45	0.46	0.46	0.46	0.46
(SD)	(0.50)	(0.50)	(0.50)	(0.50)	(0.50)
Tenure (months)	42	44	46	48	54
(SD)	(51)	(52)	(53)	(55)	(57)
Age	39	40	40	40	41
(SD)	(11)	(11)	(12)	(12)	(11)
Junior (Tenure $\leq$ 1Y) Share	0.13	0.13	0.12	0.11	0.10
(SD)	(0.34)	(0.33)	(0.33)	(0.32)	(0.29)
Young (Age 20s) Share	0.23	0.23	0.22	0.22	0.20
(SD)	(0.42)	(0.42)	(0.42)	(0.41)	(0.40)
Still Employed (remaining employed in year $t+1$)	0.95	0.90	0.90	0.90	0.89
(SD)	(0.22)	(0.30)	(0.30)	(0.30)	(0.31)
Bite (earning below next-year minimum wage)	0.015	0.014	0.054	0.010	0.002
(SD)	(0.12)	(0.12)	(0.23)	(0.10)	(0.04)
N (Obs)	11,196,181	11,456,292	11,635,792	11,868,580	12,155,296

Desc. Stats for reallocation sample

Variable	2015	2016	2017	2018	2019
Wage Growth ($\frac{w_{t+1}-w_t}{w_t}$)	0.08	0.06	0.16	0.10	-0.04
(SD)	(0.16)	(0.15)	(0.17)	(0.15)	(0.13)
Same Firm Share	0.89	0.89	0.90	0.90	0.91
(SD)	(0.32)	(0.31)	(0.31)	(0.31)	(0.29)
Move to New establishment	0.006	0.003	0.003	0.002	0.001
(SD)	(0.075)	(0.058)	(0.056)	(0.046)	(0.037)
Industry Change Share	0.08	0.05	0.06	0.05	0.09
(SD)	(0.27)	(0.22)	(0.24)	(0.23)	(0.28)
Region Change Share	0.04	0.04	0.04	0.04	0.04
(SD)	(0.20)	(0.20)	(0.20)	(0.20)	(0.20)
Diff Worked Months ($wm_{t+1} - wm_t$)	0.47	0.08	0.09	0.15	-0.30
(SD)	(2.48)	(2.68)	(2.67)	(2.69)	(2.45)
Diff # of Jobspell ($njob_{t+1} - njob_t$)	-0.03	-0.01	-0.01	-0.01	0.01
(SD)	(0.47)	(0.44)	(0.43)	(0.43)	(0.43)
Δ Revenue per Worker ($\frac{y_{B,t}-y_{A,t}}{y_{A,t}}$)	0.07	0.06	0.07	0.06	0.04
(SD)	(0.82)	(0.75)	(0.79)	(0.77)	(0.55)
Δ Average Wage ($\frac{w_{B,t}-w_{A,t}}{w_{A,t}}$)	0.008	0.007	0.008	0.007	0.004
(SD)	(0.110)	(0.101)	(0.106)	(0.099)	(0.078)
Δ Total Employment ($\frac{L_{B,t}-L_{A,t}}{L_{A,t}}$)	0.29	0.28	0.32	0.34	0.25
(SD)	(3.76)	(3.94)	(4.51)	(4.78)	(4.10)
Δ Worker Count ($\frac{N_{B,t}-N_{A,t}}{N_{A,t}}$)	0.24	0.23	0.26	0.27	0.20
(SD)	(3.38)	(3.44)	(3.91)	(4.12)	(3.37)
N (Obs)	8,547,032	8,793,113	8,673,188	9,206,388	9,512,806

Desc. Stats for still employed

Variable	Total	Female	Male	Junior (<1Y)	Senior (≥1Y)	Young (20s)	Old
Bite		0.02	0.016	0.044	0.016	0.019	0.019
Still Employed		0.902	0.915	0.740	0.932	0.895	0.913

Table 7. Reallocation Gains by Path X Reason

Outcome	Stayer	VolJ2J	VolUE2J	InvolJ2J	InvolUE2J
Real Wage Growth	0.228***	0.275***	0.328***	0.276***	0.326***
(S.E.)	(0.0004)	(0.0017)	(0.0013)	(0.0031)	(0.0020)
Industry Change	-	0.013	0.067***	0.035***	0.061***
(S.E.)	-	(0.0034)	(0.0029)	(0.0026)	(0.0053)
Diff Worked Months	0.530***	0.819***	0.888***	0.681***	0.785***
(S.E.)	(0.0076)	(0.0359)	(0.033)	(0.0657)	(0.0632)
Diff # of Job Spells	-0.033***	-0.036***	-0.052***	0.043***	-0.016
(S.E.)	(0.0009)	(0.0096)	(0.0067)	(0.0166)	(0.0131)
Δ Revenue per Worker	-	-0.052***	0.028***	0.043	0.058***
(S.E.)	-	(0.0139)	(0.0116)	(0.0296)	(0.0220)
Δ Average Wage	-	0.044***	0.070***	0.056***	0.080***
(S.E.)	-	(0.0023)	(0.0018)	(0.0079)	(0.0036)
Δ Total Employment Size	-	1.232***	1.855***	0.796***	1.937***
(S.E.)	-	(0.1401)	(0.1214)	(0.2156)	(0.2575)
N	26,936,797	1,098,691	1,337,698	353,845	336,517

Table 8. Reallocation Gains by Path X Industry Switch

Outcome	Stayer	J2J (Job-to-Job)		UE2J (Unemployed-to-Job)	
		Within Industry	Switch Industry	Within Industry	Switch Industry
Real Wage Growth	0.228***	0.265***	0.294***	0.310***	0.346***
(S.E.)	(0.0004)	(0.0026)	(0.0026)	(0.0016)	(0.0017)
Diff Worked Months	0.531***	0.666***	1.009***	0.845***	0.848***
(S.E.)	(0.0076)	(0.0384)	(0.0548)	(0.0407)	(0.0421)
Diff # of Job Spells	-0.033***	-0.060***	0.068***	-0.066***	-0.016*
(S.E.)	(0.0009)	(0.0104)	(0.0141)	(0.0086)	(0.0083)
Δ Revenue per Worker	-	0.012	-0.144***	0.074***	-0.103***
(S.E.)	-	(0.01)	(0.0306)	(0.0094)	(0.0185)
Δ Average Wage	-	0.045***	0.048***	0.062***	0.078***
(S.E.)	-	(0.0022)	(0.0039)	(0.0016)	(0.0026)
Δ Total Employment Size	-	0.152*	2.858***	0.631***	2.853***
(S.E.)	-	(0.1078)	(0.2704)	(0.1119)	(0.1904)
N	26,936,797	958,455	494,081	960,843	713,372