

Labor Market Fluidity and Aggregate Productivity

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Japan's labor market is less fluid

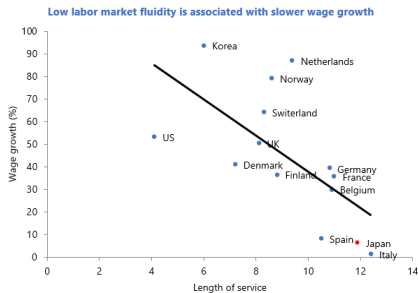
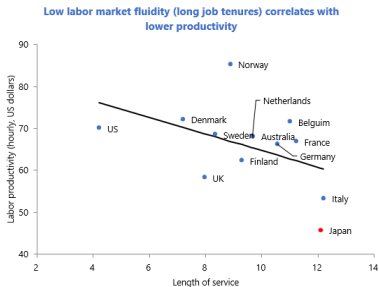
- ▶ Monthly share changing labor market status
 - ▶ US: 6.5% vs Japan: 3.4% (1980–2024; Miyamoto, 2025)
- ▶ Japan's labor market fluidity has increased only modestly over time
 - ▶ 3.2% (1980–1999) → 3.6% (2000–2024)

Country	Sample/Source	EU	EN	UE	UN	NE	NU	
Japan	1980Q1-2024Q2	Share of working-age population (%)	0.3	1.0	0.3	0.3	1.1	0.3
		Transition rates (per month, %)	0.4	1.4	13.0	11.0	2.3	0.6
	1980Q1-1999Q4	Share of working-age population (%)	0.3	1.0	0.3	0.2	1.1	0.2
		Transition rates (per month, %)	0.4	1.4	13.8	10.8	2.6	0.6
	2000Q1-2024Q2	Share of working-age population (%)	0.4	1.0	0.4	0.4	1.1	0.4
		Transition rates (per month, %)	0.5	1.3	12.3	11.1	2.0	0.7
US	1978Q1-2012Q3	Transition rates (per month, %)	1.4	1.4	22.8	13.5	2.2	2.1
	Krusell et al. (2017)							
	1994Q1-2019Q3	Transition rates (per month, %)	1.3	2.7	25.1	23.0	4.4	2.4
	Fallick and Fleischman (2004)							

Labor market fluidity matters

- ▶ Labor market fluidity can shape aggregate productivity and wage growth.
- ▶ Macro channel:
 - ▶ Reallocation across firms/sectors
 - ▶ Adaptation to technological/structural change.
- ▶ Micro channel:
 - ▶ Higher matching quality (better worker–firm matches)

Motivating facts



- ▶ Cross-country patterns: lower fluidity (longer tenure) is associated with lower productivity and slower wage growth.
 - ▶ Tenure refers to job tenure among male full-time workers.

What we do

- ▶ **Purpose:** we explore how labor market fluidity affects productivity and wage growth.
 - ▶ We focus on dismissal restrictions as a key institutional friction that slows worker reallocation.
- ▶ **Our Approach:**
 - ▶ A search-and-matching model with multi-worker firms
 - ▶ We explicitly model redundant (unproductive) workers within firms, typically abstracted from in standard search-and-matching models.
 - ▶ Dismissal restrictions prevent firms from promptly dismissing redundant (unproductive) workers.
 - ▶ *Employment protection is modeled as a firing probability, not a firing tax.*

What we find (preview of results)

- ▶ We develop two complementary models:
 1. **Analytical model**: simplified wage setting. Easing dismissal restrictions raises productivity
 2. **Quantitative model** (calibrated to Japan) : intra-firm wage bargaining. Easing dismissal restrictions raises productivity and wages, with modest unemployment response.
- ▶ Mechanism: difficult dismissal \rightarrow unproductive matches persist \rightarrow within-firm composition deteriorates \rightarrow average productivity \downarrow .

Theory model: basic idea

- ▶ Worker states: Unemployed (U) vs Employed ($L = \ell + n$).
 - ▶ Workers are ex ante identical.
 - ▶ Once employed, some workers become unproductive over time (n).

- ▶ Production:

$$y = A\ell^\alpha k^{1-\alpha}$$

- ▶ Unproductive workers do not contribute.
- ▶ Labor productivity:

$$\frac{A\ell^\alpha k^{1-\alpha}}{\ell + n}$$

- ▶ Decreases with n .

Matching technology

- ▶ Matching function: $m(U, V) = m_0 U_t^\zeta V_t^{1-\zeta}$.
- ▶ Tightness: $\theta_t \equiv V_t / U_t$.
- ▶ Vacancy-filling rate: $m_0 U_t^\zeta V_t^{1-\zeta} / V_t \equiv q(\theta_t)$.
- ▶ Job-finding rate: $m_0 U_t^\zeta V_t^{1-\zeta} / U_t = \theta_t q(\theta_t)$.

Worker flows and transitions

- ▶ Start of period: productive ℓ_t , unproductive n_t .
- ▶ After production: a fraction $\lambda_F n_t$ of unproductive workers are successfully fired.
- ▶ λ_F measures the degree of firing restriction (higher λ_F = easier dismissal).
- ▶ Workers may quit voluntarily with probability λ_Q .
- ▶ Productive workers become unproductive with probability ϕ .
- ▶ Transition equations:

$$\ell_{t+1} = (1 - \lambda_Q) (1 - \phi) \ell_t + q(\theta_t) v_t,$$

$$n_{t+1} = (1 - \lambda_F) (1 - \lambda_Q) n_t + (1 - \lambda_Q) \phi \ell_t,$$

$$U_{t+1} = [1 - \theta_t q(\theta_t)] U_t + \lambda_Q \ell_t + [\lambda_F + (1 - \lambda_F) \lambda_Q] n_t.$$

Firms

- ▶ Firm value:

$$J(S) = \max_{v,i} \left\{ A\ell^\alpha k^{1-\alpha} - w(S)(\ell + n) - cv - i + \beta J(S_{+1}) \right\},$$

- ▶ Subject to:

$$\begin{aligned}\ell_{+1} &= (1 - \lambda_Q)(1 - \phi)\ell + q(\theta)v \\ k_{+1} &= (1 - \delta)k + i\end{aligned}$$

- ▶ Key friction: the firm pays wage to both productive and unproductive workers (equal treatment)

Workers

- ▶ Value of productive employment:

$$J^E(S) = w(S) + \lambda_Q \beta J^U(S_{+1}) + \beta(1 - \lambda_Q) \left[(1 - \phi) J^E(S_{+1}) + \phi J^N(S_{+1}) \right]$$

- ▶ Interpretation:

- ▶ λ_Q : quit probability (voluntary separation)
- ▶ ϕ : probability of becoming unproductive (match obsolescence)

- ▶ Value of unproductive employment:

$$J^N(S) = w(S) + \lambda_F \beta J^U(S_{+1}) + \beta(1 - \lambda_F) \left[\lambda_Q J^U(S_{+1}) + (1 - \lambda_Q) J^N(S_{+1}) \right]$$

- ▶ Key asymmetry: worker prefers to stay at wage w ; firm prefers to dismiss (but can only do so gradually).

Job seekers

- ▶ Value of unemployment:

$$J^U(S) = z + \theta q(\theta) \beta J^E(S_{+1}) + (1 - \theta q(\theta)) \beta J^U(S_{+1})$$

- ▶ z : flow value of nonwork (benefits/leisure)
- ▶ Standard search-matching block.

Wage setting in the simple model

- ▶ Wage is pinned down by a take-it-or-leave-it offer (firm makes worker indifferent):

$$J^E (S_t) = J^U (S_t) .$$

- ▶ Implied wage: $w = z$ (Proposition 1).

Steady-state equilibrium & key proposition

- ▶ Job creation condition and capital-labor ratio:

$$[1 + r - (1 - \lambda_Q)(1 - \phi)] \frac{c}{q(\theta)} = \alpha A (k/\ell)^{1-\alpha} - z,$$

$$k/\ell = \left(\frac{1 - \alpha}{r + \delta} A \right)^{\frac{1}{\alpha}}.$$

- ▶ Steady-state stocks:

$$U = \frac{\lambda_F + (1 - \lambda_F) \lambda_Q}{\frac{1 - (1 - \lambda_Q)(1 - \phi) + (1 - \lambda_Q) \lambda_F}{1 - (1 - \lambda_Q)(1 - \phi)} \theta q(\theta) + \lambda_F + (1 - \lambda_F) \lambda_Q},$$

$$\ell = \frac{\theta q(\theta)}{1 - (1 - \lambda_Q)(1 - \phi) + \frac{1 - (1 - \lambda_F)(1 - \lambda_Q) + (1 - \lambda_Q) \phi}{1 - (1 - \lambda_F)(1 - \lambda_Q)} \theta q(\theta)},$$

$$n = \frac{(1 - \lambda_Q) \phi}{1 - (1 - \lambda_F)(1 - \lambda_Q)} \ell.$$

- ▶ *Proposition 2*: higher $\lambda_F \Rightarrow$ higher labor productivity (if $\phi > 0$).
- ▶ Limitation: wages do not respond to output changes \rightarrow motivates richer wage bargaining

Quantitative model

- ▶ Production with hoarding-induced productivity penalty:

$$y = A(1+n)^{-\psi}(\ell+n)^{\alpha}k^{1-\alpha}$$

- ▶ Wage determination (intra-firm bargaining):

$$\eta J_L(S) = (1-\eta) \left[J^E(S) - J^U(S) \right],$$

- ▶ Key wage equation:

$$w(L) = \frac{\alpha \tilde{A} k^{1-\alpha}}{\alpha + \frac{1}{\eta} - 1} L^{\alpha-1} + (1-\eta)z + \theta\eta c + (1-\eta)(1-\lambda_Q)\phi\beta \times$$
$$\frac{\frac{\alpha \tilde{A} k^{1-\alpha}}{\alpha + \frac{1}{\eta} - 1} L^{\alpha-1} - \eta z + \left[\frac{-\eta}{1-\eta} \right] \theta\eta c + (1-\lambda_Q)\phi\eta \frac{c}{q(\theta)}}{1 - [(1-\lambda_F) - \phi(1-\eta)](1-\lambda_Q)\beta}.$$

Calibration

- ▶ Calibrate to key Japanese labor market facts (quarterly model)

Parameters	Description	Values
r	Real interest rate	0.01
α	Labor share parameter	2/3
m_0	Matching efficiency	0.3981
ξ	Matching elasticity w.r.t. job seekers	0.6
b	Unemployment flow value	1.0023
ψ	Productivity penalty from hoarding	1.0
δ	Capital depreciation rate	0.0094 \times 3
A	Aggregate productivity	1.0
η	Worker bargaining power	0.5
λ_Q	Quit probability (voluntary separation)	0.0084
λ_F	Dismissal probability of an unproductive worker	0.0876
ϕ	Probability a productive worker becomes unproductive	0.0053
c	Vacancy cost	0.6700

Calibration

- ▶ Two separation channels: quits (λ_Q) and dismissals of unproductive workers (λ_F).
 - ▶ Calibration targets: match (i) the overall separation rate and (ii) the standard split between voluntary and involuntary separations.
 - ▶ Decomposition assumption: 65% of separations are voluntary (Silva & Toledo, 2009; Kuo & Miyamoto, 2019).
- ▶ Unproductive transition (ϕ): chosen to match the labor-hoarding share in the data.
 - ▶ Target moment: 5.2% labor hoarding
 - ▶ Based on Recruit Works Institute estimates comparing “required employment” vs. actual employment.

Results

Variable	Description	Baseline	$\phi : -20\%$	$\lambda_F : +20\%$
θ	Tightness	0.95	0.984	0.976
u	Unemployed	0.032	0.030	0.032
ℓ	Productive emp.	0.918	0.930	0.925
n	Unproductive emp.	0.050	0.041	0.043
$n/(\ell + n)$	Share of unproductive emp.	0.052	0.042	0.044
k	Capital	10.773	10.949	10.889
y	Output	2.058	2.091	2.080
y/L	Productivity	2.126	2.155	2.148
w	Wage	1.671	1.693	1.688

- ▶ We vary (i) incidence of unproductive workers (ϕ) and (ii) ease of dismissal (λ_F)
- ▶ Lower ϕ : reduces hoarding \rightarrow productivity & wages \uparrow ; u \downarrow slightly.
- ▶ Higher λ_F : reduces hoarding \rightarrow productivity & wages \uparrow ;
unemployment is essentially unchanged due to inflow–outflow offset.

Mechanism: why unemployment barely moves

- ▶ Relaxing dismissal restrictions raises separations from the unproductive state (inflow \uparrow).
- ▶ But it also strengthens job creation and job finding (outflow \uparrow).
- ▶ General equilibrium offset \Rightarrow unemployment stock responds only modestly.

Conclusion

- ▶ We develop a search-and-matching model with multi-worker firms in which redundant workers can be dismissed only gradually.
- ▶ Dismissal restrictions can depress aggregate productivity by slowing replacement of unproductive matches (composition channel).
- ▶ In the calibrated quantitative model, easing dismissal restrictions raises productivity/output/wages; unemployment response is muted (offsetting flows).
- ▶ Remaining issues/future work:
 - ▶ Job-to-job transitions
 - ▶ Transitional dynamics
 - ▶ Rapid structural/technological change (AI, decarbonization)