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Temporary Layoffs with Incomplete Worker Attachment in Search Equilibrium

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Increasing Labor Market Flexibility – Boon or Bane?

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Study	Results	Sample (spells)	Country
K. Mavromaras, H. Rudolph (1998)	Recalls: 26.5%	N=22601 (L)	Germany 1980-1990
G. Fischer, K. Pichelmann (1991)	Recalls: 32.4% AU: 22.2%	N=2499 (T)	Austria 1985
A. Alba-Ramirez, J. Arranz, F. Munoz-Bullon (2007)	Recalls: 35.7%	N=23035 (L)	Spain 1999-2002
P. Jensen, M. Svarer (2003)	Recalls: 50% AU: 20%	N=35000 (T)	Denmark 1981-1990
F. Jansson (2002)	Recalls: 40-47% AU: 10%	N=3668 (T)	Sweden 1995-1996
K. Roed, M. Nordberg (2003)	Recalls: 32.2% AU: 13.3%	N=815373 (T)	Norway 1989-1998

AU – attached unemployment; L – layoff unemployment; T – total unemployment;

Table 1: Summary of empirical research on temporary layoffs (Europe)

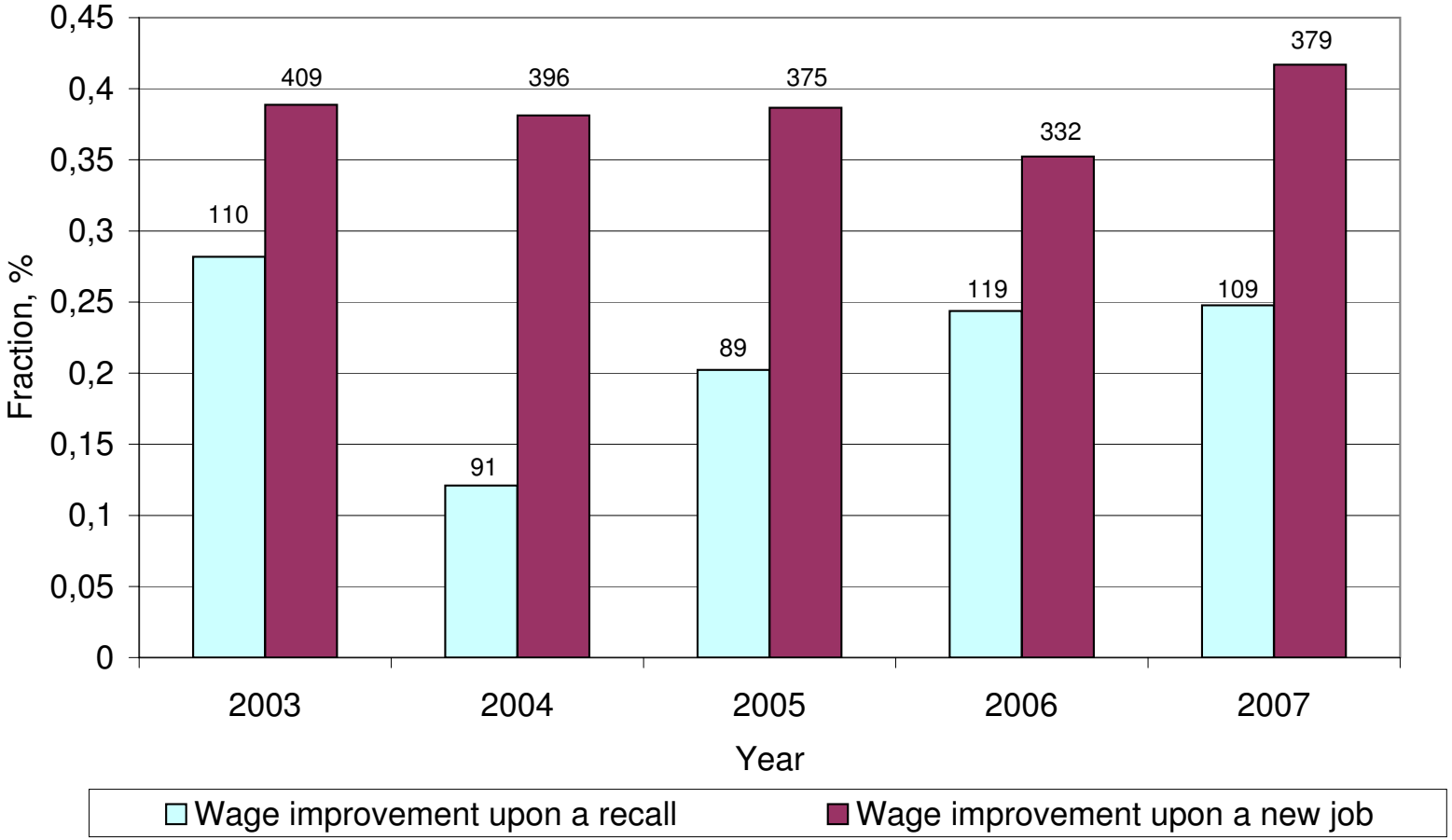

Figure 1: Probability of wage improvement, Germany 2003-2007

- **Implicit contract models:** (labour demand)
  Feldstein (1974, 1976), Baily (1977), Burdett and Wright (1989).
  – stochastic output fluctuations;
  – permanent worker attachment;

- **Job search models:** (labour supply)
  Burdett and Mortensen (1980), Pissarides (1982), Mortensen (1990);
  – workers search in attachment;
  – exogenous wage offer distribution.

Model characteristics:

- General equilibrium with endogenous market tightness;
- Idiosyncratic (binary) labour productivity shocks;
- Ex-ante identical risk neutral workers and firms;
- Random search and Nash-bargaining;

- Incomplete worker attachment and recalls;
- Non-contingent contracts with limited commitment;
- Possibility of wage renegotiations;

[1.] **Efficiency of search equilibrium**:
Hosios (1990): Search models with random matching and Nash bargaining are generally constrained inefficient, unless $\beta = \eta_q$, where η_q – elasticity of the job-filling rate;

[2.] **Endogenous wage dispersion (on-the-job search)**

- Random search with wage posting:
Burdett and Mortensen (1998), Postel-Vinay and Robin (2002), Burdett and Coles (2003), Stevens (2004);
- Random search with wage bargaining:
Pissarides (1994), Cahuc and Postel-Vinay and Robin (2003), Shimer (2006), Bonilla and Burdett (2006);

- Productivity shocks $\tilde{y} \in \{y, y^0\}$ arrive with a Poisson intensity δ:

$$\text{Productivity} = \begin{cases} y & \text{(state 1)} \quad \text{with probability} \quad p \\ y^0 & \text{(state 2)} \quad \text{with probability} \quad (1-p) \end{cases}$$

- γ – job destruction rate;
- $\lambda(\theta)$ – job arrival rate, $\lambda'(\theta) > 0$; $\theta \equiv \frac{v}{u}$ - market tightness;
- $q(\theta) = \lambda(\theta)/\theta$ – vacancy filling rate, $q'(\theta) < 0$;

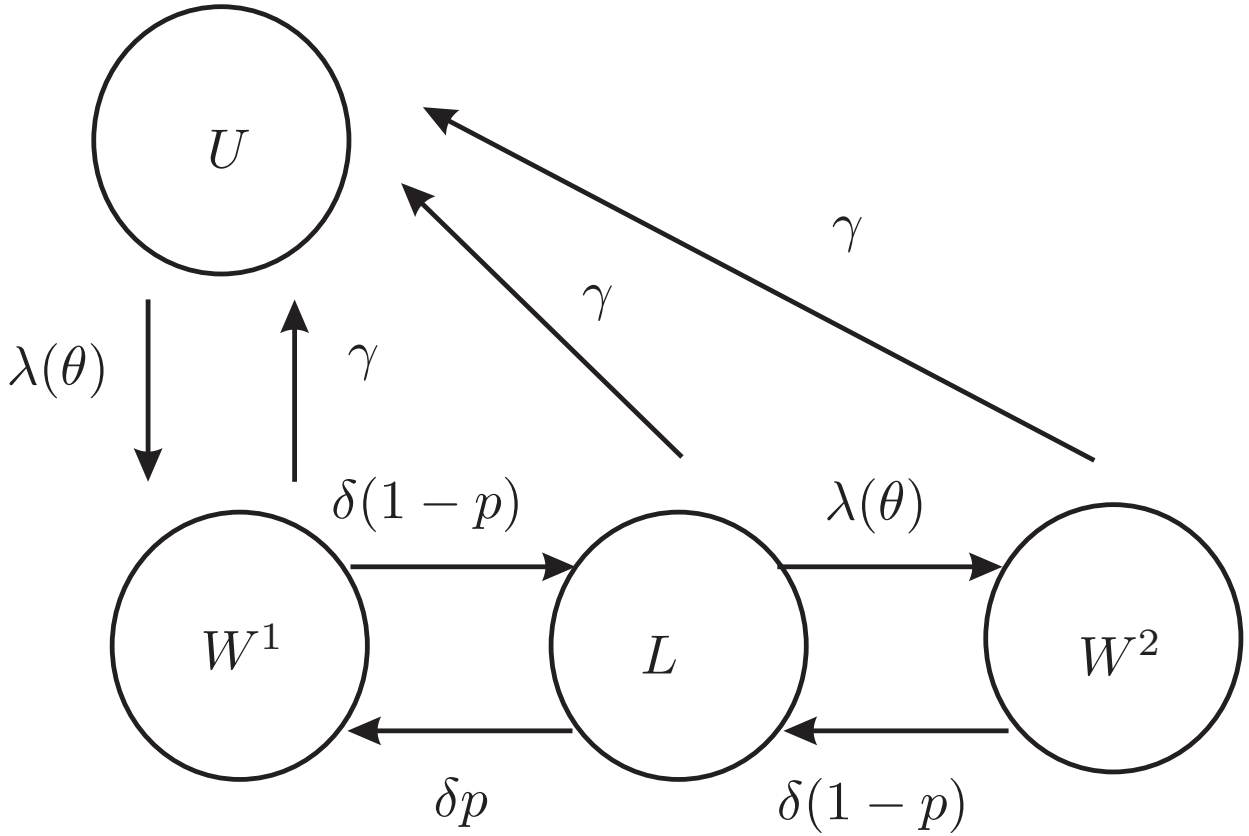

Figure 2: Labour market dynamics with temporary layoffs

Bellman equations for employed and unemployed workers:

$$rU = z + \lambda(\theta)(W^1 - U) \tag{1}$$

$$rW^1 = w^1 - \delta(1-p)(W^1 - L) - \gamma(W^1 - U) \tag{2}$$

$$rL = z + \delta p(W^1 - L) + \lambda(\theta)(W^2 - L) - \gamma(L - U) \tag{3}$$

$$rW^2 = w^2 - \delta(1-p)(W^2 - L) - \gamma(W^2 - U) \tag{4}$$

Bellman equations for filled jobs:

$$rJ^1 = y - w^1 - \delta(1-p)(J^1 - T) - \gamma J^1 \quad (5)$$

$$rT = \delta p(J^1 - T) - \lambda(\theta)T - \gamma T \quad (6)$$

$$rJ^2 = y - w^2 - \delta(1-p)(J^2 - T) - \gamma J^2 \quad (7)$$

Nash-bargaining with unattached unemployed:

$$(W^1 - U)^\beta (J^1 - V)^{1-\beta} \to \max_{w^1},$$

Solution:

$$w^1 = \beta[y + \delta(1-p)T] + (1-\beta)[rU - \delta(1-p)(L-U)] \tag{8}$$

Nash-bargaining with attached unemployed:

$$(W^2 - L)^\beta (J^2 - V)^{1-\beta} \to \max_{w^2}$$

Solution:

$$w^2 = \beta[y + \delta(1-p)T] + (1-\beta)[rU + (r+\gamma)(L-U)] \tag{9}$$

u – unattached unemployment; u_1 – attached unemployment;
e_1 – employment at wage w^1; e_2 – employment at wage w^2.

Surplus of an open vacancy:

$$rV = -c + q(\theta)\left[\alpha J^1 + (1-\alpha)J^2\right] \tag{10}$$

$$\alpha = \frac{u}{u+u_1} \qquad (1-\alpha) = \frac{u_1}{u+u_1}$$

In the equilibrium $V = 0$.

Differential equations for employment and unemployment:

$$\begin{cases} \dot{u}_1 = 0 = & \delta(1-p)(e_1+e_2) - \delta p u_1 - \lambda(\theta)u_1 - \gamma u_1 \\ \dot{e}_1 = 0 = & \lambda(\theta)u + \delta p u_1 - \delta(1-p)e_1 - \gamma e_1 \\ \dot{e}_2 = 0 = & \lambda(\theta)u_1 - \delta(1-p)e_2 - \gamma e_2 \\ 1 = & u + u_1 + e_1 + e_2 \end{cases} \tag{11}$$

$\Rightarrow$ Probability to contact an unattached unemployed (α):

$$\frac{1-\alpha}{\alpha} = \frac{u_1}{u} = \frac{\lambda(\theta)\delta(1-p)}{\gamma(\gamma+\delta+\lambda(\theta))} \qquad \alpha'(\theta) < 0 \tag{12}$$

Proposition 1: *The decentralized equilibrium with temporary layoffs is characterized by endogenous binary wage dispersion and is represented by a tuple of variables* $\{w^1, w^2, \alpha, \theta, U\}$ *satisfying conditions (1), (8), (9), (12) as well as* ***the free-entry condition:***

$$\frac{c}{q(\theta)} = (1-\beta)S^1\left[1 - \frac{(1-\alpha)d_1(\theta)\beta}{1-(1-\beta)d_2(\theta)}\right] \tag{13}$$

$d_1(\theta)$, $d_2(\theta)$ – *effective probabilities of a recall/new job respectively.*

The necessary condition *for the equilibrium existence is:* $y^0 \leq y^0_*$

$$y^0_*: \qquad T + L - U \geq \frac{\bar{y}^0 - rU}{r+\gamma} \tag{14}$$

Objective function of the **social planner**:

$$\max_{\theta} \int_0^{\infty} e^{-rt} \Big[y(e_1 + e_2) + z(1 - e_1 - e_2) - c\theta(1 - e_1 - e_2)) \Big] dt$$

subject to differential equations for $\dot{u_1}$, $\dot{e_1}$, $\dot{e_2}$

The optimal planner's solution implies:

$$\frac{c}{q(\theta)} = (1 - \eta_q) S (1 - (1 - \alpha) d_1(\theta)) \tag{15}$$

- Decentralized equilibrium:

$$\frac{c}{q(\theta)} = (1-\beta)S^1\left[1 - \frac{(1-\alpha)d_1(\theta)\beta}{1-(1-\beta)d_2(\theta)}\right] \tag{16}$$

- Social Planner:

$$\frac{c}{q(\theta)} = (1-\eta_q)S[1-(1-\alpha)d_1(\theta)] \tag{17}$$

Proposition 2: *Let $\beta = \eta_q$, then:*

(a). Search equilibrium with temporary layoffs and wage dispersion described in proposition 1 is constrained inefficient;

(b). The market tightness in the decentralized equilibrium is above the socially optimal level, implying excessive job creation;

Proposition 3: *Welfare in the decentralized equilibrium with temporary layoffs can be raised by imposing a tax τ on attached unemployed starting job with a new employer, such that $F = T = d_1(\theta)(1-\beta)S^1$. This tax policy eliminates real wage inequality $w^2 - \tau = w^1$ and is equivalently written as:*

$$F \equiv \frac{\tau}{r+\gamma+\delta(1-p)} = d_1(\theta)(1-\beta)\frac{y-z+c\theta}{r+s(\theta)+\lambda(\theta)} \tag{18}$$

Hypothesis: *For any value of the previous wage w_t expected wage change Δw of an employee recalled to work for the previous employer is lower than the expected wage change of an employee taking job with a new employer:*

$$\begin{aligned} E_t[\Delta w | Recall_{t+1} = 1] &= E[w_{t+1} | Recall_{t+1} = 1] - w_t = w_1 - w_t \\ E_t[\Delta w | New\ job_{t+1} = 1] &= \alpha w_1 + (1-\alpha) w_2 - w_t \geq w_1 - w_t \end{aligned}$$

Data: German Social Economic Panel, 2003-2007.

Variable	Mean	Description
		Dependent variable
Pay improved	0.443	1=Earnings have improved in the new job
		Individual characteristics
Age	36.06	Age of the individual in years [18, ..., 68].
Education	12.81	Amount of education or training in years [7, ..., 18]
German	0.938	1=German nationality
Gender	0.524	1=Male
		Previous job characteristics
Tenure	4.625	Number of years with a previous employer [0, ..., 43]
Recall	0.048	1=Returned to the previous employer
		Reason for separation
Quit	0.404	1=Previous employment ended in a quit
Layoff	0.185	1=Previous employment ended in a layoff
Job closure	0.121	1=Previous employment ended due to job closure
Temp. contract	0.164	1=Temporary contract expired
		Job comparison
Promotion	0.330	1=Promotion possibilities have improved in the new job
Benefits	0.228	1=Social benefits provision has improved in the new job
Security	0.262	1=Work security has improved in the new job

Table 2: Variables in the dataset, $N = 2595$

Table 3: Probit estimation results

Dependent variable $y_i = 1$ if wage improvement in the new job

Variable	Coefficient	Standard deviation	Reduced form	Standard deviation	Probability change	Standard deviation
Constant	-.059	(.240)	-.030	(.155)		
Age	$-.014^{**}$	(.006)	$-.013^{**}$	(.005)	$-.005^{**}$	(.002)
Previous job characteristics						
Tenure	-.005	(.005)				
Recall	**-.288****	(.132)	**-.244****	(.110)	**-.079****	(.034)
Job comparison						
Promotion	$.627^{**}$	(.059)	$.638^{**}$	(.052)	$.246^{**}$	(.020)
Benefits	$.620^{**}$	(.067)	$.612^{**}$	(.059)	$.235^{**}$	(.024)
Security	$.217^{**}$	(.064)	$.186^{**}$	(.057)	$.068^{**}$	(.021)
Reason for separation						
Quit	$.264^{**}$	(.084)	$.180^{**}$	(.057)	$.065^{**}$	(.021)
Layoff	$-.165^{*}$	(.098)	$-.254^{**}$	(.069)	$-.082^{**}$	(.022)
Job closure	$-.266^{**}$	(.111)	$-.340^{**}$	(.090)	$-.107^{**}$	(.027)
Temp. contract	.091	(.100)				
Observations	2595		3241		3241	
Pseudo R^2	0.1482		0.1415			
Log likelihood	-1518.3		-1911.2			

Standard deviations are given in parentheses; Two-tailed significance: * 10%, ** 5%;

- Search equilibrium with *temporary layoffs*;
  – job search in attachment;
  – endogenous (binary) wage dispersion;
- Hosios value of the bargaining power does not deliver the equilibrium efficiency. There is excessive job creation in the decentralized equilibrium;
- The inefficiency of the decentralized equilibrium is explained by a negative externality imposed on the previous employer of the worker, losing a valuable recall option;
- Being recalled to the previous employer in Germany is associated with approximately 8% lower probability of wage improvement as opposed to a job with a new employer.