Ljungqvist & Sargent's: The European Unemployment Dilemma

Trevor Gallen

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- Fact: Huge lag between entitlement increases and unemployment increase.
- Q: Can we explain the divergence with unemployment insurance/welfare?
- A: Yes. The problem agents are solving is dynamic, and our model can explain changes.

The Divergence of Unemployment Rates

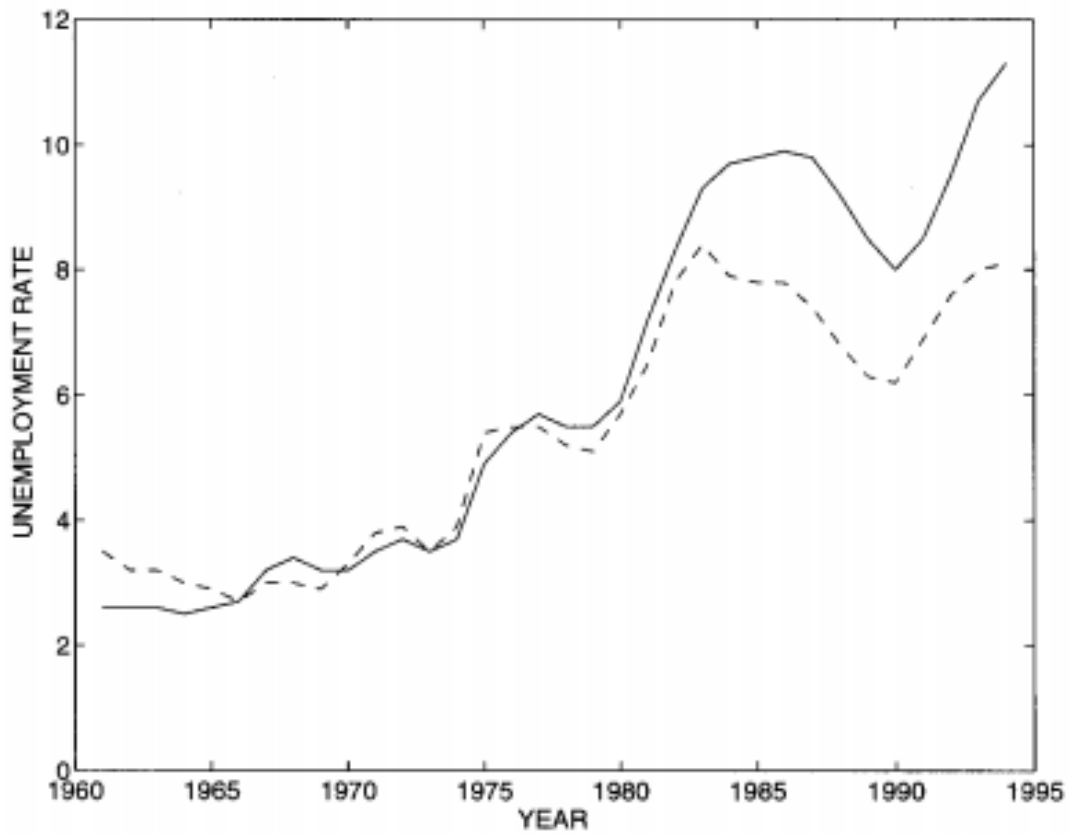

Fig. 1.—Unemployment rate in OECD as a percentage of the labor force. The solid line is unemployment in the European OECD countries, and the dashed line is unemployment in the total OECD. Data for 1961–77 are taken from *Labour Force Statistics* (1984), and data for 1978–94 are taken from *Employment Outlook* (1995).

The Divergence of Unemployment Rates

TABLE 1

Unemployment and Long-Term Unemployment in OECD

	Unemployment (%)			Long-Term Unemployment of 6 Months and Over*			Long-Term Unemployment of 1 Year and Over*			
	1974–79 (1)	1980–89 (2)	1995 (3)	1979 (4)	1989 (5)	1995 (6)	1970 (7)	1979 (8)	1989 (9)	1995 (10)
Belgium	6.3	10.8	13.0	74.9	87.5	77.7	...	58.0	76.3	62.4
France	4.5	9.0	11.6	55.1	63.7	68.9	22.0	30.3	43.9	45.6
Germany†	3.2	5.9	9.4	39.9	66.7	65.4	8.8	19.9	49.0	48.3
Netherlands	4.9	9.7	7.1	49.3	66.1	74.4	12.2	27.1	49.9	43.2
Spain	5.2	17.5	22.9	51.6	72.7	72.2	...	27.5	58.5	56.5
Sweden	1.9	2.5	7.7	19.6	18.4	35.2	...	6.8	6.5	15.7
United Kingdom	5.0	10.0	8.2	39.7	57.2	60.7	17.6	24.5	40.8	43.5
United States	6.7	7.2	5.6	8.8	9.9	17.3	...	4.2	5.7	9.7
OECD Europe	4.7	9.2	10.3	...	...	...	...	31.5	52.8	...
Total OECD	4.9	7.3	7.6	...	...	...	...	26.6	33.7	...

Source.—Cols. 1 and 2: OECD *Employment Outlook* (1991), table 2.7; col. 3: OECD *Employment Outlook* (1996), table 1.3; cols. 4 and 8: OECD *Employment Outlook* (1984), table H, except for the OECD aggregate figures, averages for 1979 and 1980, which are taken from OECD *Employment Outlook* (1991), table 2.7; cols. 5 and 9: OECD *Employment Outlook* (1992), table N, except for the OECD aggregate figures, which are taken from OECD *Employment Outlook* (1991), table 2.7; cols. 6 and 10: OECD *Employment Outlook* (1996), table Q; col. 7: OECD *Employment Outlook* (1983), table 24.

* Figures in cols. 4–10 are percentages of total unemployment.

† Except for the year 1995, the data refer only to the former West Germany.

Losing Your Job is Bad

Fig. 3.—Quarterly earnings of high-attachment workers separating in the first quarter of 1982 and workers staying through 1986. The solid line refers to stayers and the dashed line to separators. Reproduction of Jacobson et al.'s (1993) fig. 1; their last observation is omitted because it was based on an insufficient sample.

European Replacement Rates are Generous

TABLE 3

Net Unemployment Benefit Replacement Rates in 1994 for Single-Earner Households by Duration Categories and Family Circumstances

	Single			With Dependent Spouse		
	First Year	Second and Third Years	Fourth and Fifth Years	First Year	Second and Third Years	Fourth and Fifth Years
Belgium	79	55	55	70	64	64
France	79	63	61	80	62	60
Germany	66	63	63	74	72	72
Netherlands	79	78	73	90	88	85
Spain	69	54	32	70	55	39
Sweden*	81	76	75	81	100	101
United Kingdom*	64	64	64	75	74	74
United States	34	9	9	38	14	14

Source.—Martin (1996), table 2.
Note.—Benefit replacement rates are benefit entitlements on a net-of-tax and housing benefit basis as a percentage of net-of-tax earnings.
* Data for Sweden and the United Kingdom pertain to 1995.

Some Notation

- A continuum of workers with geometrically distributed life spans.
- Balanced number of lives and deaths.
- Search economy: unemployed worker chooses search intensity s_t.
- Suffers disutility $c(s_t)$ from it.
- Probability $\pi(s_t)$ find a job with wage offer $F(w)$.
- If a job, laid off with probability λ.
- If alive, probability of dying α.
- Accumulate skills by working (transitions given by μ). When employed skills increase, unemployed they decrease.

Problem

- Let y_{t+i} be the worker's after-tax income, and the rest is obvious.
- Worker wants to maximize:

$$E_t \sum_{i=0}^{\infty} \beta^i (1-\alpha)^i y_{t+i}$$

- Let $b(I)$ be the unemployment compensation to a worker whose last earnings were I.
- If worker turns down "suitable" job offer of $I_g(I)$ or more, then lose unemployment benefits.
- Want to write out this Bellman.

Bellman-I: Employed Worker

- w is wage. h is skill level, μ_e, μ_l, μ_u is transition probability for employed, laid-off, and unemployed, respectively. $1-\alpha$ is probability of living, λ is probability of losing job

$$V(w,h) = \max_{accept,reject} \{(1-\tau)wh + ...$$

$$+(1-\alpha)\beta \left[(1-\lambda) \sum_{k'} \mu_e(h,h') V(w,h') + ... \right.$$

$$\left. \lambda \sum_{k'} \mu_l(h,h') V_b(wh,h') \right], V_0(h) \Big\}$$

Bellman-I: Employed Worker

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Keep job, or don't

Bellman-I: Employed Worker

$$V(w,h) = \max_{accept,reject} \{(1-\tau)wh + ...$$

$$+(1-\alpha)\beta \left[(1-\lambda) \sum_{k'} \mu_e(h,h') V(w,h') + ... \right.$$

$$\left. \lambda \sum_{k'} \mu_l(h,h') V_b(wh,h') \right], V_0(h) \Big\}$$

If not, get money, and if you live, you keep your job or lose it. Otherwise, take new job.

Bellman-II: Unemployed Worker

$$V_b(I,h) = \max_s \{-c(s)$$

$$+(1-\tau)b(I) + (1-\alpha)\beta \sum_k \mu_u(h,h')$$

$$\times \left[[1-\pi(s)]\, V_b(I,h') + \pi(s) \left(\int_{w \geq I_g(I)/h'} V(w,h') dF(w) \right. \right.$$

$$+ \int_{w < I_g(I)/h'} \max_{accept,reject} \left\{ (1-\tau) w h' \right.$$

$$+(1-\alpha)\beta \left[(1-\lambda) \sum_{h''} \mu_e(h',h'') V(w,h'') \right.$$

$$\left. \left. \left. +\lambda \sum_{h''} \mu_l(h',h'') V_b(wh',h'') \right] , V_b(I,h') \right\} dF(w) \right) \Bigg] \Bigg\}$$

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If unemployed, choose how much to search and pay the price...

Bellman-II: Unemployed Worker

$$V_b(I,h) = \max_s \{-c(s)$$

$$+(1-\tau)b(I) + (1-\alpha)\beta \sum_k \mu_u(h,h')$$

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$$\left.\left.\left.\left. +\lambda \sum_{h''} \mu_l(h',h'') V_b(wh',h'') \right] , V_b(I,h') \right\} dF(w) \right) \right] \Bigg\}$$

...get unemployment benefits, and if live, human capital decays...

Bellman-II: Unemployed Worker

$$V_b(l,h) = \max_s \{-c(s)$$
$$+(1-\tau)b(l) + (1-\alpha)\beta \sum_k \mu_u(h,h')$$
$$\times \left[[1-\pi(s)]\, V_b(l,h') + \pi(s) \left(\int_{w \geq l_g(l)/h'} V(w,h') dF(w) \right.\right.$$
$$+ \int_{w < l_g(l)/h'} \max_{accept,reject} \{(1-\tau)wh'$$
$$+(1-\alpha)\beta \left[(1-\lambda) \sum_{h''} \mu_e(h',h'') V(w,h'') \right.$$
$$\left.\left.\left.\left. +\lambda \sum_{h''} \mu_l(h',h'') V_b(wh',h'') \right] , V_b(l,h') \right\} dF(w) \right) \right] \}$$

Could get no offer, or could get great offer, or could get okay offer, in which case...

Bellman-II: Unemployed Worker

$$V_b(I,h) = \max_s \{-c(s)$$
$$+(1-\tau)b(I) + (1-\alpha)\beta \sum_k \mu_u(h,h')$$
$$\times \left[[1-\pi(s)]\, V_b(I,h') + \pi(s) \left(\int_{w \geq I_g(I)/h'} V(w,h') dF(w) \right. \right.$$
$$+ \int_{w < I_g(I)/h'} \max_{accept,reject} \left\{ (1-\tau) w h' \right.$$
$$+(1-\alpha)\beta \left[(1-\lambda) \sum_{h''} \mu_e(h',h'') V(w,h'') \right.$$
$$\left. \left. \left. +\lambda \sum_{h''} \mu_l(h',h'') V_b(wh',h'') \right] , V_b(I,h') \right\} dF(w) \left. \right) \left. \right] \left. \right\}$$

For "okay" offer, if we accept, get wages, if don't die, could be fired again, go on UI (new wages), or could stay. If reject keep UI

Bellman-III: unemployed with no UI

$$V_0(h) = \max_s \left\{ -c(s) + (1-\alpha)\beta \sum_{h'} \mu_u(h,h') \right.$$
$$\left. \times \left\{ [1-\pi(s)]\, V_0(h') + \pi(s) \int V(w,h') dF(w) \right\} \right\}$$

Bellman-III: unemployed with no UI

$$V_0(h) = \max_s \left\{ -c(s) + (1-\alpha)\beta \sum_{h'} \mu_u(h,h') \right.$$

$$\left. \times \left\{ [1-\pi(s)]\, V_0(h') + \pi(s) \int V(w,h') dF(w) \right\} \right\}$$

If unemployed, choose how hard to search, and if live, skills decay, and may not get offer, and may get offer.

- Period is 2 weeks long.
- $\beta = 0.9985$, interest rate of 4%.
- Probability of dying: $\alpha = 0.0009$, or 42.7 years of life.
- Probability laid off: $\lambda = 0.009$, or 4.3 years for a job.
- Calibration: need skill distribution μ, β, F, α, λ, c, $\pi(s)$, $b(I)$, $I_g(I)$.
- Break up skill distribution into 21 parts from 1-2 (skilled make double unskilled).
- 10% chance of increasing skill if work, otherwise stay same.
- 20% chance of decreasing skill if no work, otherwise stay same.
- $c(s) = 0.5s$
- $\pi(s) = s^{0.3}$.
- $F(w) \sim \mathcal{N}(0.5, 0.1)$ (truncated, normalized).

Steady States

TABLE 4

STEADY-STATE VALUES FOR THE WELFARE STATE ECONOMY AND THE LAISSEZ-FAIRE ECONOMY

	Welfare State Economy	Laissez-Faire Economy
GNP per capita*	1.542	1.555
Average productivity of employed*	1.657	1.659
Average wage of employed	.879	.878
Average skill level in the population	1.876	1.880
Unemployment rate (%)	6.95	6.28
Average duration of unemployment (weeks)	13.3	11.8
Percentage of unemployed at a point in time with spells so far ≥ 6 months	12.6	9.8
Percentage of unemployed at a point in time with spells so far ≥ 12 months	1.3	.7
Discounted expected net consumption of a newborn worker†	577.2	580.2

* GNP and average productivity are computed for the 2-week period.
† The discounted stream of consumption is net of disutility of searching.

Optimal Reservation Wages

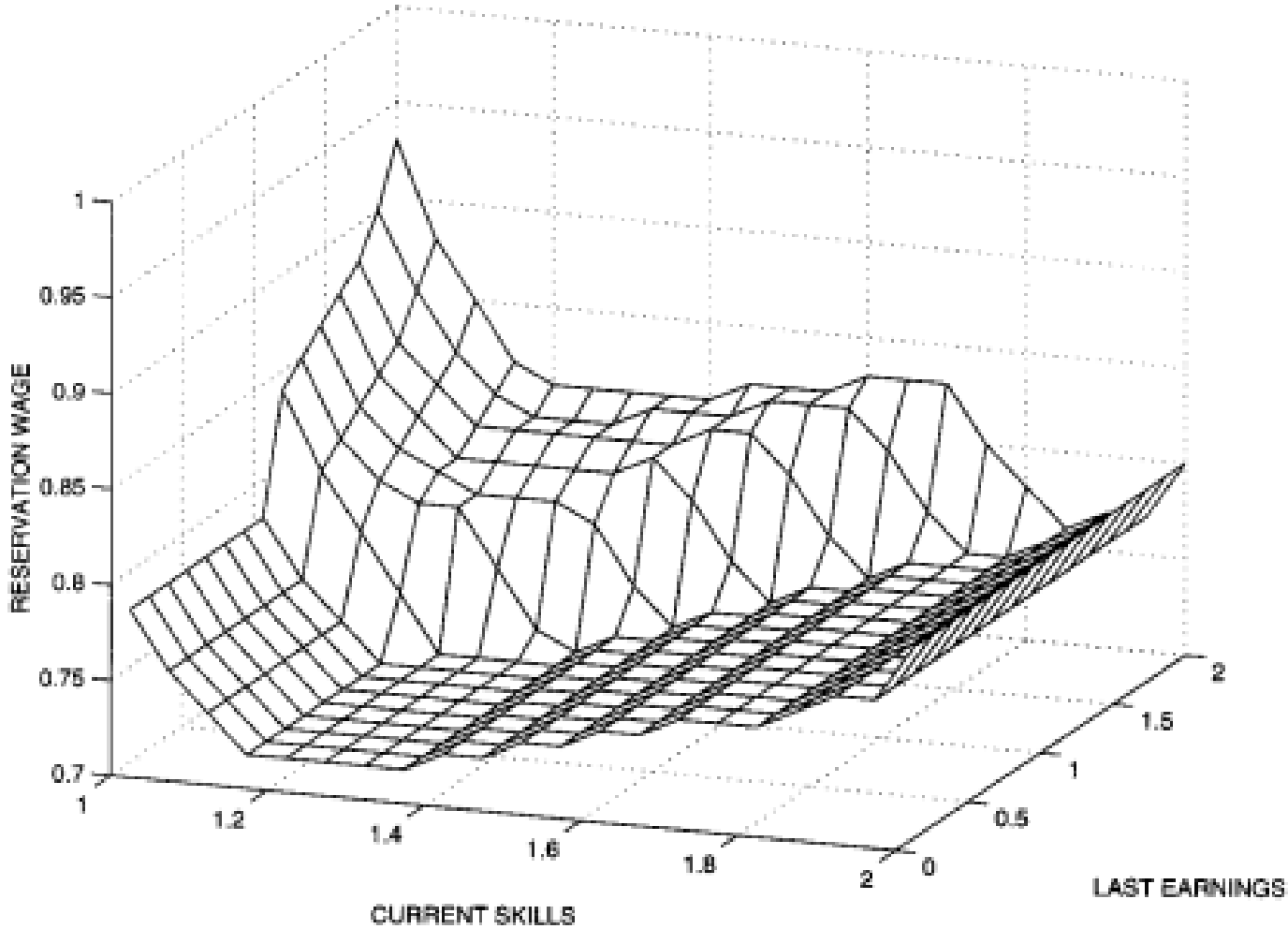

Fig. 4.—Reservation wages in the welfare state economy of unemployed workers with unemployment compensation. The reservation wages are drawn as a function of the unemployed workers' current skills and their last earnings before being laid off.

Optimal Search Intensities

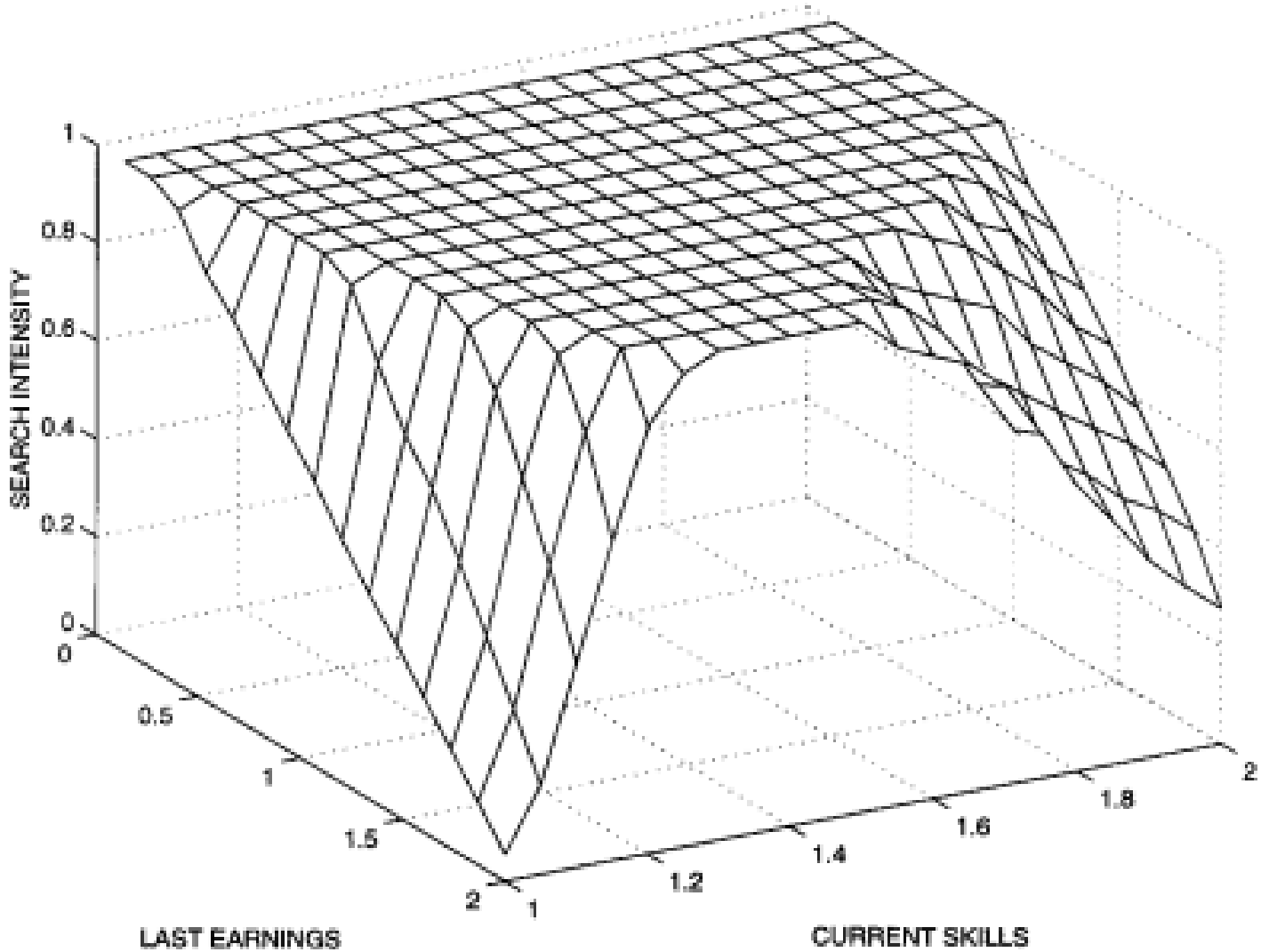

FIG. 5.—Search intensities in the welfare state economy of unemployed workers with unemployment compensation. The search intensities are drawn as a function of the unemployed's current skills and their last earnings before being laid off.

With No Benefits, Reservation Wages are Similar

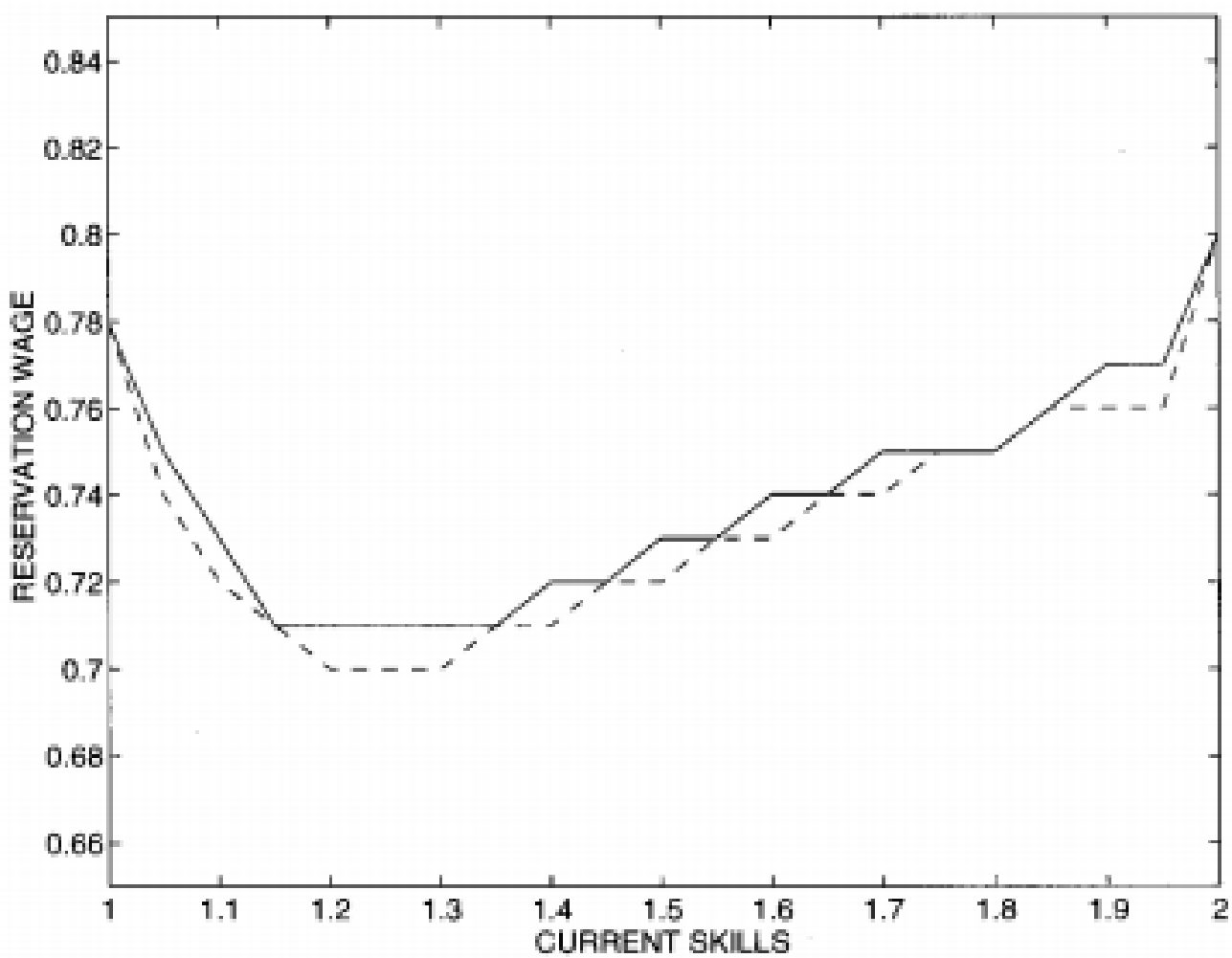

Fig. 6.—Reservation wages of unemployed workers without benefits drawn as a function of their current skills. The solid line describes the welfare state economy and the dashed line refers to the laissez-faire economy.

Why a U-shape?

Hazard Rates

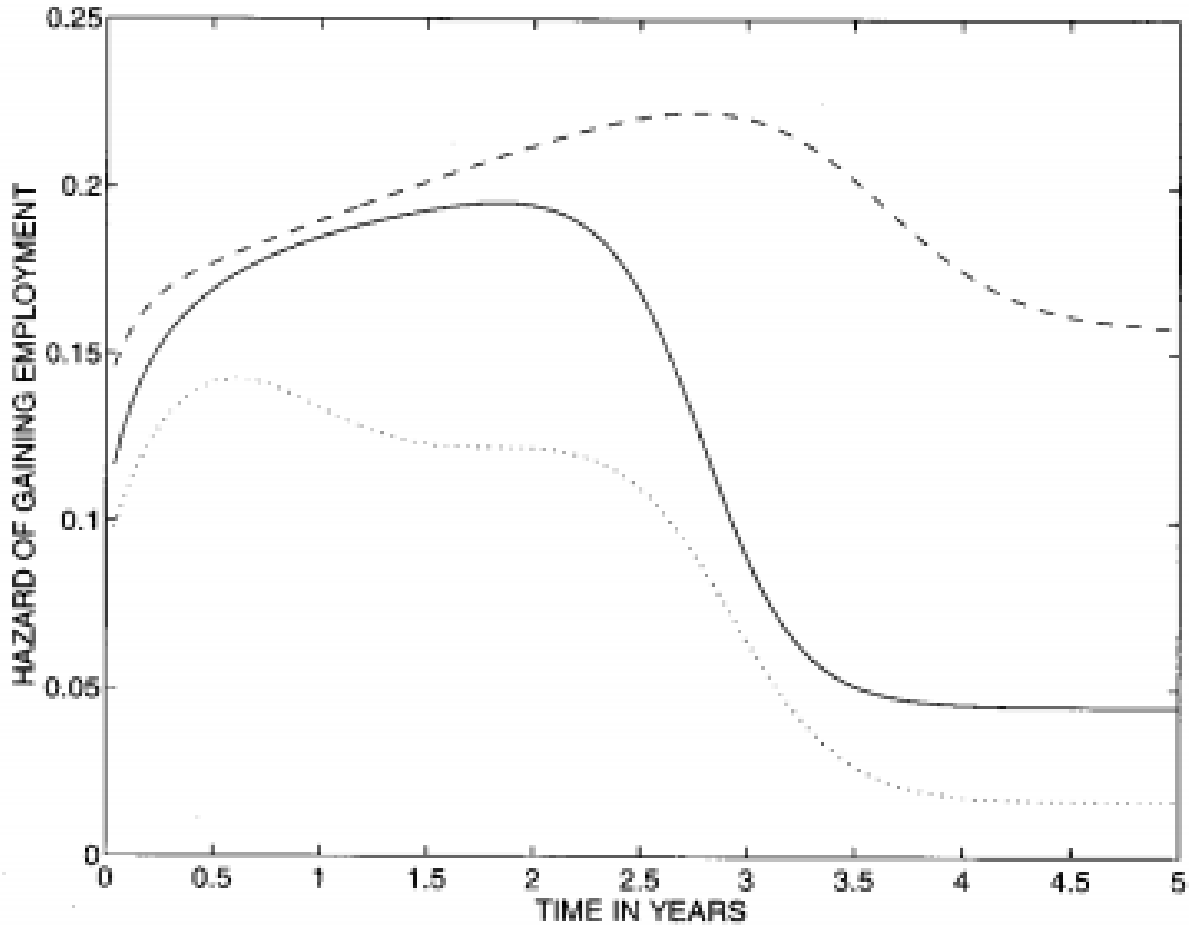

Fig. 7.—The hazard of gaining employment as a function of the length of the unemployment spell, given an initial skill level equal to the highest one. The curves show the fraction of still-unemployed workers who gain employment in any given 2-week period after the layoff. The dashed line pertains to the laissez-faire economy; the solid and dotted lines refer to the welfare state economy, with the workers' last earnings belonging to the third-highest earnings class and the highest earnings class, respectively.

Experiment

- What if we entered turbulent times?
  - Suddenly fire a bunch of people (raise the fires rate)
  - Those fired lose all skills.
  - Then back to normal.
- Steady states are similar: responses to shocks are not.
- Prolonged unemployment in a welfare state: skills depreciate.
- Unemployment benefits are indexed to previous wage level.
- When shock comes that makes you obsolete, unemployment far more generous.

Hazard Rates

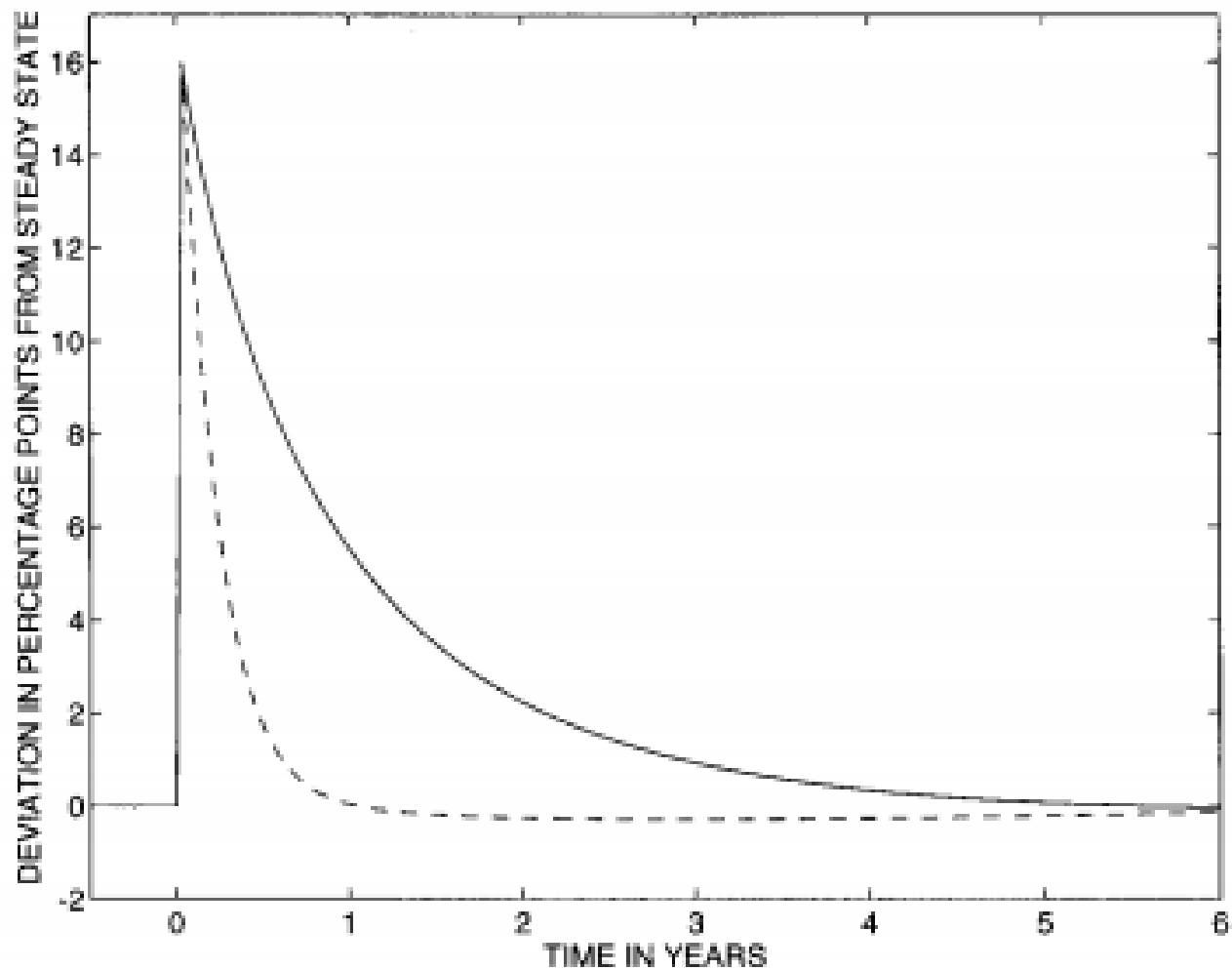

FIG. 8.—Response of unemployment. The solid line describes the welfare state economy and the dashed line refers to the laissez-faire economy.

Productivity

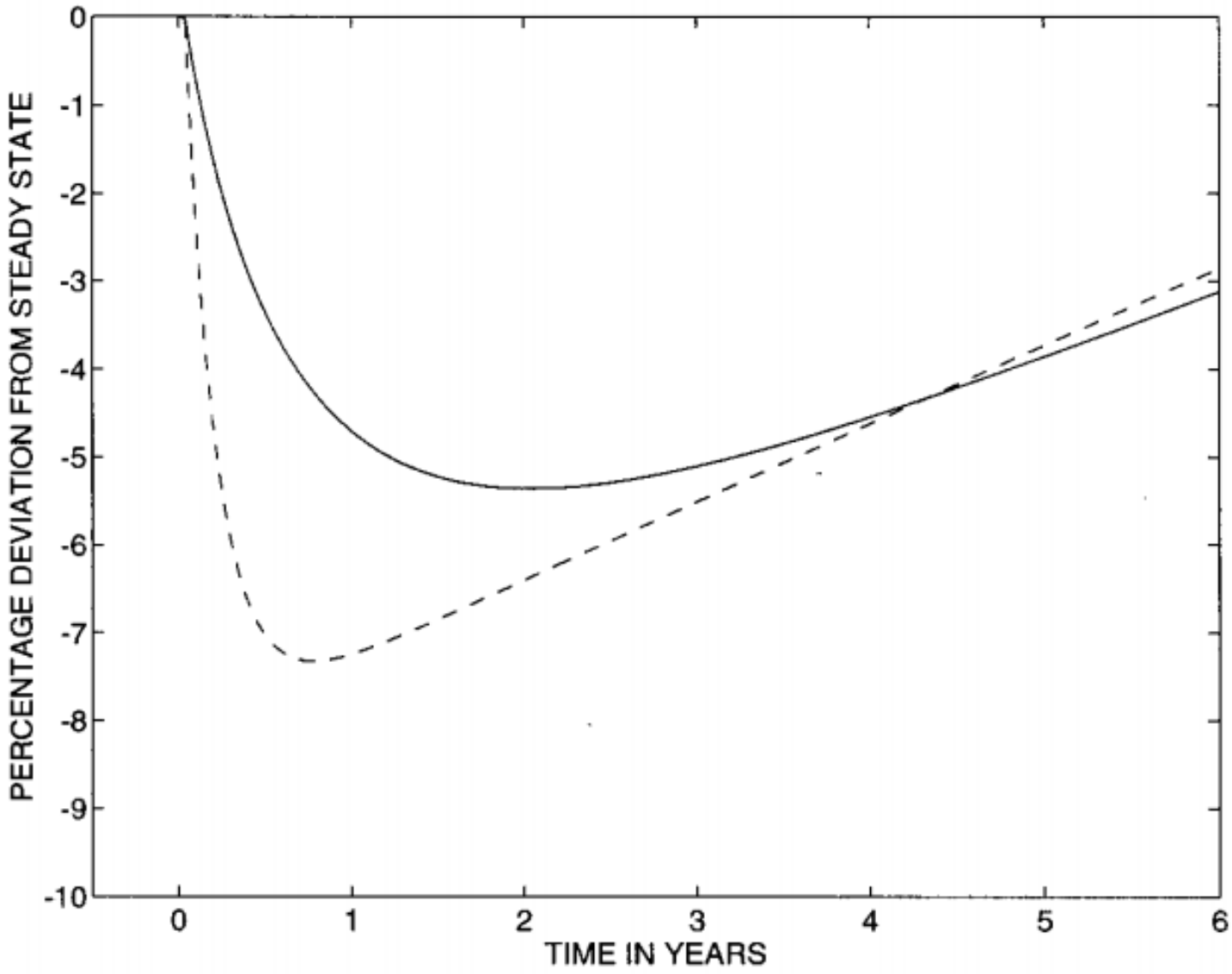

Fig. 11.—Response of average productivity of employed workers. The solid line

Replicating Jacobson et al. (1993)

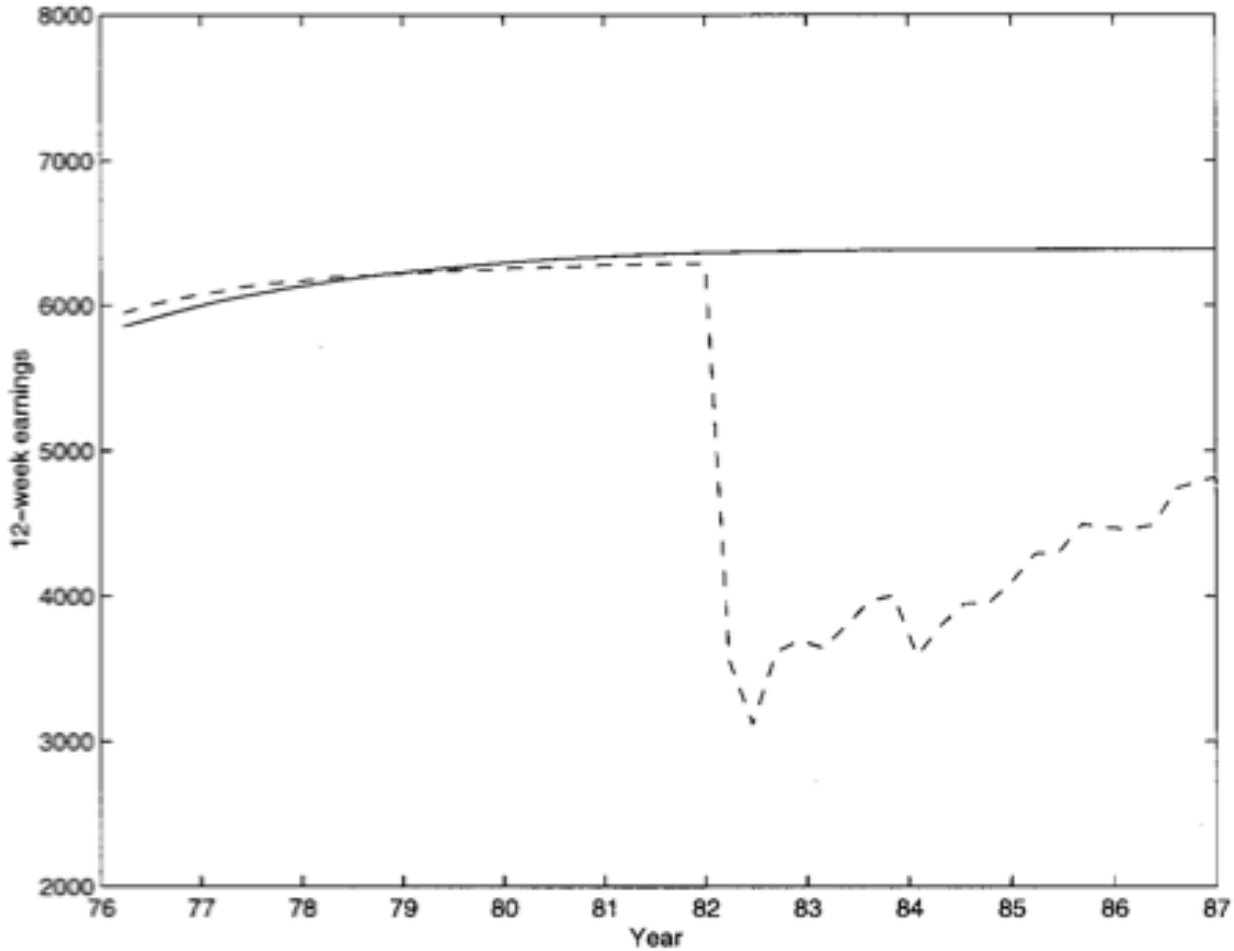

Fig. 15.—12-week earnings of high-attachment workers separating in the first 12-week period of 1982 with skill losses exceeding 40 percent and workers staying through 1986. The solid line refers to stayers and the dashed line to separators. The simulations are based on the laissez-faire economy with economic turbulence indexed by variance .04. (The earnings figures are multiplied by a factor of 600 to facilitate comparison with fig. 3.)

TABLE 5

STEADY-STATE VALUES FOR THE WELFARE STATE ECONOMY AND THE LAISSEZ-FAIRE ECONOMY WITH DIFFERENT DEGREES OF ECONOMIC TURBULENCE

	DEGREE OF ECONOMIC TURBULENCE*			
	0	.02	.03	.04
Tax rate (%): Welfare state	2.85	3.88	5.66	11.69
Average productivity of employed:†				
Welfare state	1.657	1.562	1.531	1.507
Laissez-faire	1.659	1.552	1.520	1.496
Unemployment rate (%):				
Welfare state	6.95	7.13	8.84	14.87
Laissez-faire	6.28	5.81	5.77	5.73
Average duration of unemployment (weeks):				
Welfare state	13.3	13.7	17.5	31.8
Laissez-faire	11.8	10.6	10.6	10.7
Percentage of unemployed at a point in time with spells so far ≥ 6 months:				
Welfare state	12.6	18.2	34.9	63.1
Laissez-faire	9.8	8.2	8.3	8.5
Percentage of unemployed at a point in time with spells so far ≥ 12 months:				
Welfare state	1.3	5.8	23.5	55.6
Laissez-faire	.7	.6	.6	.6
Discounted expected net consumption of a newborn worker:‡				
Welfare state	577.2	544.4	525.6	486.1
Laissez-faire	580.2	549.6	540.3	533.5

* The degree of economic turbulence is indexed by the variance used to compute the distribution of skill losses at layoffs.

† Average productivity is computed for the 2-week period.

‡ The discounted stream of consumption is net of disutility of searching.

Criticisms

- Infinitely-lived UI
- Perfect monitoring (Pavoni 2005)
- No on-the-job search
- Firing, hiring independent of age, tenure, skill (Rothstein 2011)
- Homogeneity in baseline type.
- No utility, savings.
- No anticipation of firing (Gallen 2013)
- Rising evidence that liquidity matters (Chetty 2008).