THE CYCLICAL BEHAVIOR OF EQUILIBRIUM UNEMPLOYMENT AND VACANCIES - ROBERT SHIMER

Present by Rongjin Zhang

Oct 28, 2025

LINKAGE TO UNEMPLOYMENT COURSE

- Unemployment rate is counter-cyclical, and vacancy rate is pro-cyclical
- Job finding rate
$$f(\theta) = \frac{m(U,V)}{U} = m(1,\theta)$$
where $\theta \equiv v/u$ is the v-u ratio
- The probability of entering employment f_t, this is almost exactly offset by the increase in unemployment u_t
$$u_t^s = s_t e_t (1 - \frac{1}{2} f_t)$$
$$s_t = \frac{u_{t+1}^s}{e_t(1 - \frac{1}{2} f_t)}$$
- Bargained wages cannot generate realistic fluctuations

MAIN IDEA

This paper demonstrates how the standard matching model cannot generate realistic fluctuations by performing simple analytical comparative statics and calibrating the stochastic model to match U.S. data, taking into account labor productivity and separation shocks.

MAIN FINDING

- The standard model fails to capture the cyclical patterns of unemployment and vacancies.
- The main reason for the low volatility of unemployment and vacancies in response to shocks lies in the Nash-bargaining wage mechanism.
- Introducing wage rigidity into the matching model can better replicate the observed vacancy–unemployment (v–u) fluctuations.

COMPARATIVE STATISTIC

Solve the equilibrium of a stochastic version of the Pissarides (1985) analytically:

$$\frac{r+s}{q(\theta_{p,s})} + \beta\theta_{p,s} = (1-\beta)\frac{p-z}{c}$$

The elasticity of the v-u ratio θ with respect to "net labor productivity" $p-z$ is:

$$\frac{r+s+\beta f(\theta_{p,s})}{(r+s)(1-\eta(\theta_{p,s}))+\beta f(\theta_{p,s})}$$

where $\eta(\theta) \in [0,1]$ is the elasticity of $f(\theta)$

COMPARATIVE STATISTIC

The elasticity of the v-u ratio θ with respect to separation rate is:

$$\frac{-s}{(r+s)(1-\eta(\theta_{p,s}))+\beta f(\theta_{p,s})}$$

where $\eta(\theta) \in [0,1]$ is the elasticity of $f(\theta)$

Behavior o vacancies and unemployment at steady state:

$$v_{p,s} = (\frac{s(1-u_{p,s})}{\mu u_{p,s}^{\alpha}})^{1/(1-\alpha)}$$

where $m(u,v) = \mu u^{\alpha} v^{1-\alpha}$

EMPIRICAL DATA

TABLE 1—SUMMARY STATISTICS, QUARTERLY U.S. DATA, 1951–2003

		u	v	v/u	f	s	p
Standard deviation		0.190	0.202	0.382	0.118	0.075	0.020
Quarterly autocorrelation		0.936	0.940	0.941	0.908	0.733	0.878
	u	1	−0.894	−0.971	−0.949	0.709	−0.408
	v	—	1	0.975	0.897	−0.684	0.364
Correlation matrix	v/u	—	—	1	0.948	−0.715	0.396
	f	—	—	—	1	−0.574	0.396
	s	—	—	—	—	1	−0.524
	p	—	—	—	—	—	1

CALIBRATION RESULTS

Table 3—Labor Productivity Shocks

		u	v	v/u	f	p
Standard deviation		0.009	0.027	0.035	0.010	0.020
		(0.001)	(0.004)	(0.005)	(0.001)	(0.003)
Quarterly autocorrelation		0.939	0.835	0.878	0.878	0.878
		(0.018)	(0.045)	(0.035)	(0.035)	(0.035)
	u	1	−0.927	−0.958	−0.958	−0.958
			(0.020)	(0.012)	(0.012)	(0.012)
	v	—	1	0.996	0.996	0.995
				(0.001)	(0.001)	(0.001)
Correlation matrix	v/u	—	—	1	1.000	0.999
					(0.000)	(0.001)
	f	—	—	—	1	0.999
						(0.001)
	p	—	—	—	—	1

Notes: Results from simulating the model with stochastic labor productivity. All variables are reported in logs as deviations from an HP trend with smoothing parameter 10^5. Bootstrapped standard errors—the standard deviation across 10,000 model simulations—are reported in parentheses. The text provides details on the stochastic process for productivity.

CALIBRATION RESULTS

TABLE 4—SEPARATION RATE SHOCKS

		u	v	v/u	f	s
Standard deviation		0.065	0.059	0.006	0.002	0.075
		(0.007)	(0.006)	(0.001)	(0.000)	(0.007)
Quarterly autocorrelation		0.864	0.862	0.732	0.732	0.733
		(0.026)	(0.026)	(0.048)	(0.048)	(0.048)
	u	1	0.999	−0.906	−0.906	0.908
			(0.000)	(0.017)	(0.017)	(0.017)
	v	—	1	−0.887	−0.887	0.888
				(0.020)	(0.020)	(0.021)
Correlation matrix	v/u	—	—	1	1.000	−0.999
					(0.000)	(0.000)
	f	—	—	—	1	−0.999
						(0.000)
	s	—	—	—	—	1

Notes: Results from simulating the model with a stochastic separation rate. All variables are reported in logs as deviations from an HP trend with smoothing parameter 10^5. Bootstrapped standard errors—the standard deviation across 10,000 model simulations—are reported in parentheses. The text provides details on the stochastic process for the separation rate.

CALIBRATION RESULTS

$$w_{p,s} = (1 - \beta)z + \beta(p + c\theta_{p,s})$$

Table 6—Bargaining Power Shocks

		u	v	v/u	f	w
Standard deviation		0.091	0.294	0.379	0.106	0.011
		(0.018)	(0.086)	(0.099)	(0.028)	(0.015)
Quarterly autocorrelation		0.940	0.837	0.878	0.878	0.864
		(0.023)	(0.046)	(0.036)	(0.036)	(0.047)
	u	1	−0.915	−0.949	−0.949	0.818
			(0.045)	(0.032)	(0.032)	(0.112)
	v	—	1	0.995	0.995	−0.827
				(0.001)	(0.001)	(0.128)
Correlation matrix	v/u	—	—	1	1.000	−0.838
					(0.000)	(0.124)
	f	—	—	—	1	−0.838
						(0.124)
	w	—	—	—	—	1

Notes: Results from simulating the model with stochastic bargaining power. All variables are reported in logs as deviations from an HP trend with smoothing parameter 10^5. Bootstrapped standard errors—the standard deviation across 10,000 model simulations—are reported in parentheses. The text provides details on the stochastic process for the workers' bargaining power.

POSITION

1. Abraham and Katz (1986) argue that unemployment is driven by fluctuations in productivity shocks; however, they do not examine the implicit magnitude of shocks required to reproduce the observed shifts along the Beveridge curve.
2. Another strand of research focuses on time variation in the separation rate but does not address the cyclical pattern of the v–u ratio
3. Mortensen and Pissarides (1994) confirm that large productivity shocks should generate a large v–u ratio (three times as high in a good state as in a bad state), yet their model still produces a low v–u correlation of –0.26 compared to the empirical value of –0.88.
4. Hall (2005) proposes that the solution may hinge on the determination of real wages, which should remain largely unchanged over the business cycle.

CONCLUSION

A searching and matching model with Nash-bargained wage cannot generate substantial movements along Beveridge curve in response to shocks.

- Wage affects turnover rate i.g. higher wage to attract workers, so less quits; a shift in productivity distribution will not affect average productivity but affect average wages, therefore, the equilibrium v-u ratio.
- Informational assumption: match-specific productivity distribution is known by both firm and workers. Workers faces the tradeoff of demanding a high wage or reducing the risk of unemployment, so the wages depend on the hazard rate of productivity distribution.