Topics for Today

1.) Comparative Statics in M.P Model
   - productivity shocks
   - separation rate shocks

2.) Welfare Properties of the MP. Model
   - Hosios Condition

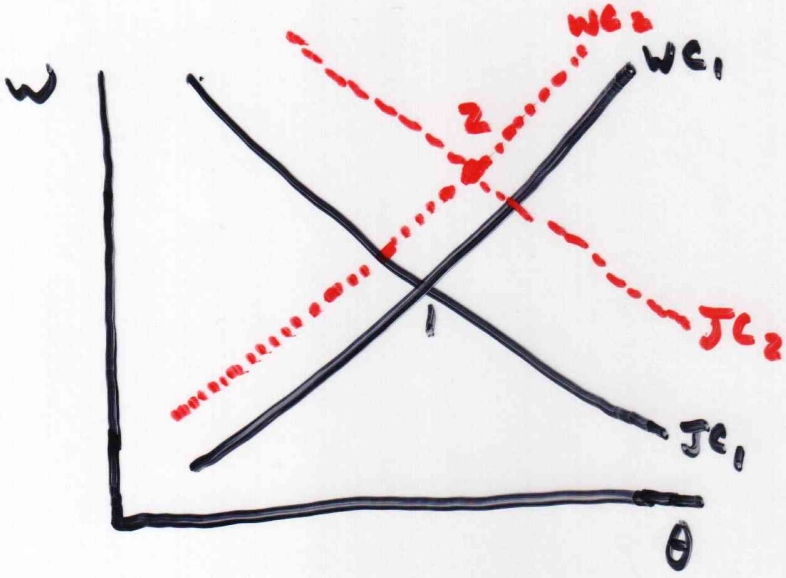
3.) Empirical Evaluation of M.P Model
   - Shimer (2005)
   - Hornstein, Krusell & Violante (2005)

Comparative Statics in M·P Model

(1.) Increase in Productivity, $y \uparrow$

a.) Job Creation line shifts up

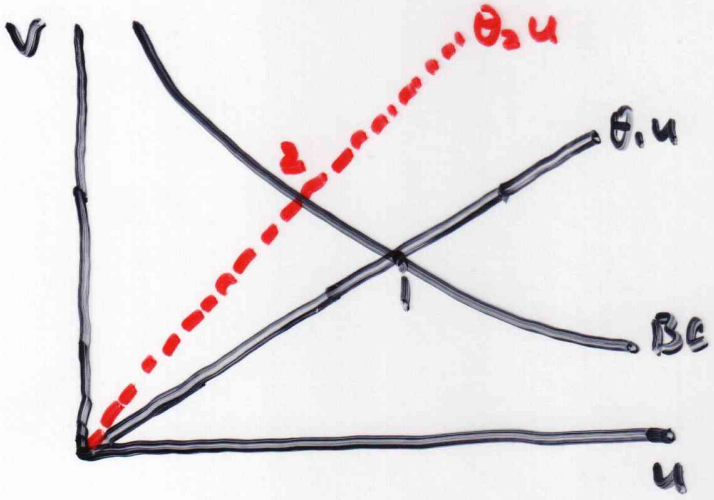
b.) Wage Curve shifts up



$y \uparrow \Rightarrow$ Profits $\uparrow$ (since wages don't rise 1-for-1).

$\Rightarrow$ Firms create more vacancies

$\Rightarrow \theta \uparrow$ until profits go back down



$u \downarrow$, $v \uparrow$

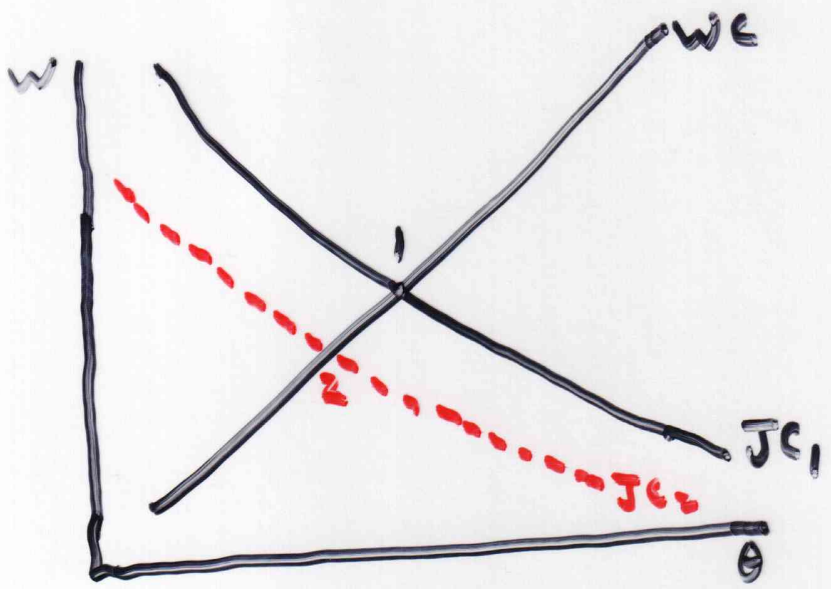
Note: This is not consistent with long-run, balanced-growth considerations. As is, model predicts steadily rising y accompanied by steadily falling u. In long-run, wages must fully absorb persistent increase in y. One idea - let z depend positively on w.

(2.) Increase in Separation Rate, $s\uparrow$

a.) Job creation Curve shifts down

b.) Beveridge Curve shifts out

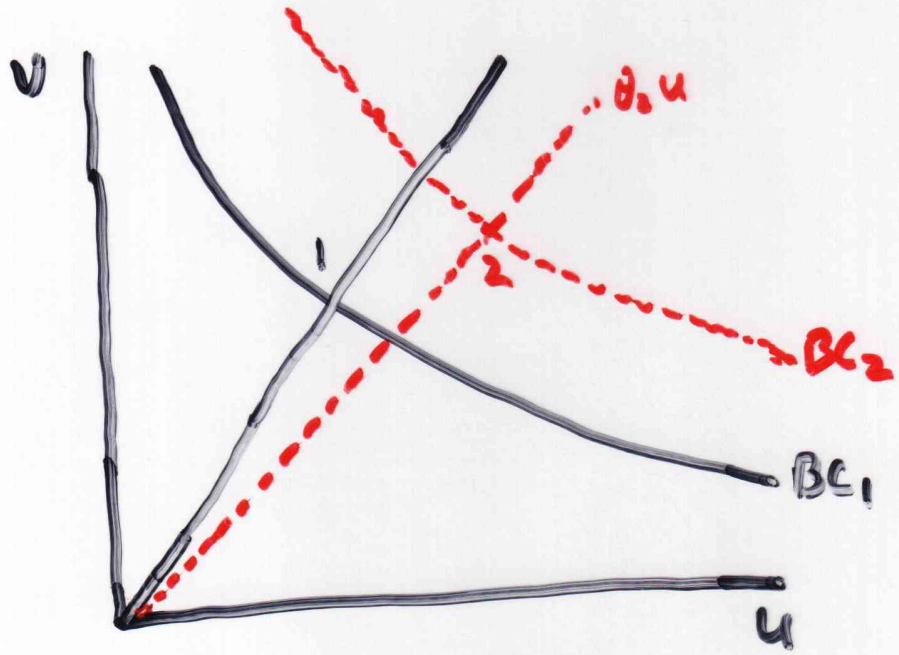
c.) θu line rotates clockwise



$s\uparrow \Rightarrow$ Profits $\downarrow$ (since wages fall less than increase in search costs)

$\Rightarrow$ Firms create fewer vacancies

$\Rightarrow$ $\theta\downarrow$ until profits go back up



$u\uparrow$ unambiguously

$v\uparrow$ as long as workers' bargaining power not too low

Welfare Properties of the M·P Model

- An important aspect of the M·P model is that it features congestion externalities. When a firm creates a vacancy, it doesn't consider the fact that it's making it harder for other firms to hire, and easier for workers to find a job. Likewise, a searching worker doesn't consider the fact that he's making it harder for other workers to find jobs, and easier for firms to hire.

- As we shall see, an important reason for this is the ex post nature of Nash Bargaining. If firms can post wages in advance, some firms might be willing to offer high wages in return for a lower search cost. At the same time, workers might be willing to look for a long time in exchange for a high paying job.

- With Nash Bargaining, there is no guarantee that the M-P equilibrium is efficient. It will only be efficient if the workers' bargaining power is related in a particular way to the parameters of the matching function. This condition is called Hosios Condition.

Hosios Condition

- Let's put ourselves in the shoes of the social planner, and choose an allocation that maximizes the discounted value of output + leisure, net of vacancy costs.

- Letting n_t = measure of employed workers, and
  v_t : measure of vacancies

we have the following Lagrangian (note, due to the law of large numbers, this is a deterministic problem).

$$\max_{v_t,\, n_{t+1}} \sum_{t=0}^{\infty} \beta^t \left[y n_t + z(1-n_t) - c v_t \right] + \lambda_t \left[(1-s) n_t + q\left(\frac{v_t}{1-n_t}\right) v_t - n_{t+1} \right]$$

FOCs:

(1) $$-\beta^t c + \lambda_t \left[q'(\theta_t)\theta_t + q(\theta_t) \right] = 0 \qquad > v_t$$

(2) $$-\lambda_t + \beta^{t+1}(y-z) + \lambda_{t+1}\left[(1-s) + q'(\theta_{t+1})\theta_{t+1}^2 \right] = 0 \qquad > n_{t+1}$$

Solve (1) for λ & sub into (2), then assume steady state

$$y - z = \frac{r + s + \alpha\theta q(\theta)}{(1-\alpha) q(\theta)} c$$

$$\alpha = -\frac{q' \theta}{q}$$

Next, go back to M-P model, subtract wc from JC

$$y - z = \frac{r + s + \phi\theta q(\theta)}{(1-\phi) q} c$$

$\Rightarrow$ **Equil. = Optimal iff $\phi = \alpha$** } Hosios Condition

$\phi > \alpha$: Workers bargaining power too high
Equil. job supply too low

$\phi < \alpha$: Workers bargaining power too low
Equil. job supply too high

Intuition: $\alpha = -\frac{q'}{q}\theta$ = elast. of prob. of filling a vacancy w.r.t. θ

High α $\Rightarrow$ additional vacancies have large negative externalities

$\Rightarrow$ want to discourage vacancies by giving workers more bargaining power.

Summary Statistics, quarterly U.S. data, 1951 to 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
Correlation Matrix	u	1	−0.894	−0.971	−0.949	0.709	−0.408
	v	—	1	0.975	0.897	−0.684	0.364
	v/u	—	—	1	0.948	−0.715	0.396
	f	—	—	—	1	−0.574	0.396
	s	—	—	—	—	1	−0.524
	p	—	—	—	—	—	1

Table 1: Seasonally adjusted unemployment u is constructed by the BLS from the Current Population Survey (CPS). The seasonally adjusted help-wanted advertising index v is constructed by the Conference Board. The job finding rate f and separation rate s are constructed from seasonally adjusted employment, unemployment, and mean unemployment duration, all computed by the BLS from the CPS, as explained in equations (1) and (2). u, v, f, and s are quarterly averages of monthly series. Average labor productivity p is seasonally adjusted real average output per person in the non-farm business sector, constructed by the Bureau of Labor Statistics (BLS) from the National Income and Product Accounts and the Current Employment Statistics. All variables are reported in logs as deviations from an HP trend with smoothing parameter 10^5.

Quarterly U.S. Unemployment, in millions, and Trend, 1951–2003

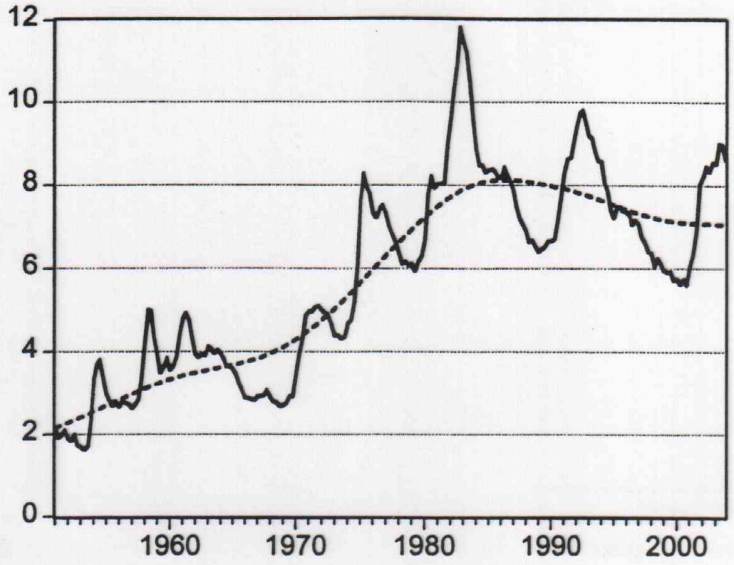


Figure 1: Unemployment is a quarterly average of the seasonally adjusted monthly series constructed by the BLS from the CPS, survey home page `http://www.bls.gov/cps/`. The trend is an HP filter of the quarterly data with smoothing parameter 10^5.

Quarterly U.S. Help Wanted Advertising Index and Trend, 1951–2003

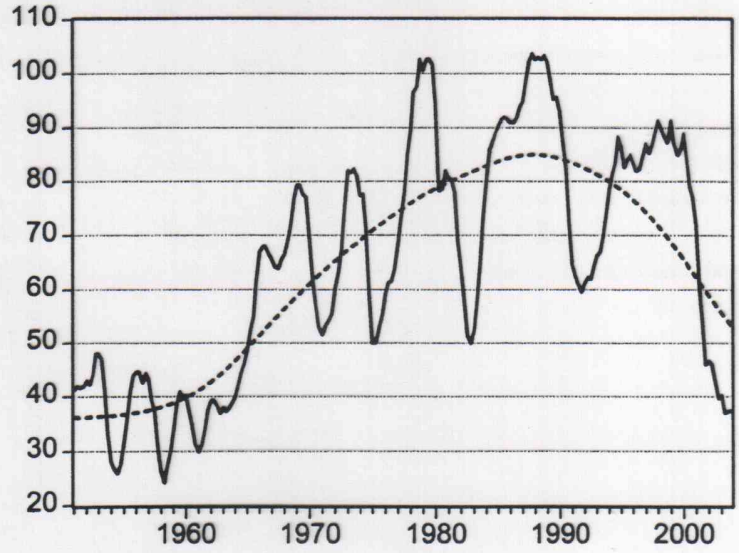


Figure 3: The help-wanted advertising index is a quarterly average of the seasonally adjusted monthly series constructed by the Conference Board with normalization 1987 = 100. The data were downloaded from the Federal Reserve Bank of St. Louis database at `http://research.stlouisfed.org/fred2/data/helpwant.txt`. The trend is an HP filter of the quarterly data with smoothing parameter 10^5.

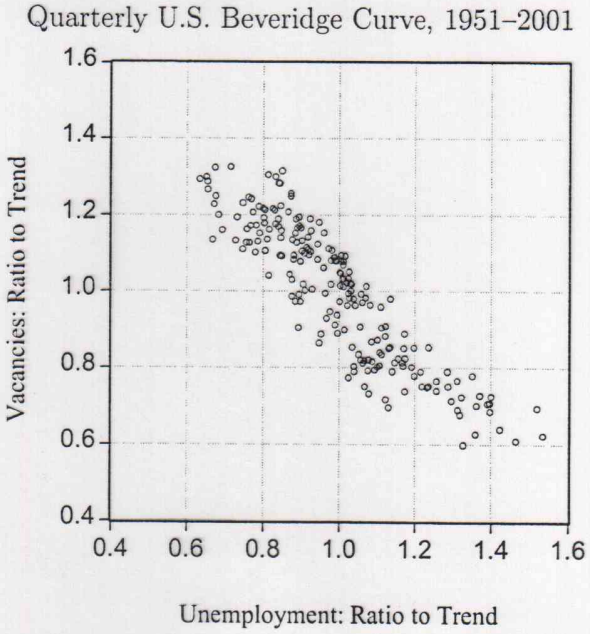


Figure 3: The unemployment rate is constructed by the Bureau of Labor Statistics (BLS) from the Current Population Survey. The help-wanted advertising index is constructed by the Conference Board. Both are quarterly averages of seasonally adjusted monthly series and are expressed as ratios to an HP filter with smoothing parameter 10^5.

Quarterly U.S. Vacancy-Unemployment Ratio and Average Labor Productivity, 1951–2003

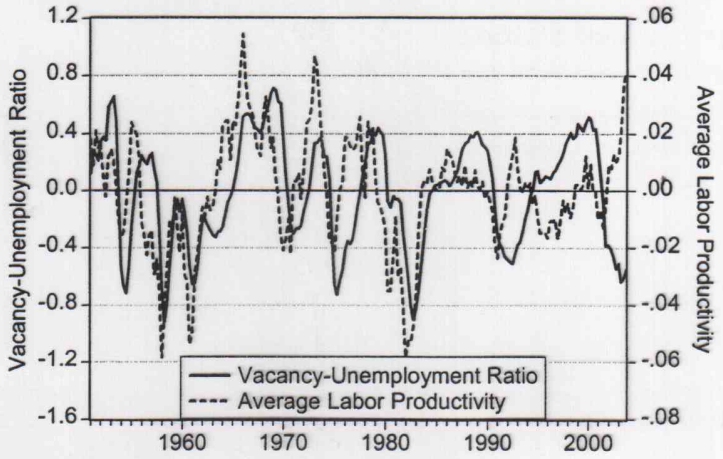


Figure 9: Unemployment is constructed by the BLS from the CPS. The help-wanted advertising index is constructed by the Conference Board. Both are quarterly averages of seasonally adjusted monthly series. Labor productivity is real average output per worker in the non-farm business sector, constructed by the BLS Major Sector Productivity and Costs program. The v-u ratio and labor productivity are expressed as deviations from an HP filter with smoothing parameter 10^5.

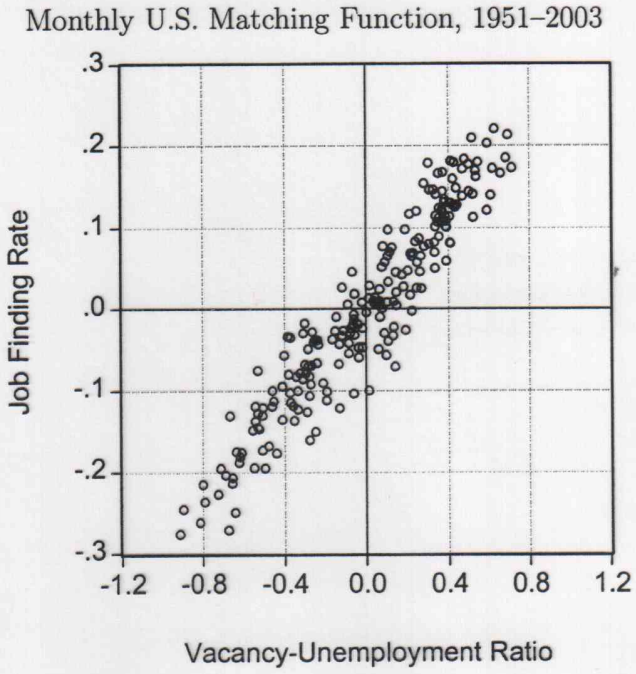


Figure 6: The v-u ratio is constructed by the BLS from the CPS and by the Conference Board. The job finding rate is constructed using equation (1) and BLS data from the CPS. Both are quarterly averages of seasonally adjusted monthly series and are expressed as deviations from an HP filter with smoothing parameter 10^5.

Labor Productivity Shocks

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

Table 3: 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.

Separation Rate Shocks

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

Table 4: 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.

Table 1 Aggregate Statistics: 1951:1–2004:4

	HP Smoothing Parameter: 10^5						
	u	v	θ	λ_w	w	s	p
Standard Deviation	0.20	0.23	0.38	0.12	0.02	0.02	0.02
Autocorrelation	0.94	0.95	0.95	0.91	0.95	0.91	0.89
Correlation with p	−0.40	0.31	0.38	0.38	0.69	−0.35	1.00
	HP Smoothing Parameter: 1600						
	u	v	θ	λ_w	w	s	p
Standard Deviation	0.13	0.14	0.26	NA	0.01	0.01	0.01
Autocorrelation	0.87	0.90	0.89	NA	0.81	0.77	0.76
Correlation with p	−0.29	0.45	0.38	NA	0.72	−0.61	1.000

Notes: Data are quarterly, and u is the unemployment rate of the civilian population; v is the help-wanted advertising index; $\theta = v/u$ is labor market tightness; p is output per employee in the nonfarm business sector; s is the labor share constructed as the ratio of compensation of employees to output in the nonfarm sector; w is the wage computed as labor share times labor productivity, i.e., $w = s \cdot p$. The statistics for the job-finding rate, λ_w, are those reported in Shimer (2005) for an HP smoothing parameter of 10^5.

Table 2 Parameters and Steady States for Calibrations

	Common across Calibrations		
	$r = 0.012, \alpha = 0.72, p = 1,$ $A = 1.35, \lambda = 1.35, \theta = 1, u = 0.07$		
	Specific to Calibrations		
	Shimer	Hagedorn & Manovskii	Hall
β	0.72	0.05	NA
b	0.40	0.95	0.40
w/p	0.98	0.97	0.98
b/w	0.41	0.98	0.41
η_{wp}	1.00	0.50	0.00

Table 3 Steady State Elasticities

Response of to change in	θ			λ_w			u		
	p	b	σ	p	b	σ	p	b	σ
Shimer	1.72	−0.69	−0.07	0.48	−0.19	−0.02	−0.45	0.18	0.95
Hagedorn & Manovskii	23.72	−22.51	−0.08	6.64	−6.30	−0.02	−6.18	5.87	0.95
Hall	81.70	0.00	−8.17	22.88	0.00	−2.29	−21.30	0.00	3.06