The Ins and Outs of Unemployment: A Conditional Analysis

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Motivation

- Conventional wisdom: recessions (high unemployment) begin with layoffs and persist because unemployed can't find jobs.

- Hall (2005) and Shimer (2007): job finding rate fluctuates; job separation rate acyclical.

- Problems:

i) What drives fluctuations in finding rates?

ii) What is the direction of causality? Could movements in separation rates drive fluctuations in finding rates?

iii) Do conclusions hold true for important business cycle shocks?

Contribution

- Analyze the dynamics of unemployment in technology induced recessions (consider investment-neutral and investment-specific shocks).

- Look both the intensive margin (hours per employee) and the extensive margin (number of employed workers) of the labor market.

- Characterize unemployment dynamics in terms of the job separation and the job finding rates.

Results 1

- Investment-neutral technology shocks increase unemployment in the short run and affect labor market variables along the extensive margin.

- Investment-specific technology shocks expand aggregate hours (both hours per worker increase and unemployment falls), but the intensive margin more important.

- Impact response of unemployment is almost entirely due to a jump in the separation rate. Dynamics due to movements in the finding rate.

- Neutral shocks important sources of cyclical fluctuations in unemployment. They explain the recession of the late 80's and the subsequent (jobless) recovery of the early 90's.

Results 2

Results challenge sticky price explanation of technology shock/hours relationship (Galí (1999)).

- When technology improves and monetary policy is not accommodating enough, demand is sluggish to respond and firms take advantage of technology improvements to economize on labor input.

- Naturally applies to the intensive margin - displacing workers is more costly than changing prices.

- Extensive margin plays a key role for neutral shocks. Fall in hours is related to the reallocation of workers across jobs. Consistent with the Schumpeterian creative destruction (see model in Canova, et. al. (2007)).

The empirical model

- Basic specification: $X = (\ \Delta q,\ \ \Delta y_n, h,\ \ u,\ \ s,\ \ f)'$.

- q and GDP scaled by output deflator.

- Identification of shocks: long run restrictions as in Fisher (2006) or Michelacci and Lopez Salido (2007).

- Use a VAR with 8 lags, a constant and a decay restriction.

- f and s: both approximate/exact flow rates as in Shimer (2005).

Problem: low frequency movements

- There is a bias in full sample results because of low frequency comovements

- Taking subsamples is inefficient and probably biased - LR restrictions used on a small sample problematic.

- Subsample dynamics roughly unchanged; VAR constant is affected. Break the constant at 1973:2 and 1997:1.
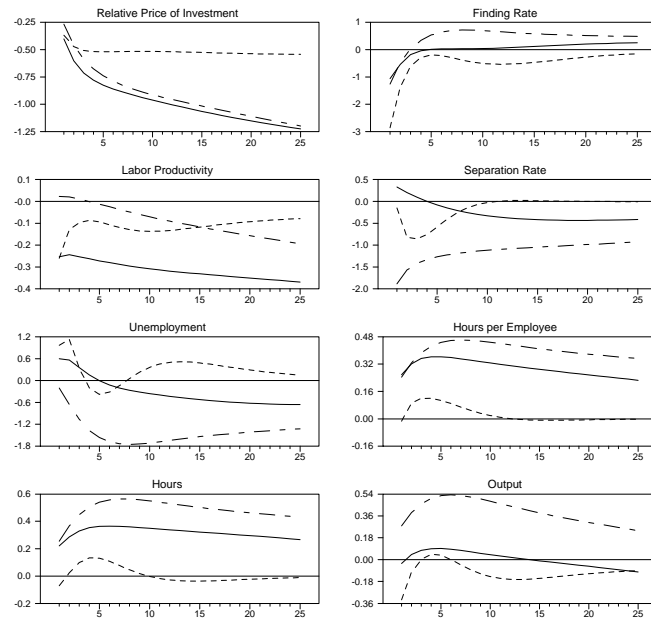
Neutral Shock

55:I-00:IV (continuous), 55:I-73:I (dotted), 73:II-97:I (dash-dotted)
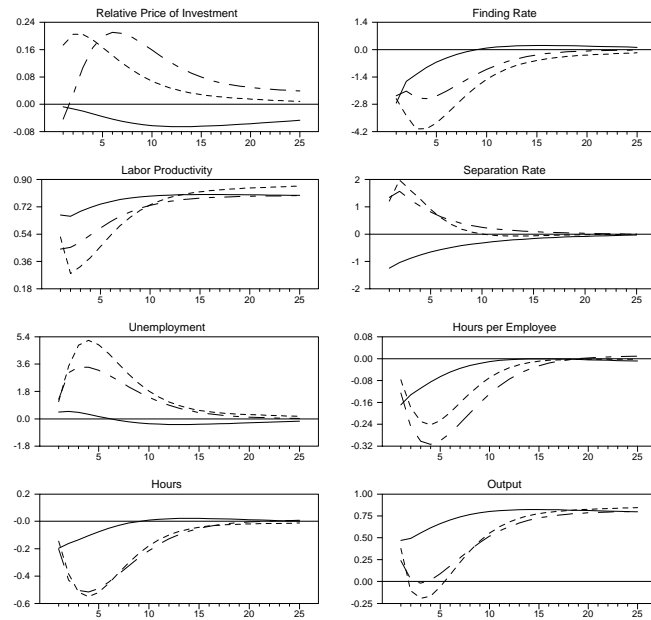
Investment Specific Shock

55:I-00:IV (continuous), 55:I-73:I (dotted), 73:II-97:I (dash-dotted)
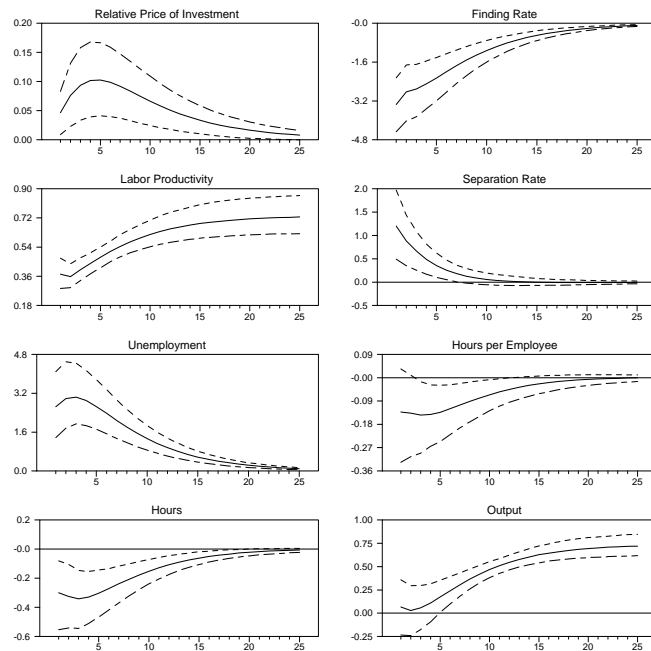

Neutral shock
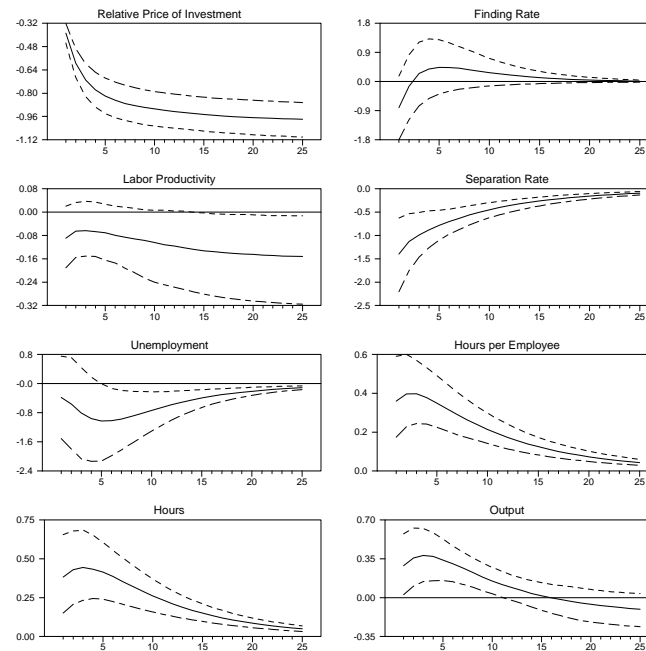
Investment specific shock

Evidence

- (Positive) Neutral shock increases unemployment; hours fall. Change in hours-per-employee small and insignificant.

- Unemployment increases on impact due to the rise in the separation rate and of the fall in the job finding rate. The separation rate returns quickly to normal; the job finding rate takes up to fifteen quarters to recover.

- Output takes about 5 quarters to significantly respond but then gradually increases until it reaches its new higher long-run value.

- Positive investment specific shock increases output and hours per capita; unemployment fall (insignificant).

- The fall of unemployment on impact is due to a drop in the separation rate. This effect is partly compensated by a fall in the job finding rate.

- The increase in hours is due to the sharp and persistent increase in the number of hours-per-employee.

- **Labor market adjustments to neutral technology shocks along the extensive margin; those in response to an investment specific technology shock along the intensive margin.**
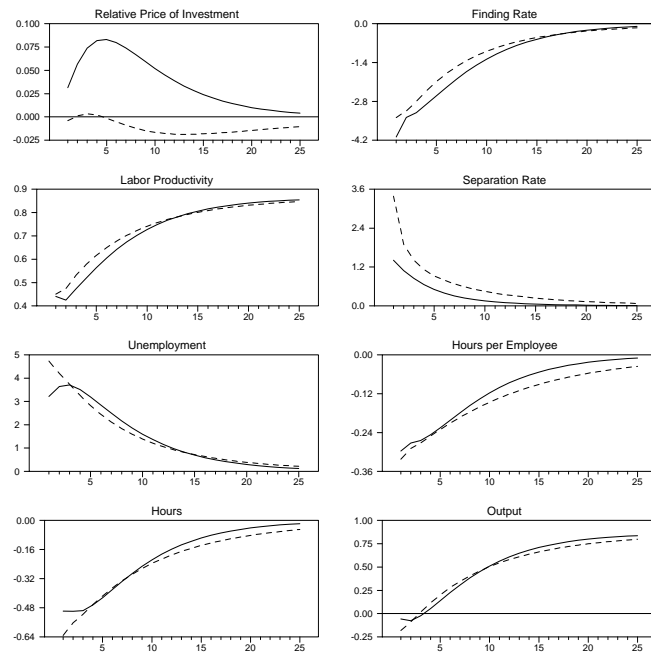
Neutral Shock
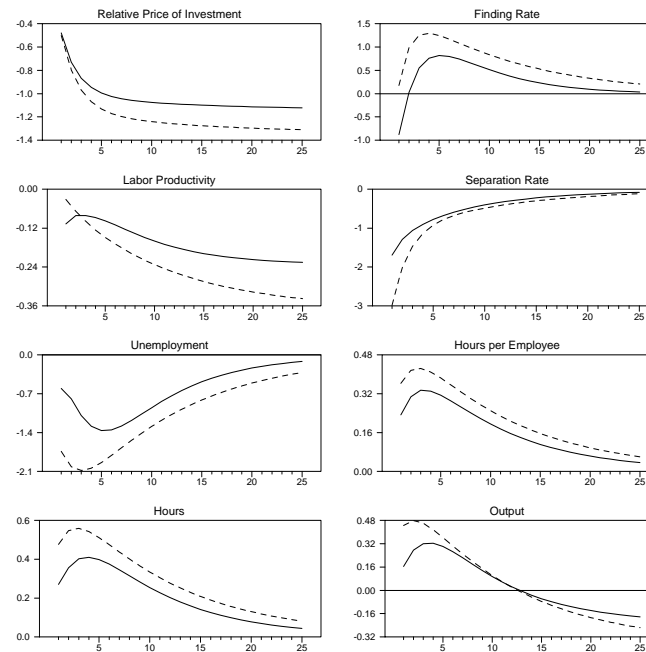

Investment Specific Shock

Neutral shock

Investment specific shock

Approximate rates.

Neutral Shock

Investment Specific Shock

(a) Neutral technology shock   (b) Investment specific technology shock
Exact rates (dotted lines) and approximated rates (solid lines).

Comparison exact/approximate rates

- The sign/shape of responses are similar.

- For neutral shocks: with exact rates, dynamics of the separation rate more accentuated.

- For investment shocks with exact rates, the separation rate falls more on impact. The fall in the unemployment rate is more pronounced (extensive margin more important).

Difference with Hall (2005) and Shimer (2007)

- Analysis is conditional on technology shocks, rather than unconditional.

- Measures the ins and outs of unemployment on impact and over the adjustment path, rather that at generic business cycle frequencies.

- Permits feedbacks in response to technology shocks.

Fujita and Ramey (2006) and Yashiv (2007) look unconditionally to the same data as Hall and Shimer, but results differ.

How important is the separation rate?

- Stock of unemployment evolves as:

$$\dot{u}_t = S(l_t - u_t) - Fu_t \tag{1}$$

$l_t =$labor force and $u_t =$ unemployment, S and F are the separation and finding rates in levels. The unemployment rate converges to the following *fictional* rate:

$$\tilde{u} = \frac{S}{S + F} \equiv \frac{\exp(s)}{\exp(s) + \exp(f)}.$$

- Shimer (2007): $\tilde{u}$ close to actual unemployment rate.

- Can calculate the contribution of f and s to the cyclical fluctuations in $\tilde{u}$ and evaluate how accurately $\tilde{u}$ approximates u in technology induced recessions (misses movements in and out of the labor force).
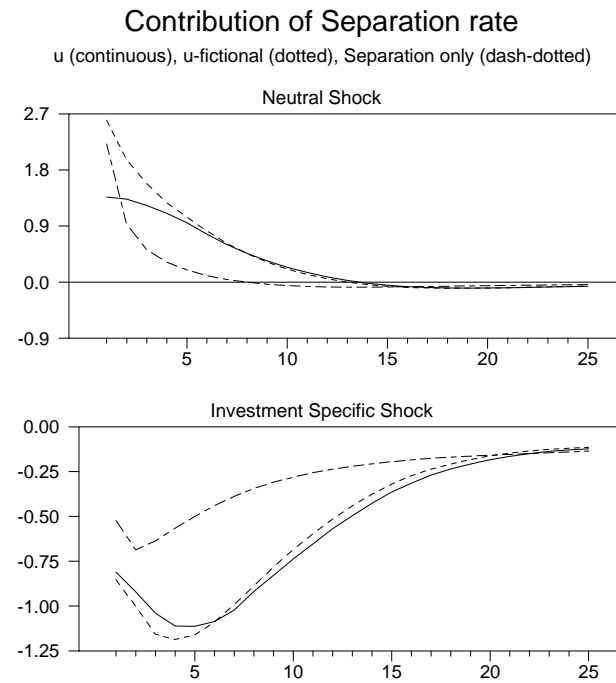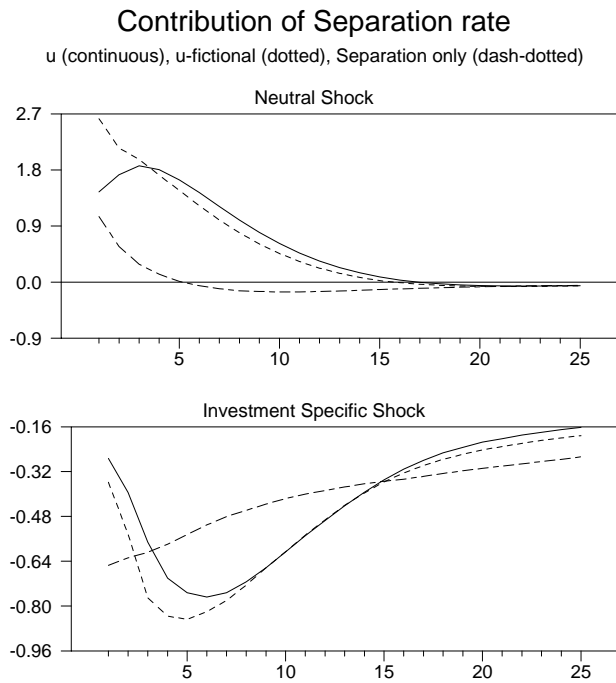
Approximated rates   **Exact rates**

True unemployment rate: solid line; $\tilde{u}$:dotted line. Dash-dotted is $\tilde{u}|f$ fixed

- Impact effect of $\tilde{u}$ after a neutral shock explained by s, especially with exact rates (90 per cent). Contribution falls to 40 per cent after one quarter and to 20 per cent one year after the shock.

- Impact response of actual and fictional unemployment different: flow in and out of the labor force important.

- Following an investment specific shock, unemployment falls little on impact with approximate rates(the fall in s and the fall in f compensate each other) and a lot with exact rates (mainly due to the fall in s).

- Impact response of actual and fictional unemployment similar: others labor market flows small.

The contribution of technology shocks

| Variable	Neutral				Investment specific			
	Horizon (quarters)				Horizon (quarters)			
	1	8	16	32	1	8	16	32
A. Approximated rates								
Output	1	6	30	55	3	5	5	4
Hours	8	9	8	7	14	16	21	22
Hours per Worker	5	5	4	4	17	23	29	29
Unemployment	23	21	21	21	3	3	6	6
Finding Rate	17	17	17	17	0	1	2	2
Separation Rate	10	8	7	6	5	8	12	14
B. Exact rates								
Output	8	4	17	37	14	8	6	6
Hours	22	19	18	16	24	15	14	14
Hours per Worker	14	12	11	10	35	27	28	28
Unemployment	34	30	29	27	3	1	1	1
Finding Rate	1	25	24	24	0	1	2	3
Separation Rate	34	34	30	26	0	1	1	1

- Neutral shocks explain a substantial proportion of the volatility of unemployment (20 per cent with approximate rates), little of hours (5 percent).

- Investment specific shocks account for a substantial proportion of the volatility of hours (20 per cent of hours per capita, 30 per cent of hours per worker) and little of unemployment (less than 10 per cent).

- With exact rates the numbers are larger.

Data and Technology component
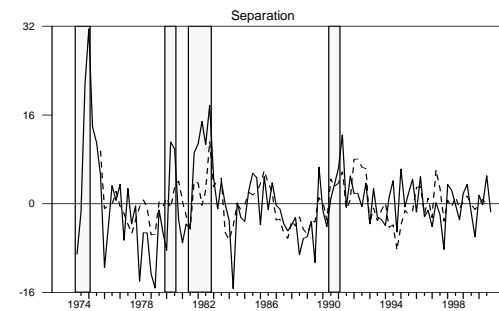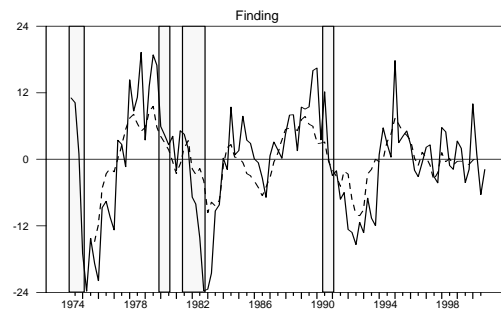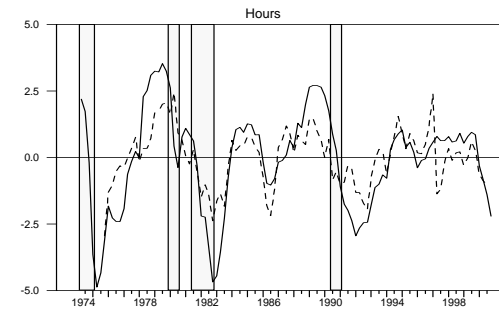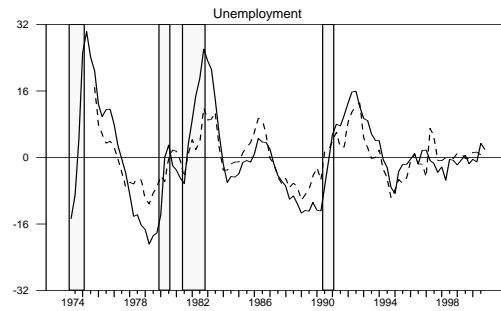
Original solid; component due to technology dotted

All filtered with HP(1600). Grey areas are NBER recessions.

- Technology shocks drive cyclical fluctuations in labor market variables (more for unemployment than for hours).

- They account for several important business cycle episodes, including the recession of the late 80's and the subsequent remarkably slow labor market recovery of the early 90's.

Unemployment, Data and Technology component

Finding, Data and Technology component

Output, Data and Technology component

Separation, Data and Technology component
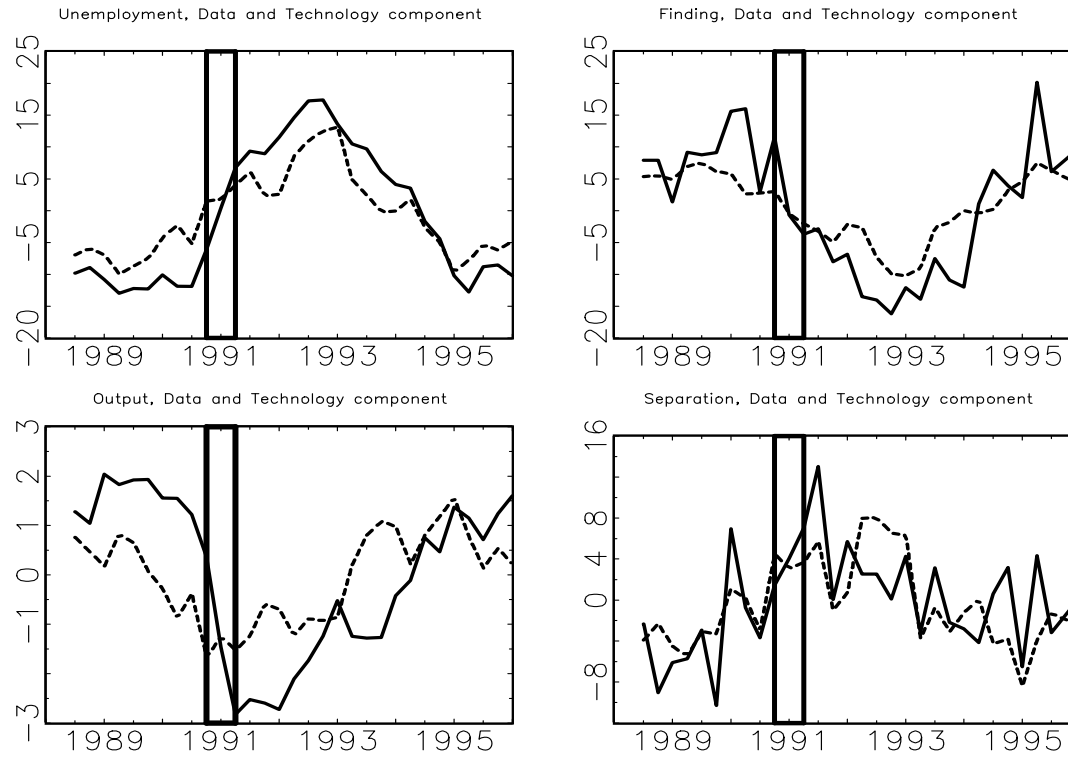
Original solid, component due to technology shocks dotted

Exact rates. All HP(1600) filtered. The vertical lines comprise the NBER recession.

- Recession of late 1980 generated a jobless recovery (see Bernanke (2003)).

- Downturn in employment severe; peak in unemployment lags by two years the trough in output - different from previous episodes.

- The technology component of the data tracks quite closely the evolution of the raw data.

- Mainly due to neutral shocks that naturally induce jobless recoveries: following the initial rise in job separation and unemployment, output increases to its new higher long run value, while unemployment remains above trend because of the low job finding rate, which induces a remarkably slow recovery in the labor market.

Robustness

Results robust to

- omitted variables/omitted shocks.

- VAR lag length.

- Alternative treatment of low frequency components.

- Medium, sign or long-run identifying restrictions.

- Choice of Price deflators for q and GDP.

- Alternative data sets (Elsby, et. al (2007)).

Conclusions

- Neutral/investment specific shocks produce different labor market responses. VAR with just one technology shock is not enough.

- Distinction extensive vs. intensive margin important to understand propagation of technology shocks.

- Unemployment rate moved both by separation and finding rate - roughly as conventional wisdom would suggest. On impact separation rate crucial.

- Neutral shocks important sources of cyclical fluctuations in unemployment. They explain the recession of the late 80's and the subsequent (jobless) recovery of the early 90's.