

Understanding the Great Recession

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CEF, Oslo 2014

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- Investment and consumption persistently low.

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 - employment, vacancies, LFPR, job finding rate, unemployment rate, real wages
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 - Endogenize labor force participation.
 - Derive wage inertia as an equilibrium outcome.

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 - employment, vacancies, LFPR, job finding rate, unemployment rate, real wages
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- Novel features of labor market
 - Endogenize labor force participation.
 - Derive wage inertia as an equilibrium outcome.
- Estimate model using pre-2008 data.
- Use estimated model to analyze post-2008 data.

Questions and Answers

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- *Consumption wedge*
 - perturbation to agents' intertemporal Euler equation that makes them want to accumulate the risk-free asset.
- *Financial wedge*
 - motivated by sharp increase in credit spreads observed in post-2008 period.
 - perturbation to households' first order condition for optimal capital accumulation.

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- Rise in government consumption associated with ARRA had peak multiplier effect in excess of 2.
- But overall effect was small because of size and timing of spending.

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- Why was the drop in inflation so moderate?

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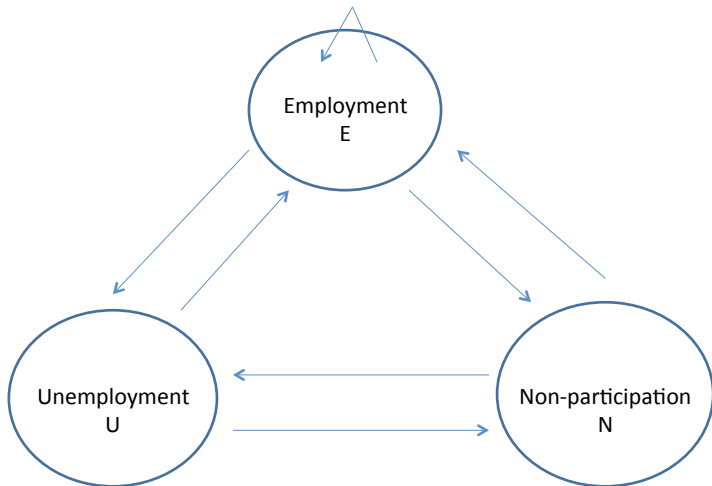
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 - Rise in cost of firms' working capital as measured by spread between corporate-borrowing rate, risk-free interest rate.

Labor Market

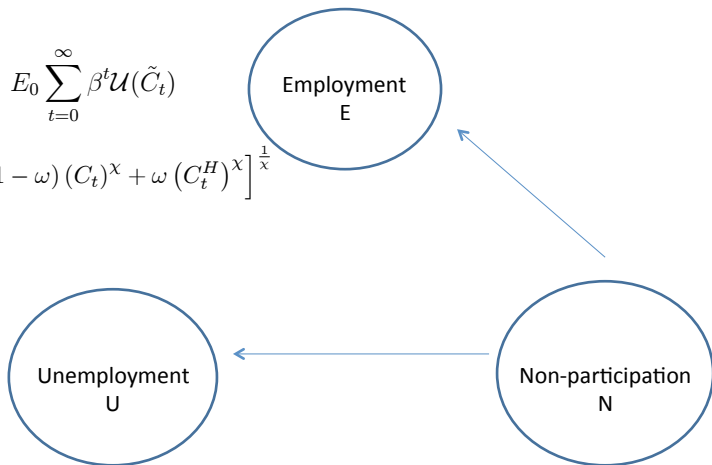
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$$E_0 \sum_{t=0}^{\infty} \beta^t \mathcal{U}(\tilde{C}_t)$$

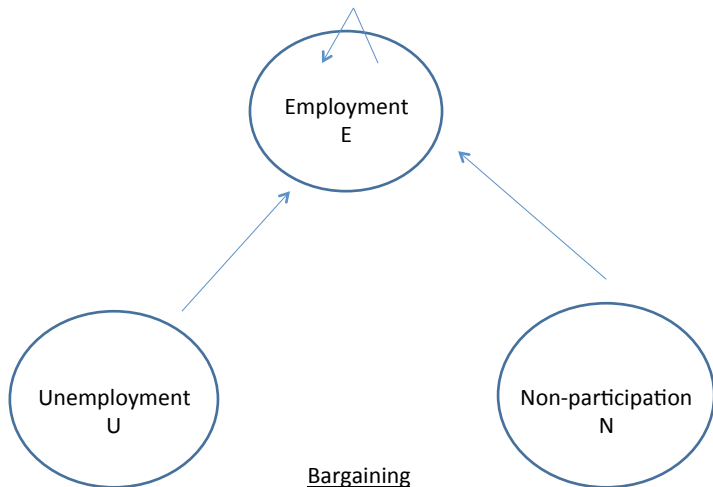
$$\tilde{C}_t = \left[(1 - \omega) (C_t)^x + \omega (C_t^H)^x \right]^{\frac{1}{x}}$$



-Household labor force decision

-Split between U and E determined by job-finding rate.

Labor Market



Bargaining

Three types of worker-firm meetings:

i) E to E , ii) U to E, iii) N to E

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- After expansionary shock, rise in wages is relatively small.

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- Taylor rule.

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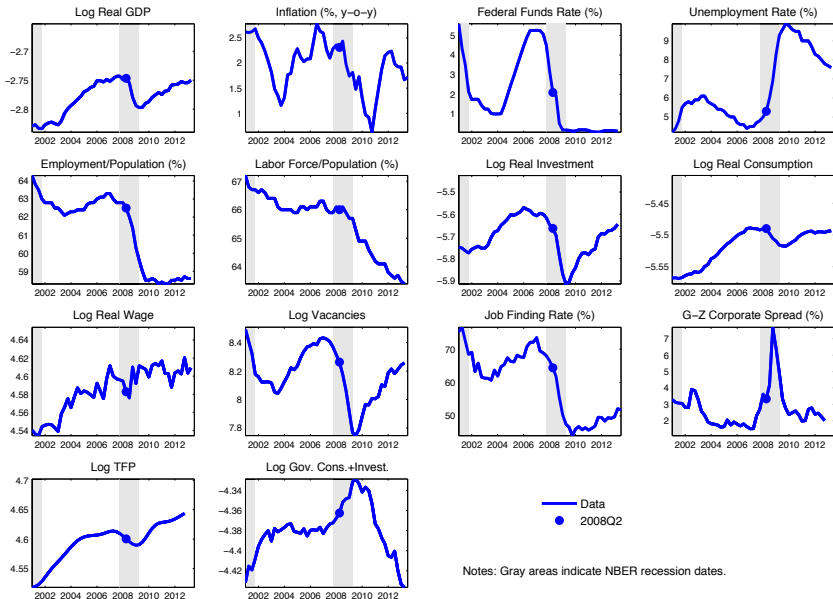
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- Elasticity of substitution between home and market goods: 3.
 - set *a priori*, see Aguiar-Hurst-Karabarbounis (2012).

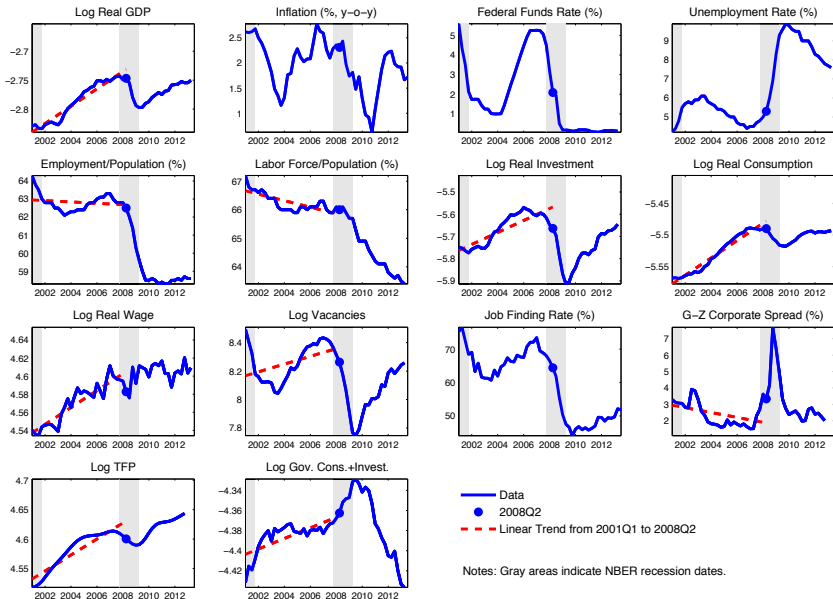
Accounting for the Great Recession

- Use model to assess which shocks account for gap between:
 - What actually happened.
 - What would have happened in absence of the shocks.

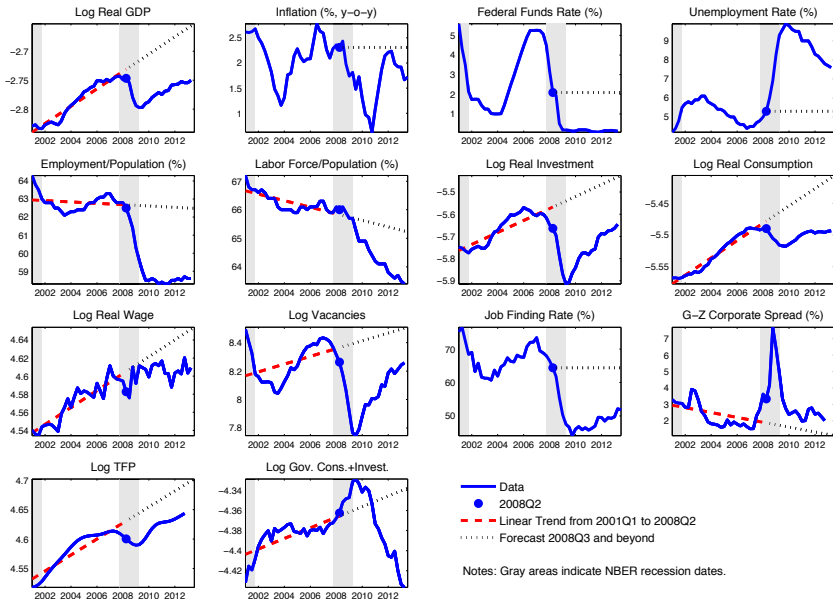
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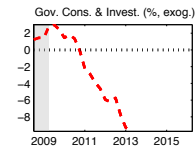
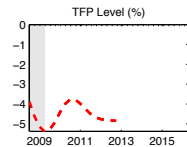
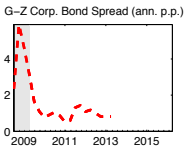
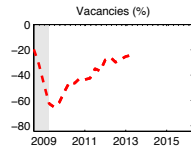
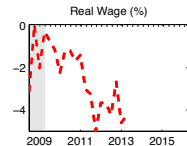
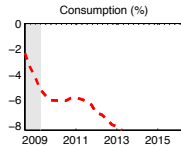
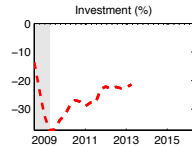
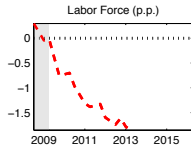
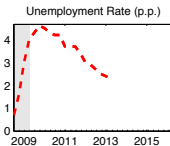
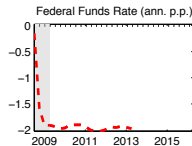
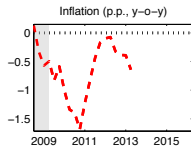
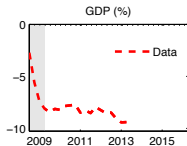
The U.S. Great Recession



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The U.S. Great Recession: Data Targets



Two Financial Market Shocks

- ① *Consumption wedge*, Δ_t^b : Shock to demand for safe assets ('*Flight to Quality Shock*', see e.g. Fisher 2014):

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- Financial wedge also applies to working capital loans:
 - Interest charge on working capital: $R_t (1 + \Delta_t^k)$
 - Assume 1/2 of labor inputs financed with loans.
 - Higher financial wedge directly increases cost to firms.

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- Stochastic simulation starting 2008q3 (nonlinear model, no perfect foresight).

Monetary Policy in the Great Recession

- From 2008Q3 to 2011Q2:
 - Taylor-type feedback rule subject to the ZLB.

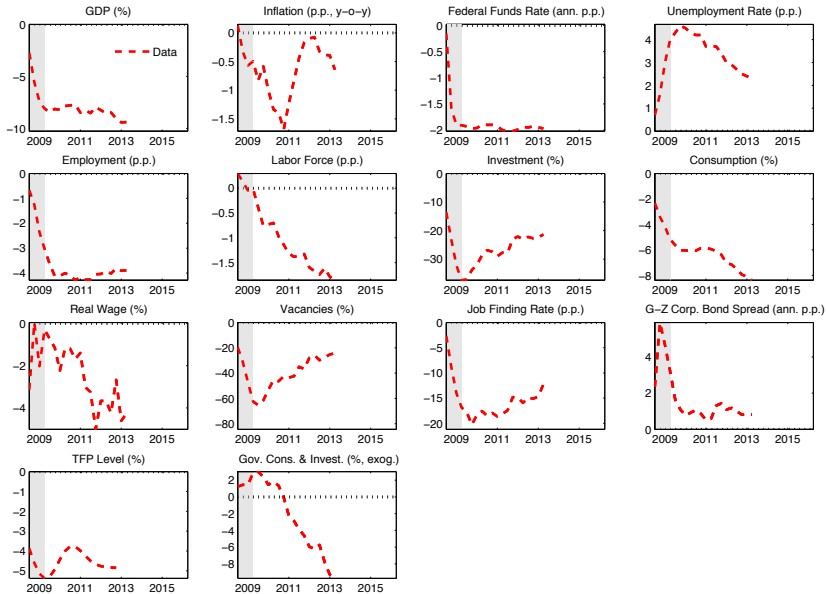
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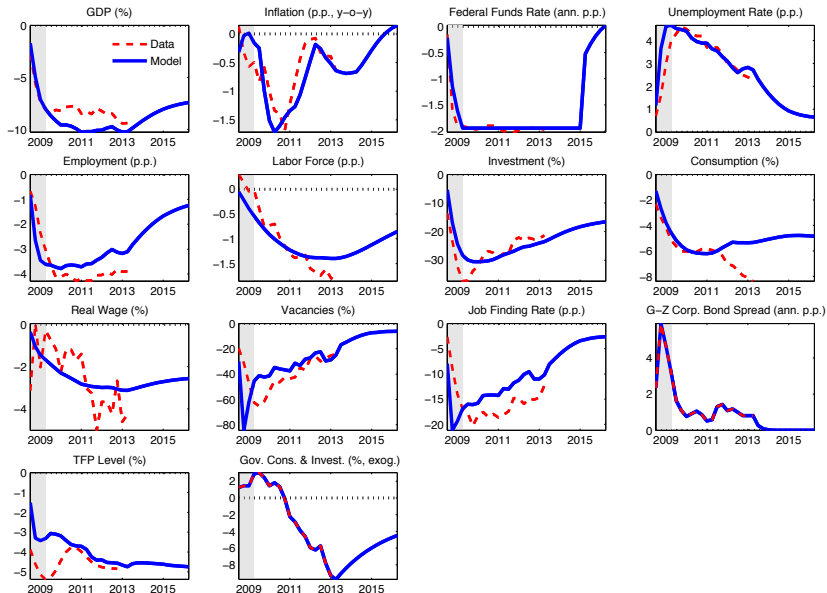
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- Policy from 2013Q1:
 - keep funds rate at zero until either unemployment falls below 6.5% or inflation rises above 2.5%.

The U.S. Great Recession: Data vs. Model



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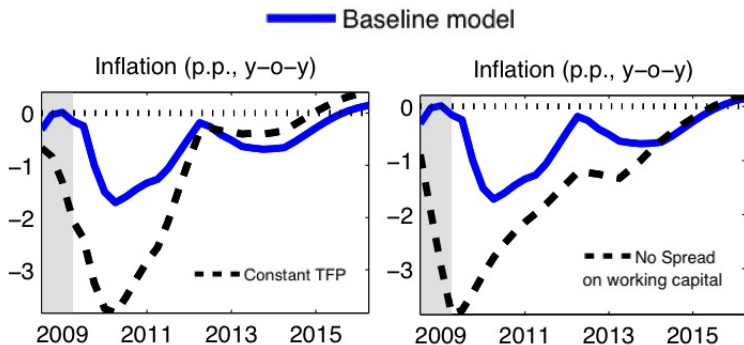
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- Alternative: standard Phillips curve misses sharp rise in costs
 - Unusually high cost of credit to finance working capital.
 - Fall in TFP.

⇒ *Both raise countervailing pressure on inflation.*

Decomposition for Inflation



Beveridge Curve

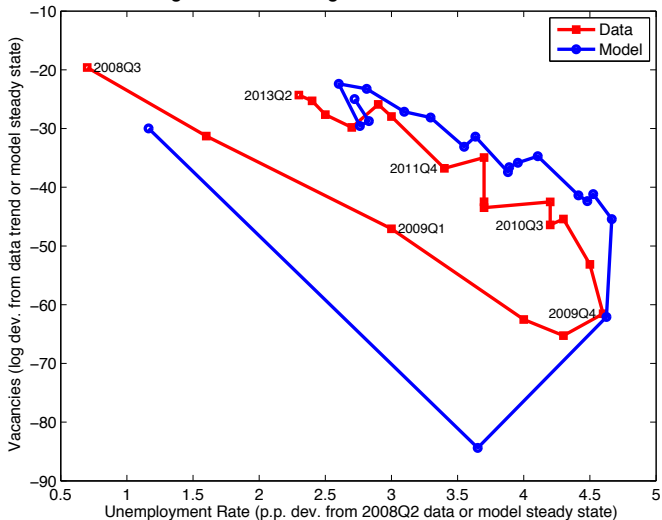
- Much attention focused on 'sharp' rise in vacancies and relatively small fall in unemployment
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 - This claim is based on assumption (a *really* bad one now!) that unemployment is at steady state.
- In our model, no shift occurs in the matching technology.
 - if anything, our model predicts an even bigger 'shift' than occurred.

The Beveridge Curve: Data vs. Model

Figure 15: Beveridge Curve: Data vs. Model



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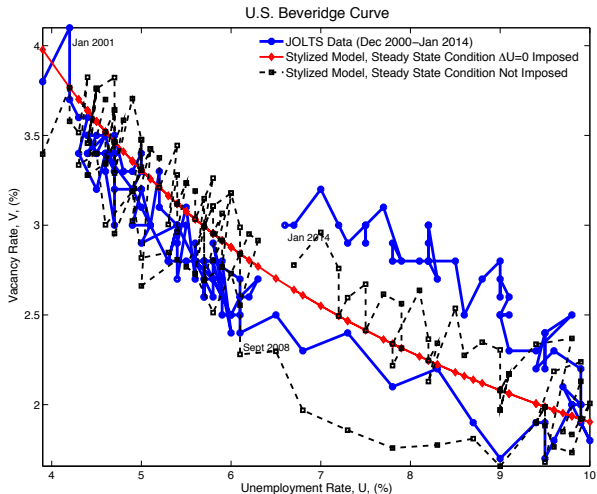
solving for V_t :

$$V_t = \left[(1 - \rho) \frac{(1 - U_t)}{\sigma_t U_t^{1-\alpha}} - \frac{U_{t+1} - U_t}{\sigma_t U_t^{1-\alpha}} \right]^{1/\alpha}$$

standard approximation sets this to zero

- Naturally implies a 'fish hook' pattern.

Magnitude of Fish Hook in DMP Model



$$(\rho = 0.97, \alpha = 0.6, \sigma = 0.84, \text{ monthly})$$

Conclusion

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- No (or little) evidence for ‘mismatch’ in labor market.
- Modest fall in inflation is not a puzzle once fall in TFP and risky working capital channel are taken into account.

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 - Hard to get ZLB to matter in a model with flexible prices.
- Work with a modified New Keynesian DSGE model.
 - Forces are captured in the form of ‘wedges’.
 - That is, we avoid microfounding the shocks.

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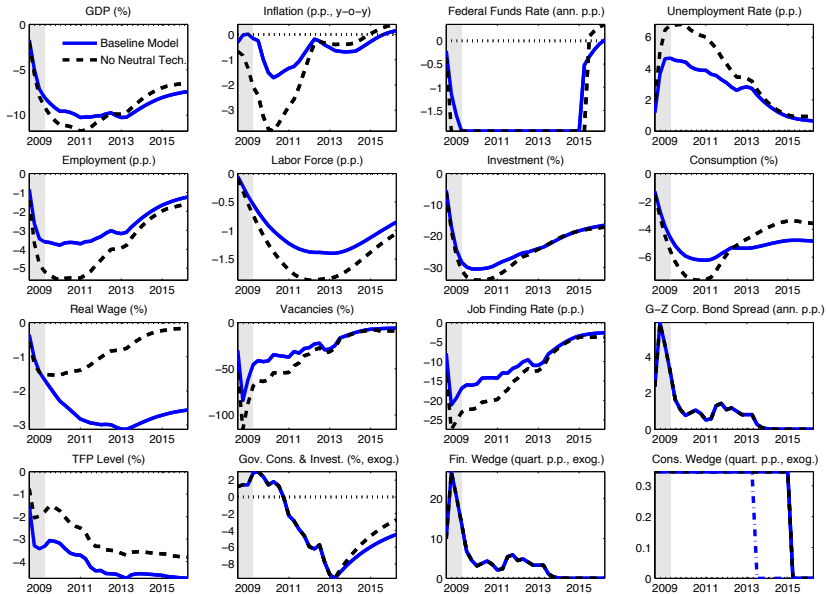
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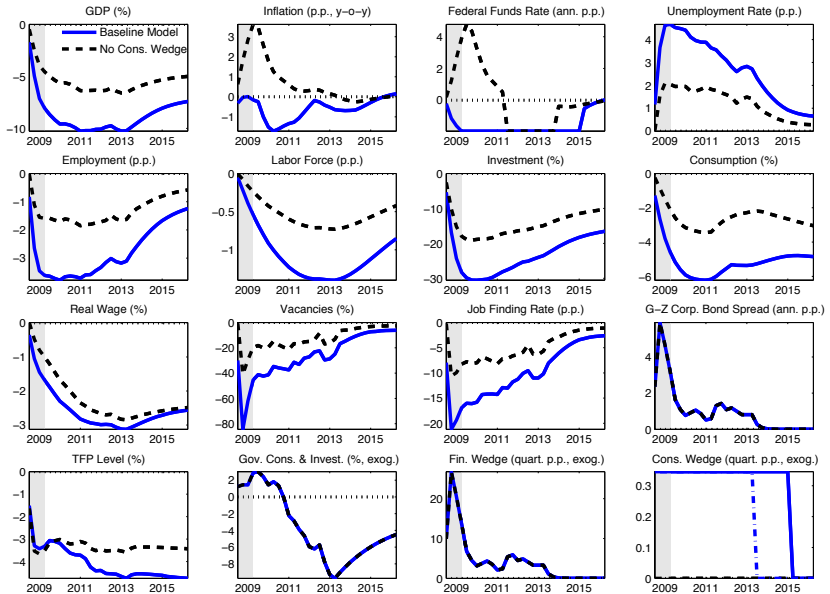
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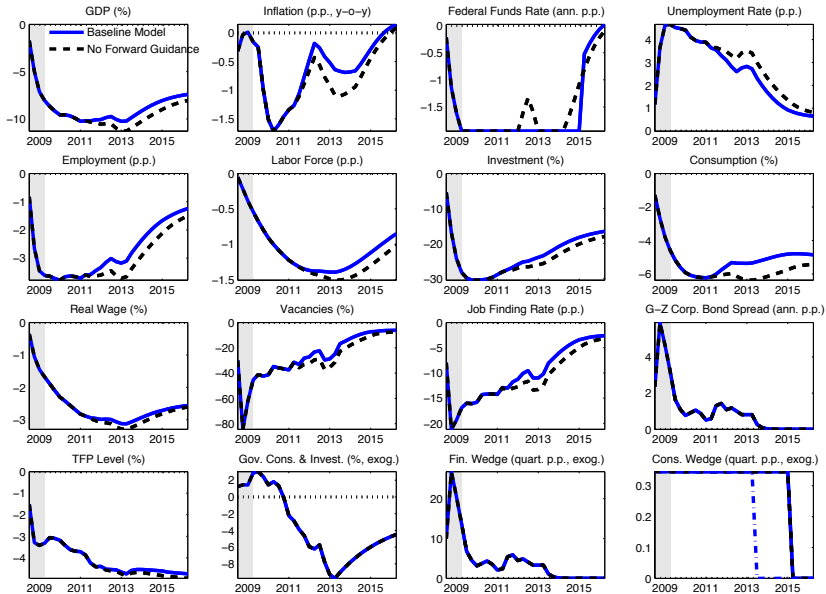
The Effect of Neutral Technology



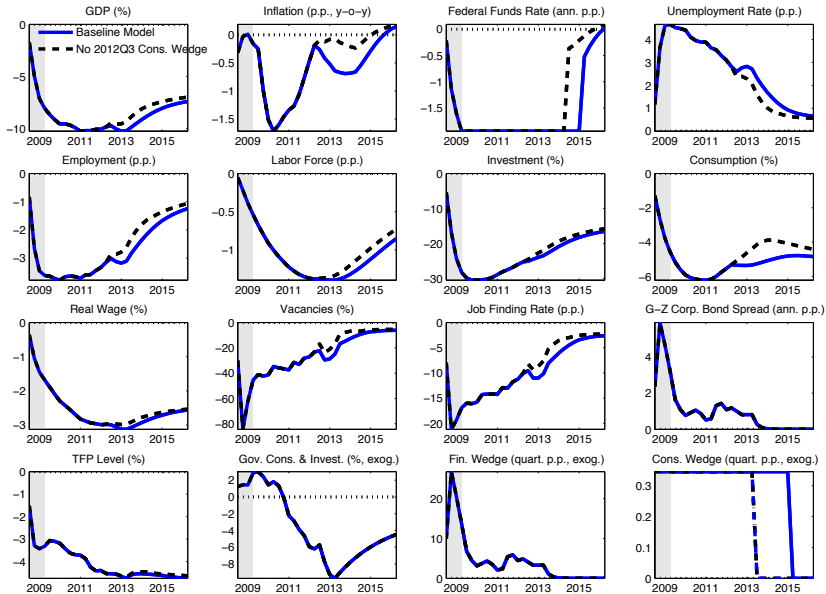
The Effect of Consumption Wedge



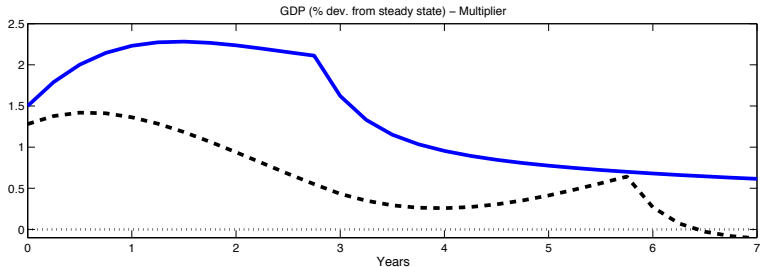
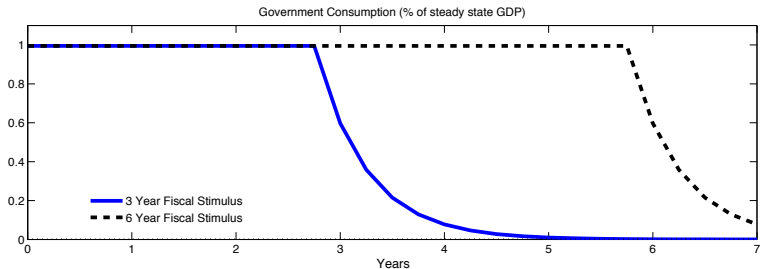
The Effect of Forward Guidance



The Effect of 2012Q3 Consumption Wedge

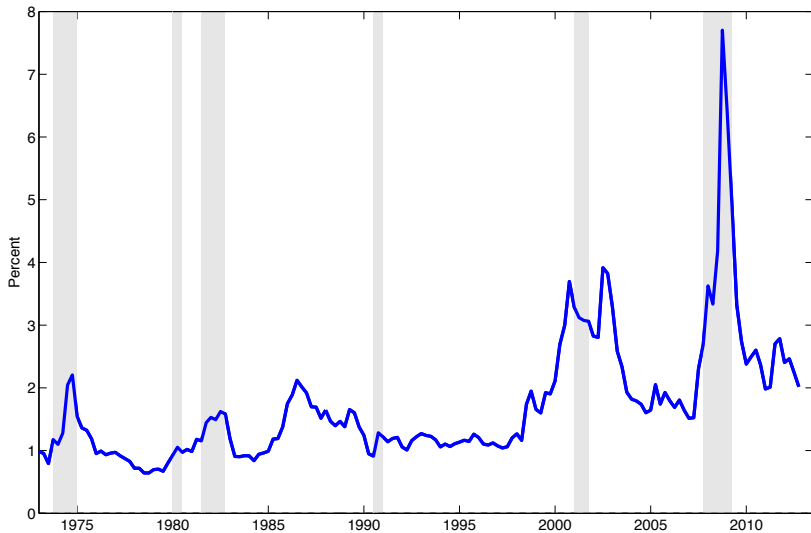


The Government Consumption Multiplier

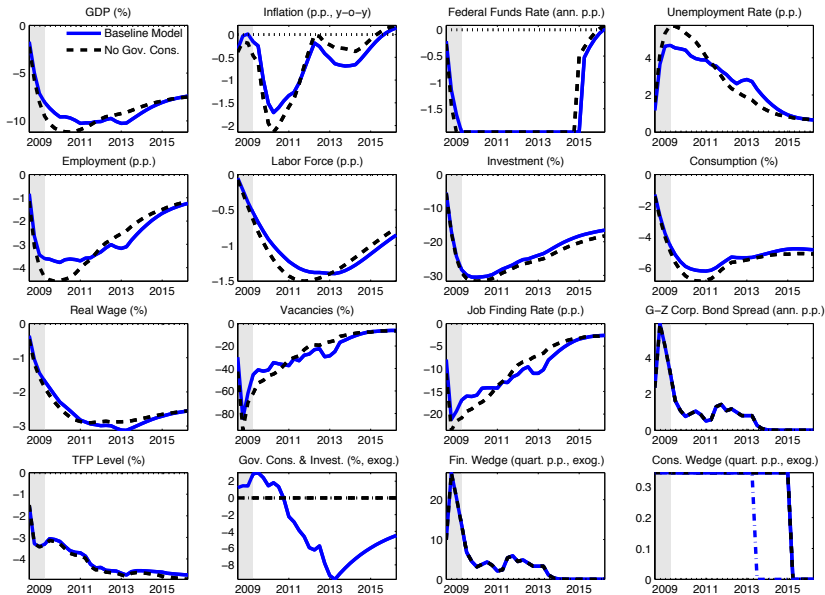


Notes: Stimulus lasts for 3 or 6 years with $AR(1)=0.6$ thereafter. 3 years constant nominal interest rate. Perfect foresight.

Gilchrist-Zakrajšek Corporate Spread



The Effect of Government Consumption



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 - G movements expected to last beyond ZLB have very small multiplier effects.
 - G beyond ZLB has negative impact on ZLB, because of depressive wealth effects on consumption.

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- Policy from 2011Q3-2012Q4: date-based forward guidance (8 quarters)
- Policy from 2013Q1:
 - keep funds rate at zero until either unemployment falls below 6.5% or inflation rises above 2.5%.

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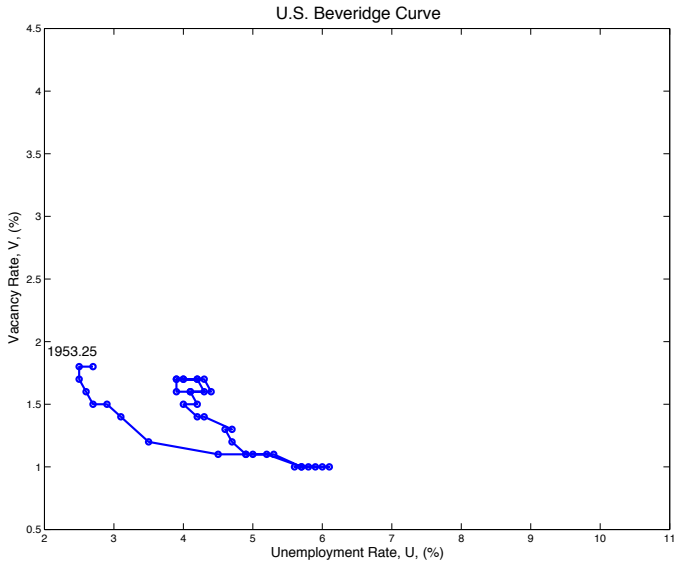
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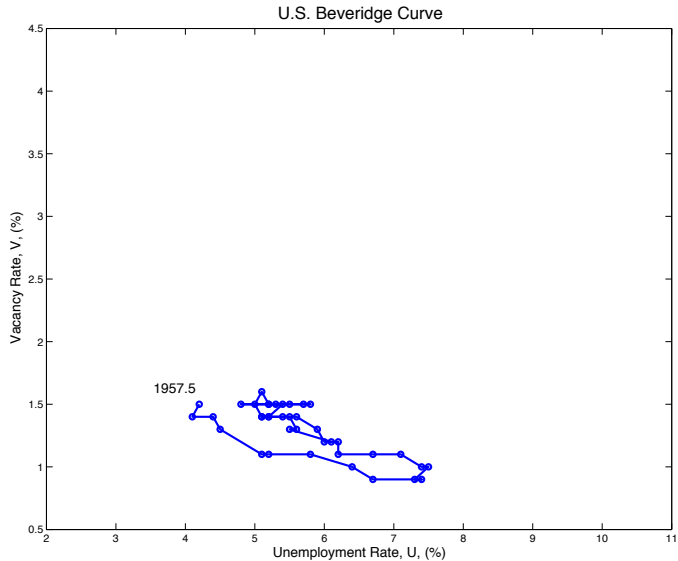
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- Solve nonlinear model, imposing certainty equivalence.

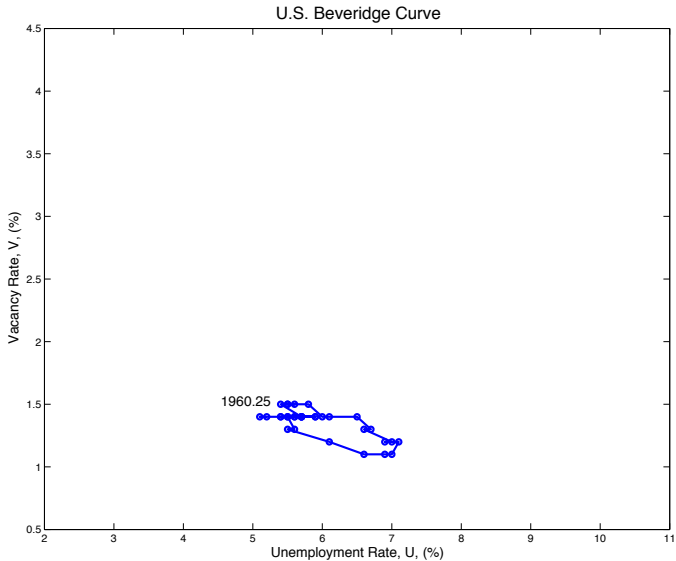
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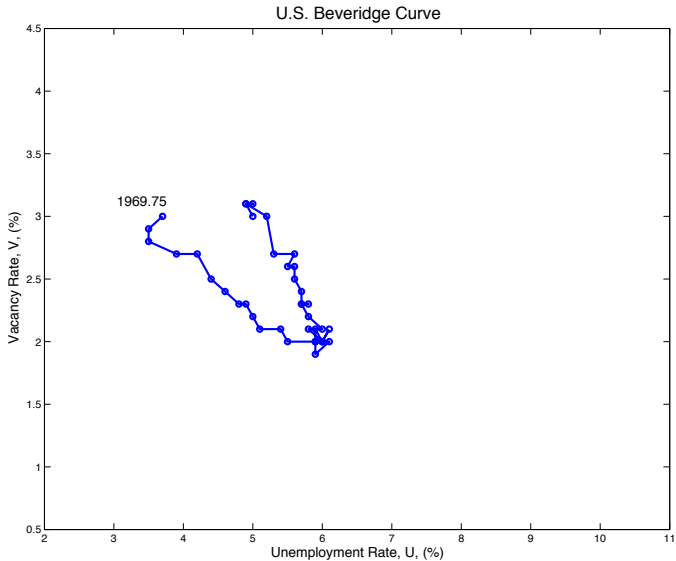
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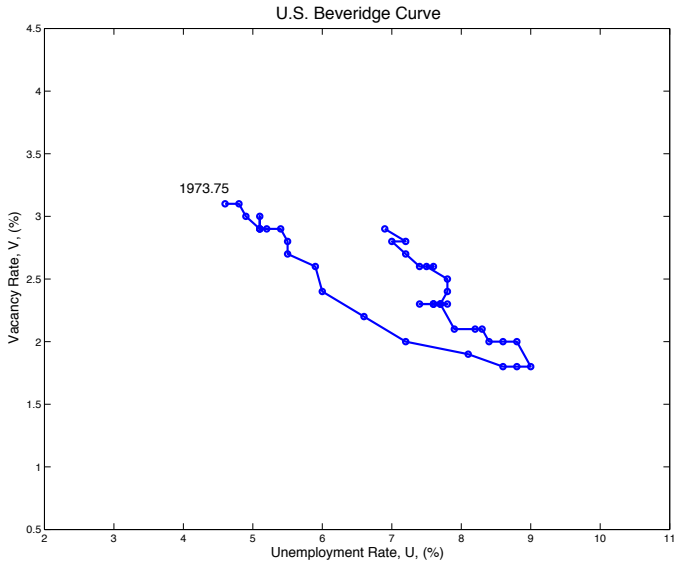
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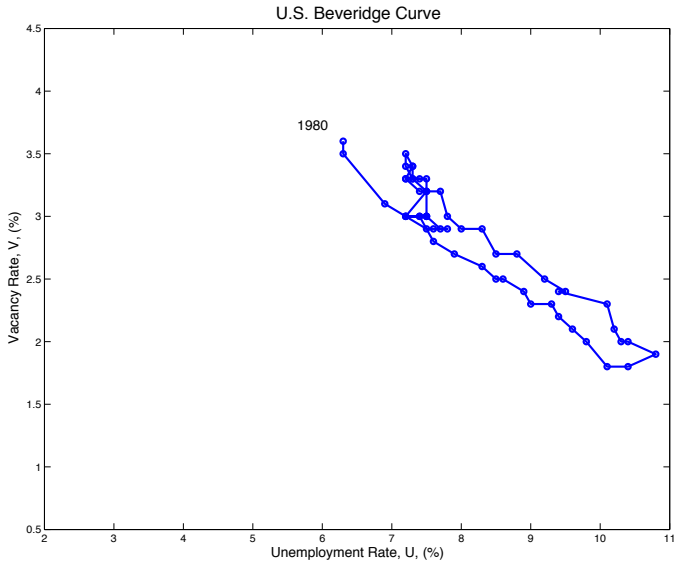
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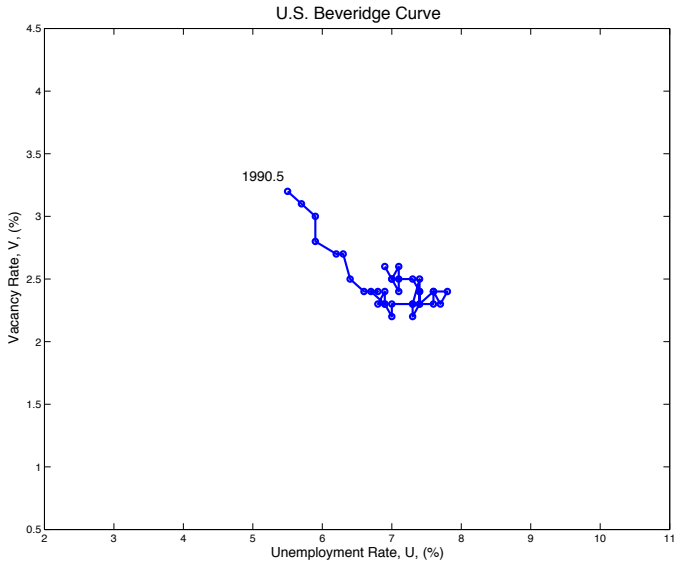
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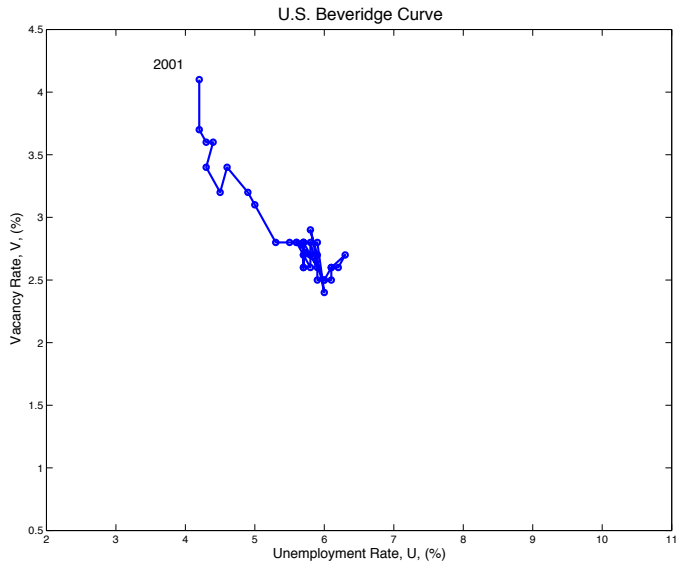
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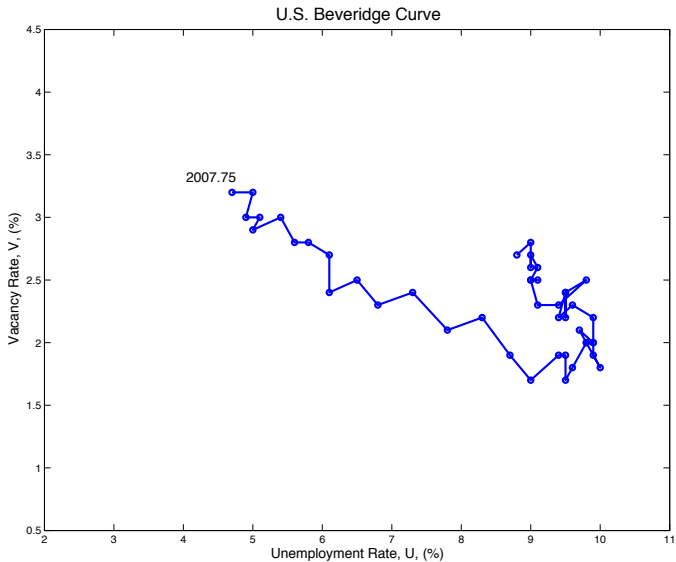
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- Unemployed and just-separated workers at end of $t - 1$:

$$\begin{array}{c} \text{separated workers at end of } t-1 \\ \underbrace{\hspace{10em}} \\ \text{employed in } t-1 \\ (1 - \rho) \quad \underbrace{l_{t-1}} \end{array} \quad + \quad \begin{array}{c} \text{unemployed in } t-1 \\ \underbrace{\hspace{10em}} \\ \text{labor force in } t-1 \\ \underbrace{L_{t-1}} \quad - l_{t-1} \end{array}$$

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- Some thrown exogenously into non-employment:

$$\overbrace{s (L_{t-1} - \rho l_{t-1})}^{\text{stay and search for jobs}}, \quad \overbrace{(1 - s) (L_{t-1} - \rho l_{t-1})}^{\text{go into non-employment}}$$

Beginning of Period Job Search

- Labor force at start of time t :

$$L_t = \begin{array}{l} \text{period } t-1 \text{ unemployed and separated who stay in labor force} \\ \overbrace{s(L_{t-1} - \rho l_{t-1})} \\ \text{people that were employed in previous period and remain attached} \\ + \\ \overbrace{\rho l_{t-1}} \\ \text{people sent to labor force from non-employment} \\ + \\ \overbrace{r_t} \end{array}$$

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- Number of people searching for jobs at start of time t :

$$r_t + s(L_{t-1} - \rho l_{t-1}) = L_t - \rho l_{t-1}.$$

Job Finding

- Total meetings between workers and firms at start of t :

$$l_t = (\rho + x_t) l_{t-1} = \rho l_{t-1} + f_t \overbrace{(L_t - \rho l_{t-1})}^{r_t + s(L_{t-1} - \rho l_{t-1})},$$

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- Workers and firms that meet, begin to bargain.
 - In equilibrium, meetings turn into matches.

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- Same procedure as in Hall (2014) except he starts trend in 1990, obtains similar results.