Technology Shocks and Labor Market Dynamics: Some Evidence and Theory

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3. VAR-based measures [e.g., Shapiro-Watson (1988), Gali (1999), Francis-Ramey (2005)]

What do technology shocks do to hours?

- Solow residual: positively correlated with hours
- BFK shock: negatively correlated with hours
- VAR-based shock: hours may rise or fall –how hours enter VAR matters (e.g., Gali, 1999 vs. CEV, 2004)

Why hours?

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- Labor market implications traditionally important for evaluating business cycle theories at least since Dunlop and Tarshis
- Recent examples: Gali (1999), Huang, Liu, and Phaneuf (2004).

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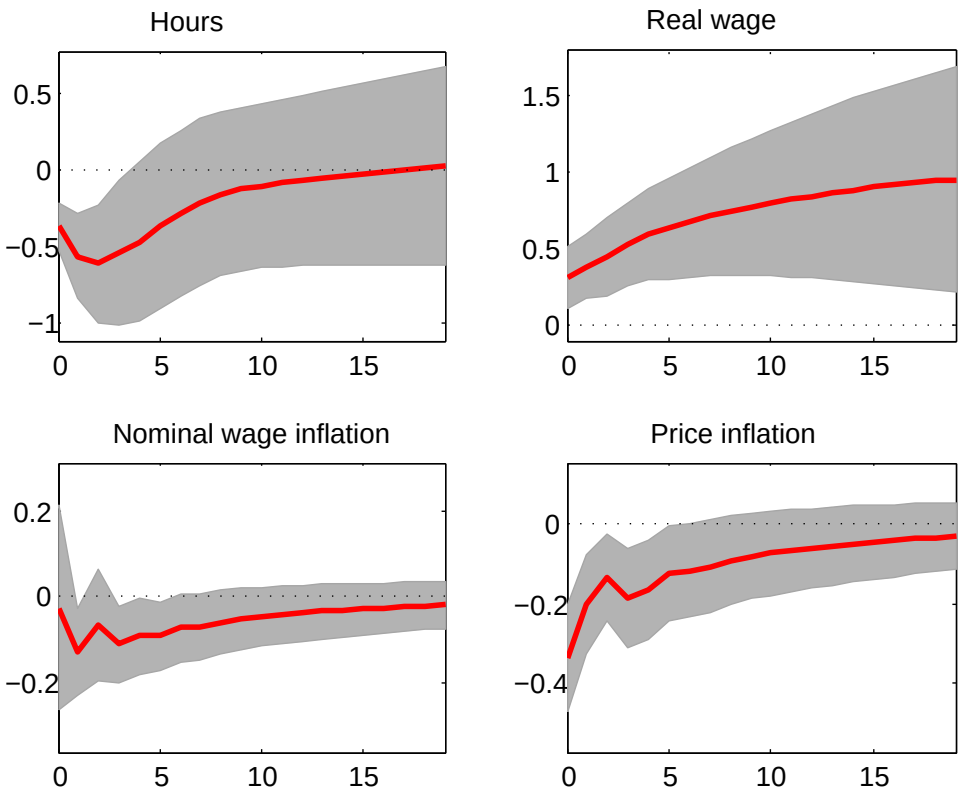
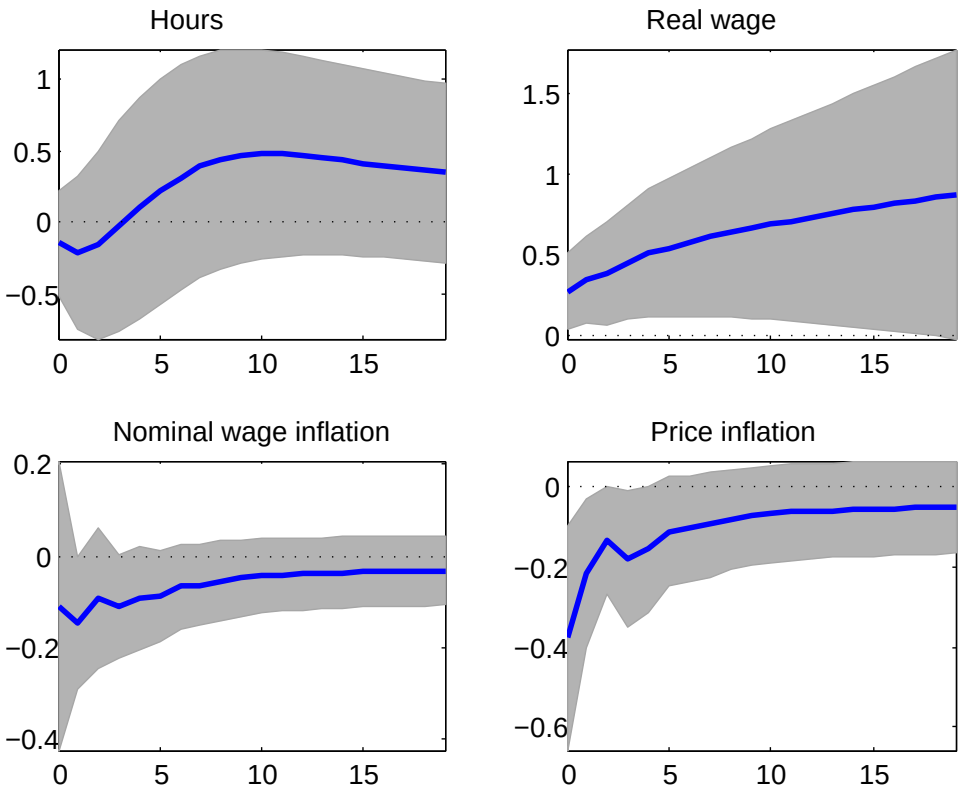
- Our goal: (i) examine the effects of tech shocks on wages and prices (not just employment); (ii) use these facts to evaluate competing theories.

VAR Impulse Responses (hours in difference)



Impulse Responses (hours in level)



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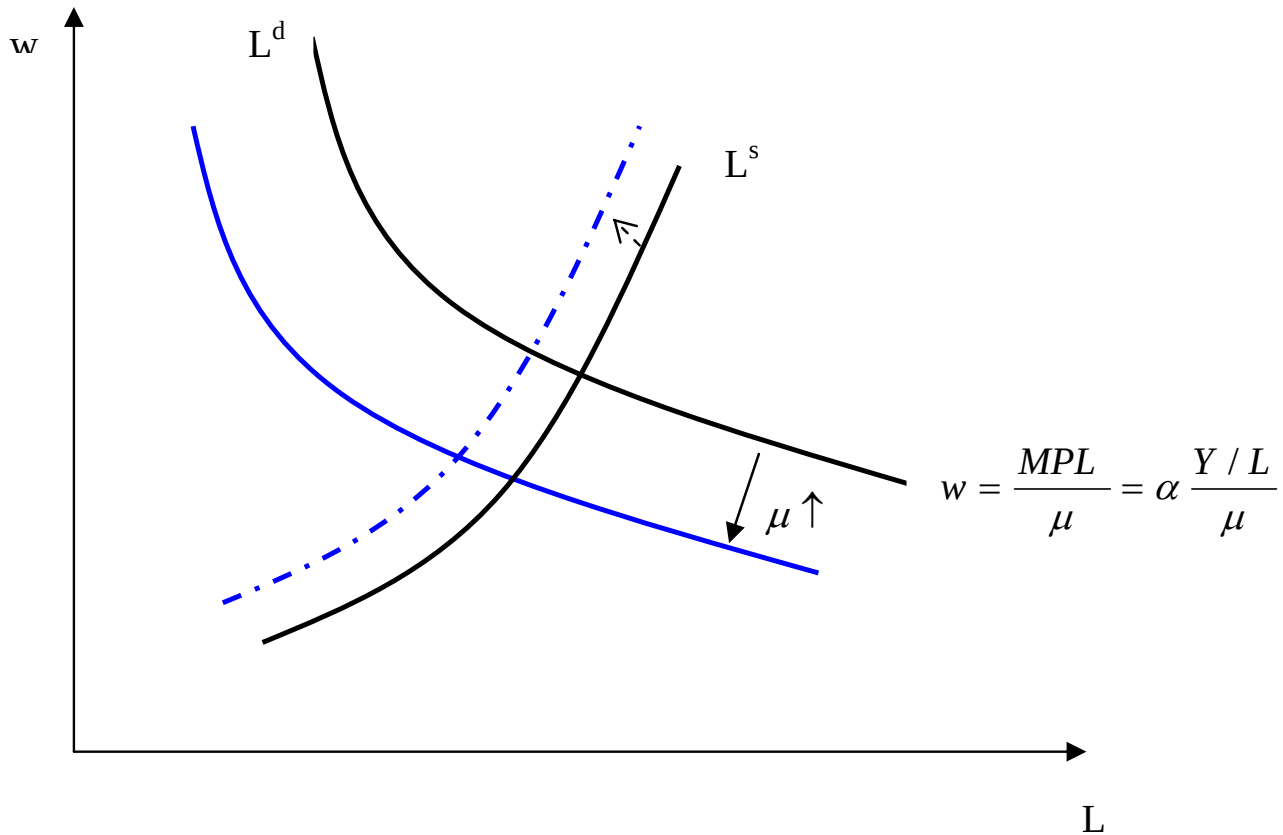
- Nominal wage declines weakly, much weaker than does the price level
- Corroborating evidence on wages and prices: BFK (2004) with independent measure of technology shocks.

Do we have a theory that accounts for these facts?

Pre-determined prices: an illustrative example in the spirit of Gali (1999)

- Price-setting: p_t predetermined;
- Aggregate demand: $p_t + y_t = m$ (constant money supply);
- Employment: $n_t = y_t - a_t$;
- Real wage: $w_t - p_t = \sigma y_t + \eta n_t$.
- Positive technology shock $\Rightarrow$ declines in hours, real wage, and nominal wage

Labor market adjustments under sticky prices



Analyzing the sticky-price mechanism

Dynamics driven by two competing forces:

1. Price inertia $\Rightarrow$ hours and real wage decline
2. Monetary-policy accommodation $\Rightarrow$ aggregate demand increases, mitigating the first effect.

Parameter calibration

- Measuring monetary-policy accommodation

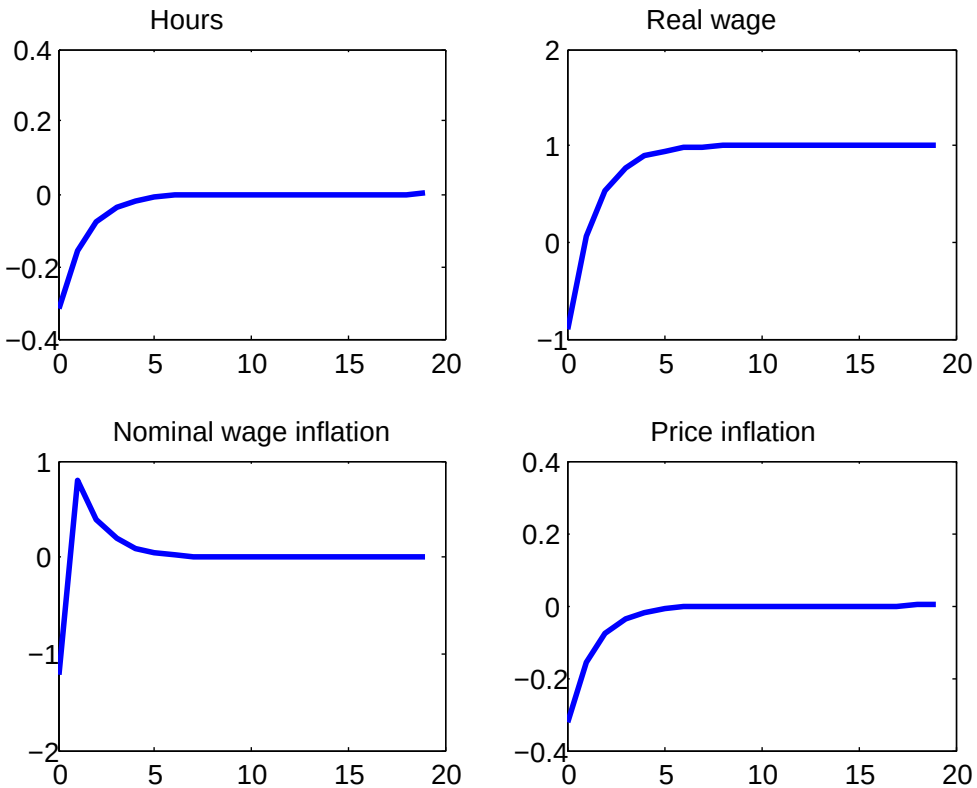
$$\mu_t = \underset{}{const.} + \underset{(0.06)}{0.62}\mu_{t-1} + \underset{(0.05)}{0.14}\varepsilon_t$$

where ε_t is some measure of technology shock.

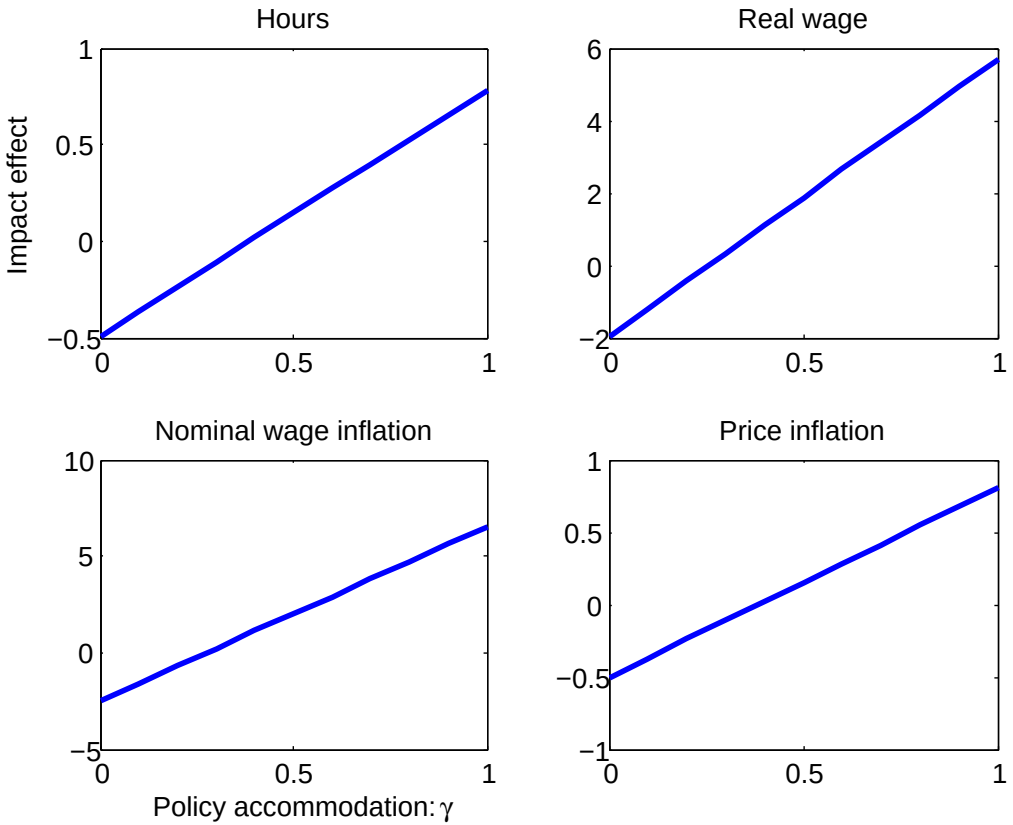
- Other parameters:

$$\beta = 0.99, \quad \eta = 5, \quad \alpha_p = 0.75, \quad \alpha_w = 0, \quad \epsilon_p = 10, \quad \epsilon_w = 6$$

Impulse responses in the sticky-price (SP) model



Role of monetary policy accommodation in the SP model



Analyzing the SP model

1. Predicted responses of hours and price inflation seem OK
2. Potential problems with nominal and real wage adjustments

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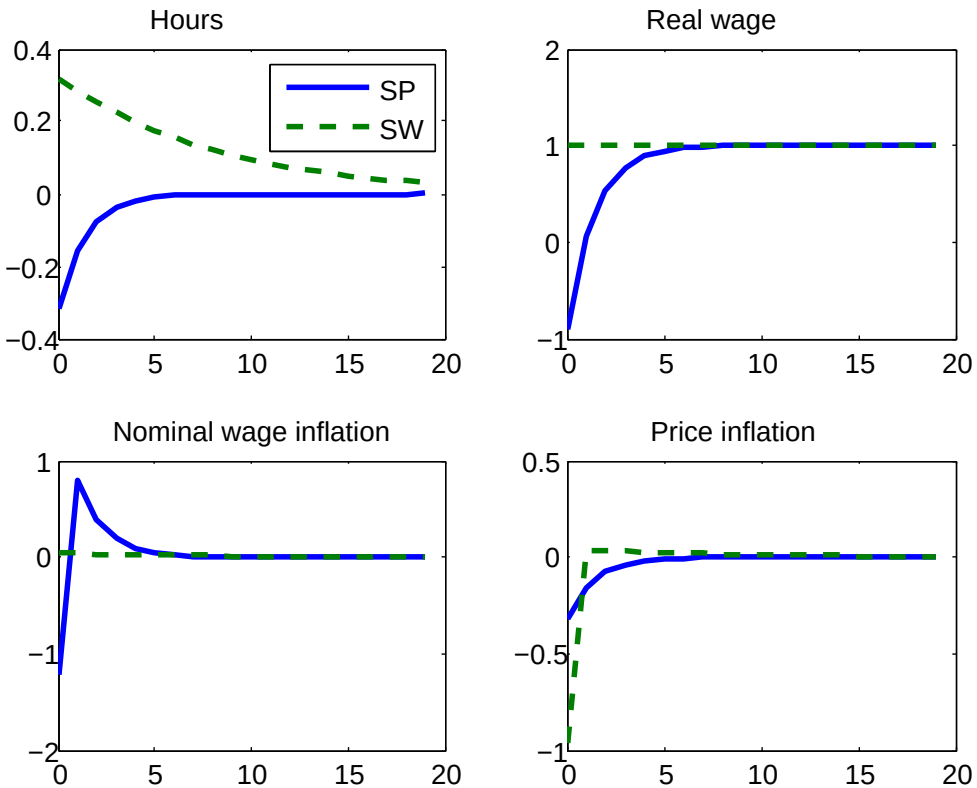
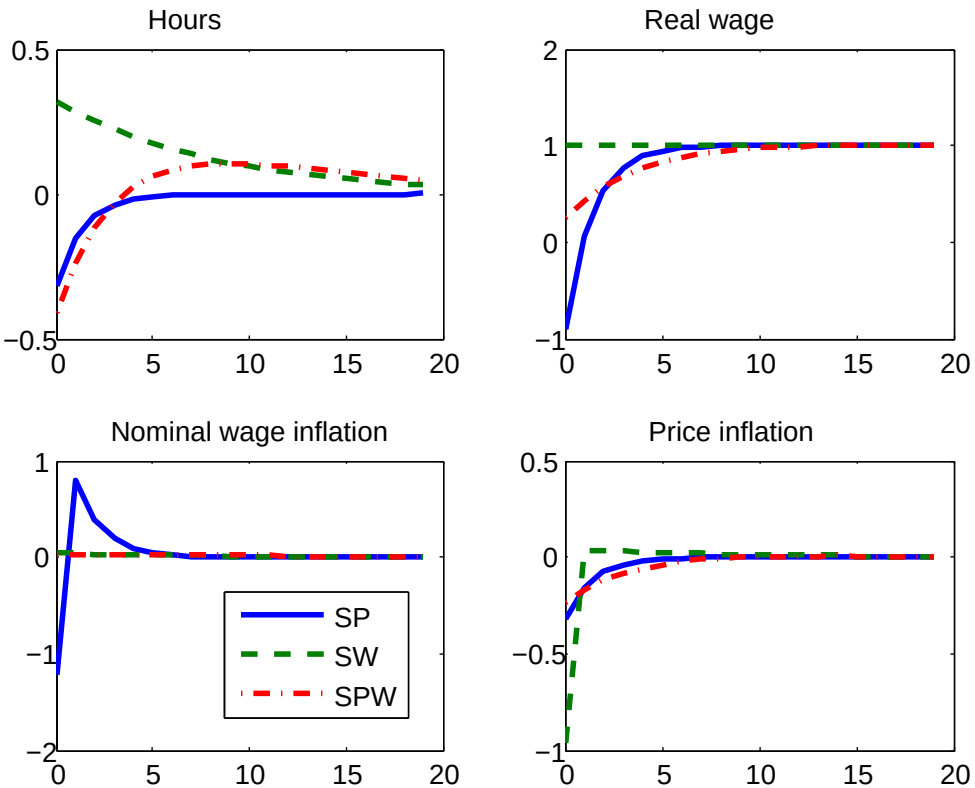
2. Potential problems with nominal and real wage adjustments
3. Nominal wage rigidity may be important...

Labor-market responses in a pure sticky-wage(SW) model



Labor-market responses in the hybrid model (SPW)



The General Framework

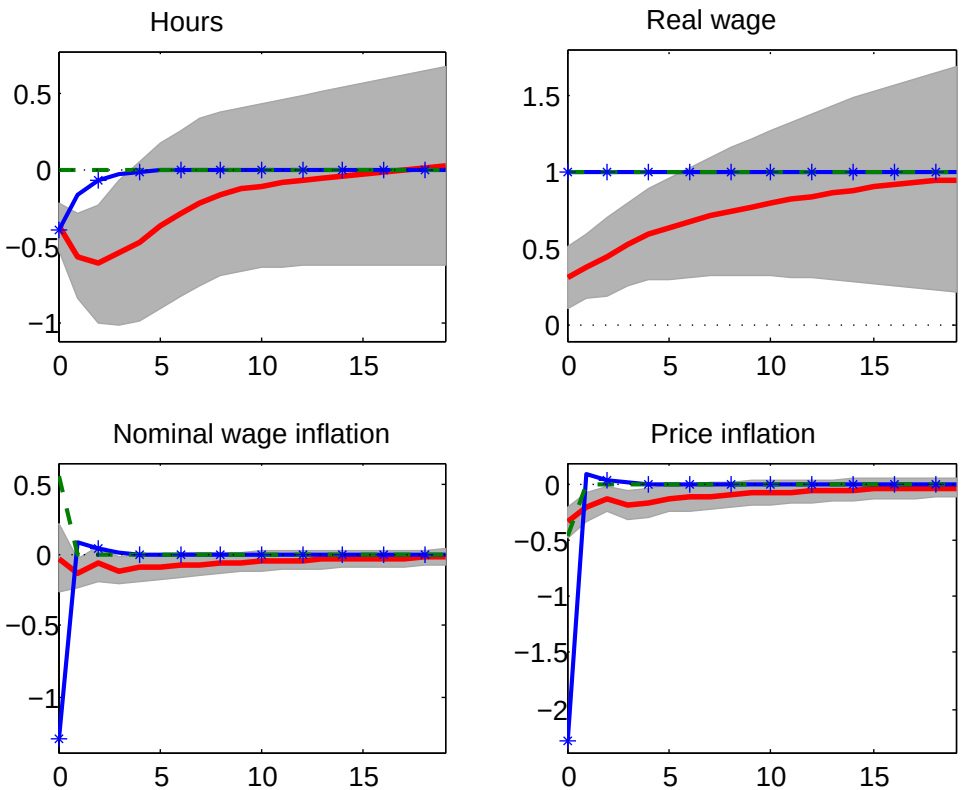
- The SPW model seems promising in generating the observed labor market dynamics
- How far can it go?
- New model elements for quantitative evaluations
  1. Habit formation (e.g., Francis-Ramey (2005), CEE (2005)):

$$U_t = \log(c_t - bC_{t-1}) + \Phi \log \frac{M_t}{P_t} - V(N_t), \quad b \in \{0, 0.8\}$$

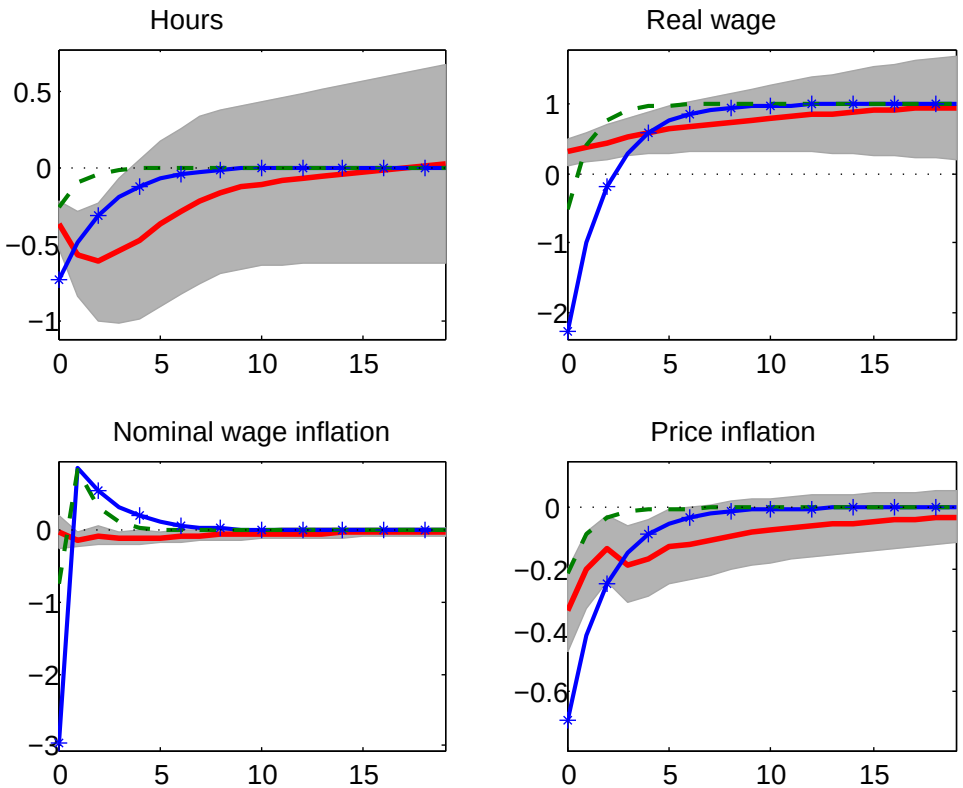
  2. Taylor rule (in place of Gali rule):

$$i_t = 0.5 i_{t-1} + (1 - 0.5)[1.1\pi_t + 0.5 g_{yt}]$$

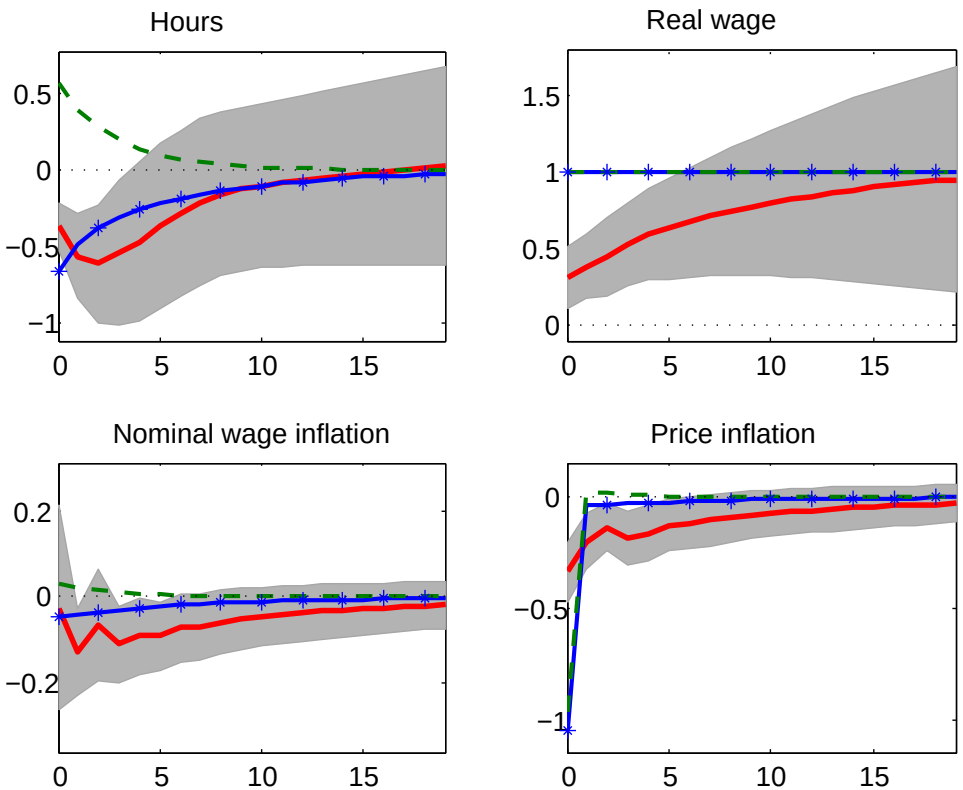
Model without nominal rigidities



Model with sticky prices

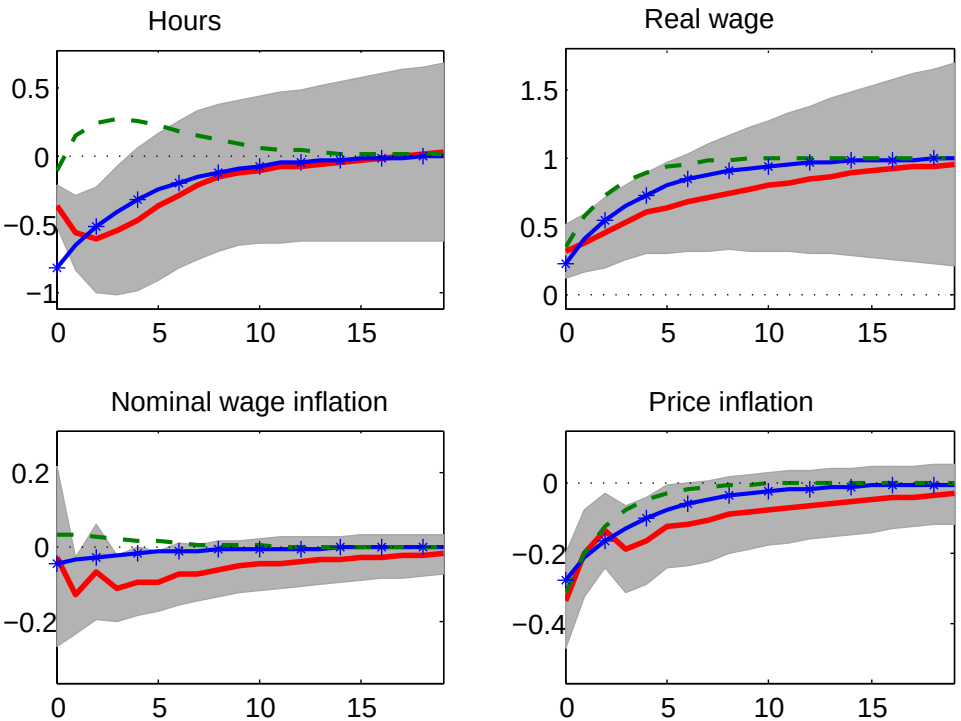


A pure sticky-wage model

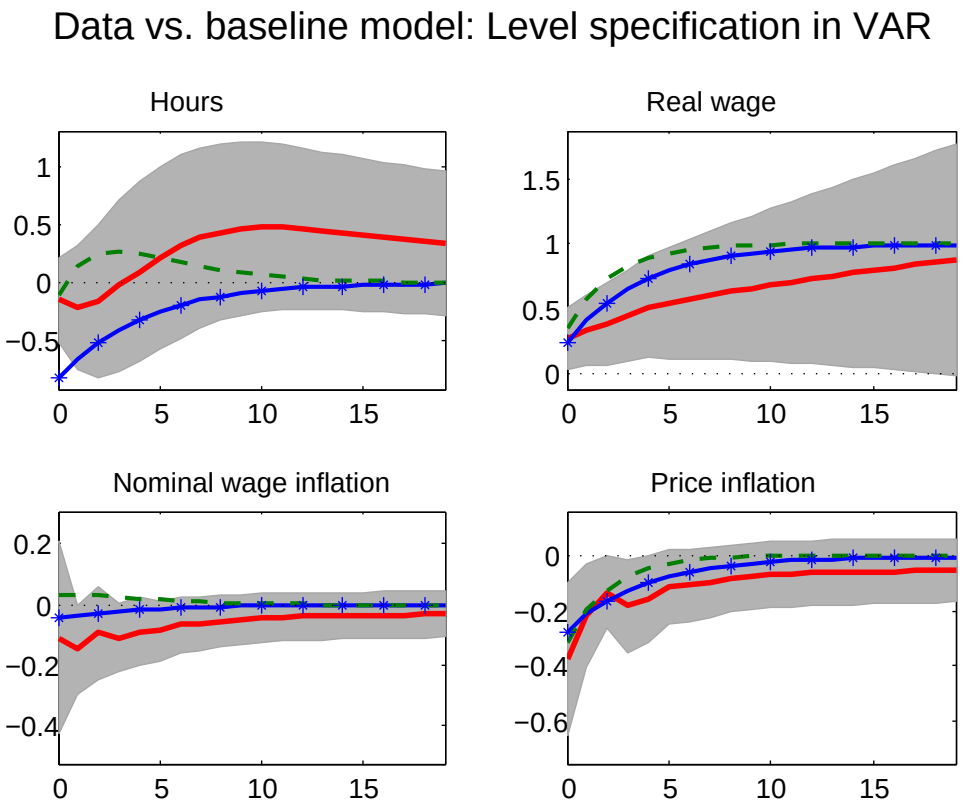


The hybrid model (SPW): diff specification in VAR

Data vs. baseline model: Difference specification in VAR



The hybrid model (SPW): level specification in VAR



The Volcker-Greenspan Era

- Can our model account for labor market dynamics in the post-Volcker period?

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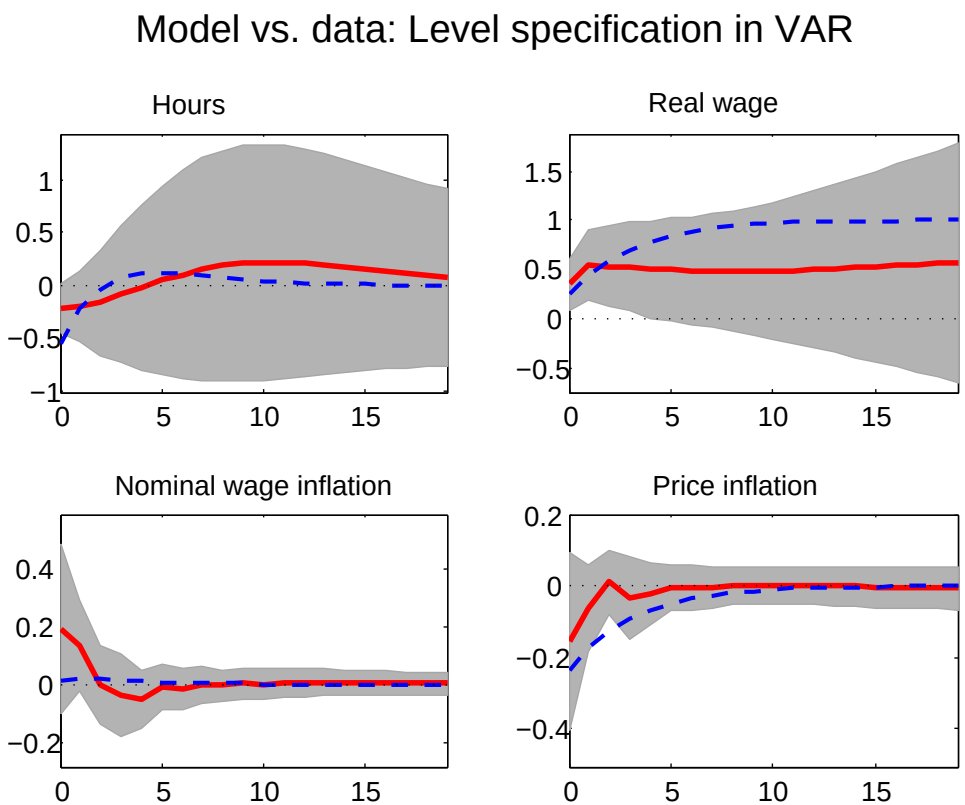
- Re-calibrated monetary policy rule: 1982:Q3 - 2003:Q4

$$i_t = 0.5 i_{t-1} + (1 - 0.5)[2.15\pi_t + 0.5 g_{yt}]$$

Model vs. VAR under the Volcker-Greenspan regime



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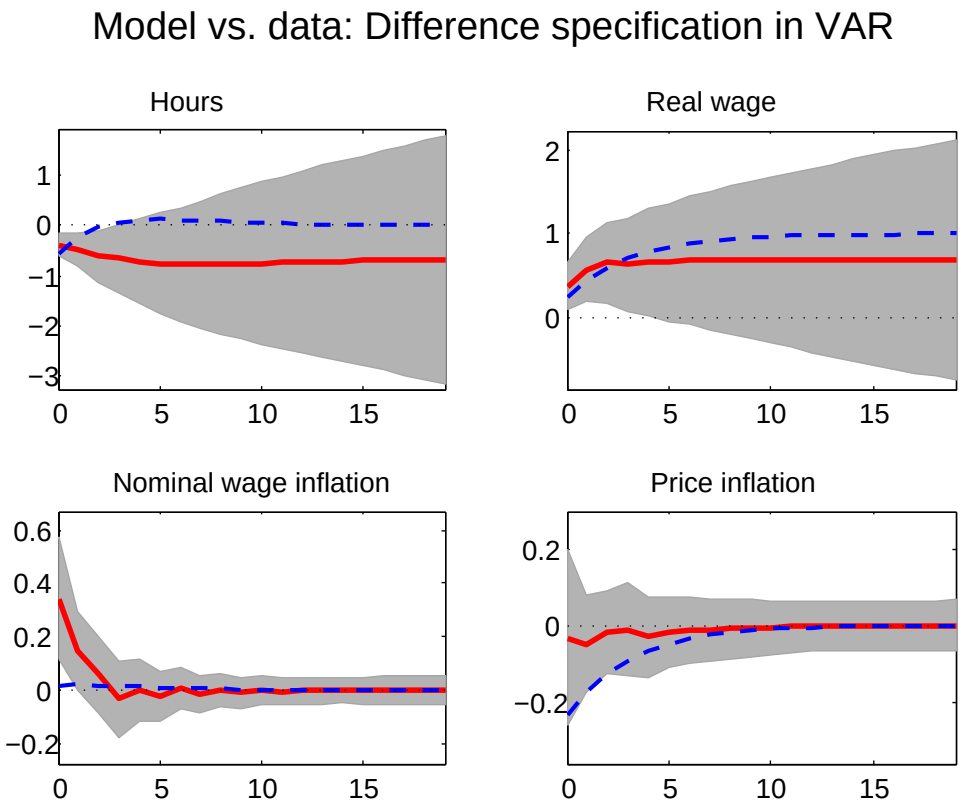

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- A standard RBC model or its variant does not do well on wages and prices.
- A sticky-price model, with or without habit, has difficulty on real and nominal wages.
- A hybrid model with both nominal wage and price rigidities is more promising than others; adding habit further improves its quantitative performance.