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Technology Shocks and Aggregate Fluctuations: How Well Does the RBC Model Fit Postwar U.S. Data?

by Jordi Gali and Pau Rabanal

Comments by Ellen R. McGrattan, Minneapolis Fed

Overview of Gali-Rabanal

- Part I: Survey of structural VAR literature
  - RBC models don't fit postwar data well

    Evidence: Hours fall in response to positive technology shock

  - Technology shocks don't play central role for business cycles

    Evidence: Contribution of these shocks quantitatively small

- Part II: Results of Sticky price/wage/habit Model
  - Demand factors are main force for business cycles

The Structural VAR

- Application of Blanchard and Quah (1989):

$$X_t = C(L)e_t = C_0 e_t + C_1 e_{t-1} + C_2 e_{t-2} + ...$$

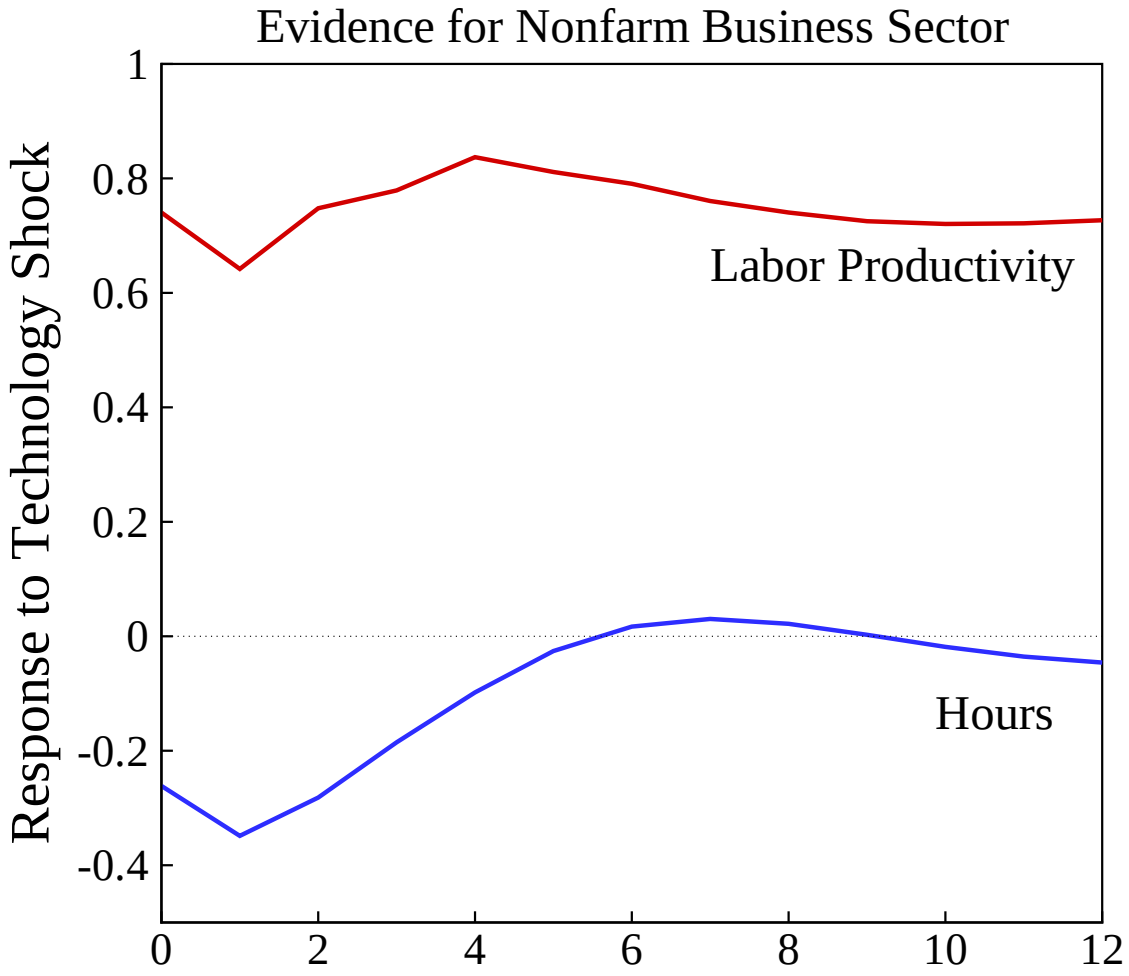
  - $X_t = [\Delta$ Log labor productivity, Δ Log hours$]'$
  - $e_t =$ ['technology shock', 'demand shock']$'$

- Identifying restrictions:

  - $Eee' = I$,
  - (1,2) element of $C(1) = 0$

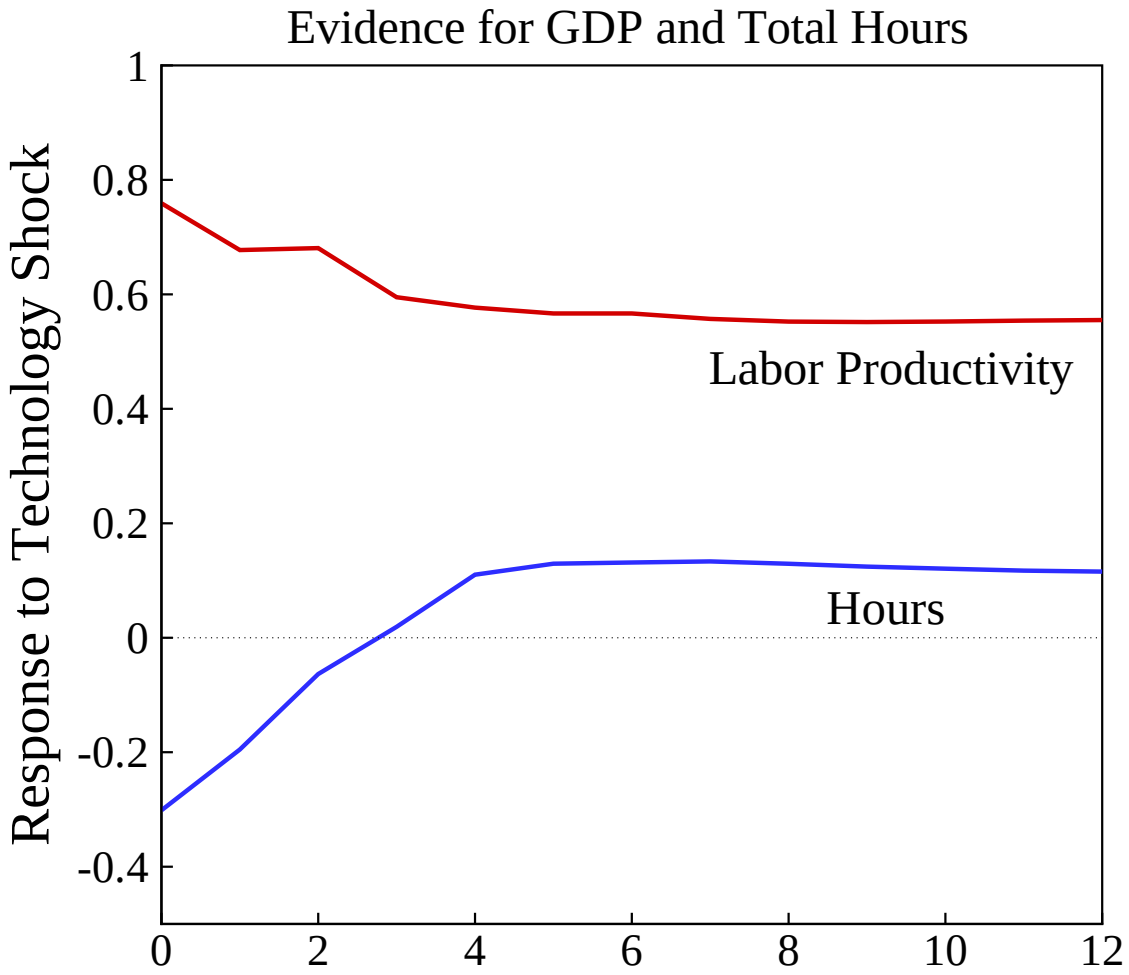
    $\Rightarrow$ demand shocks have no long-run effect on labor productivity

The Evidence that dooms RBC theory



- Technology shocks drive down hours! RBC Theory predicts opposite.

VAR RESULTS ROBUST TO DATA CHOICE



A Simple Check on Structural VAR Methodology

- What if "data" come from RBC model?
  - Take plain vanilla RBC model
  - Simulate time series from model
  - Apply GR methodology to data from model
  - Compare

    GR impulse responses with true responses

    GR technology with true technology

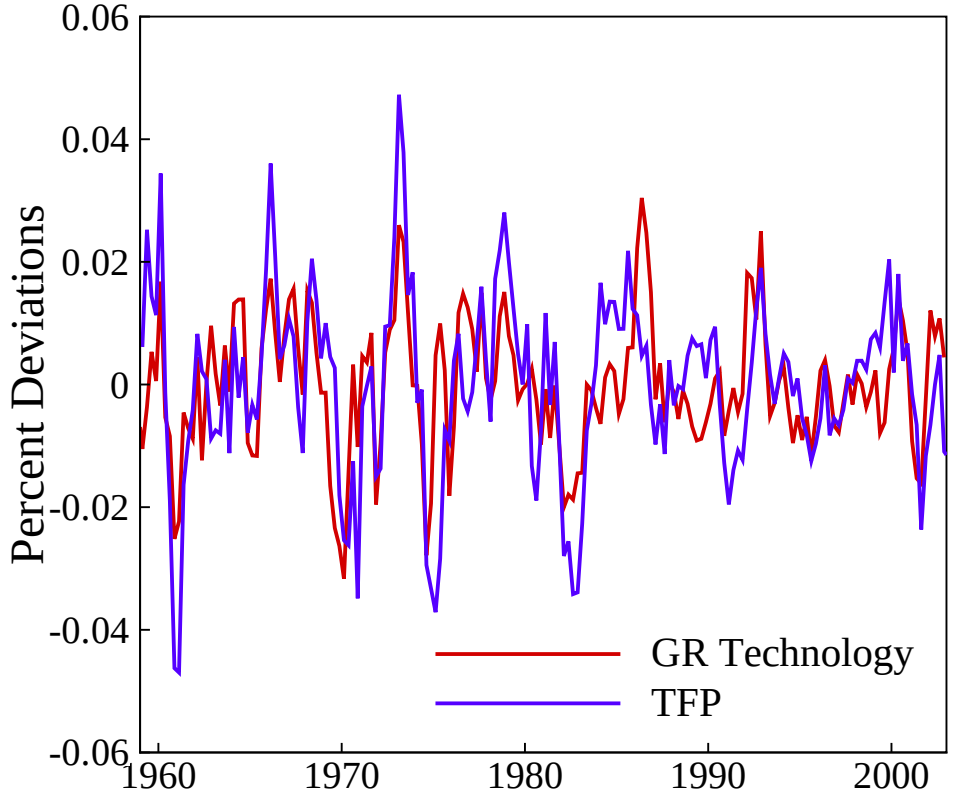
Specific Procedure

- Use RBC model with 4 shocks:
  - Technology = TFP
  - Government Spending
  - Labor wedge such that static f.o.c. holds ($U_L/U_C = (1-\tau)w$)
  - Investment wedge such that dynamic Euler equation holds
- Estimate vector stochastic process for these shocks using US data

Results of Simple Check

- Facts from my RBC model:
  - Positive technology shocks imply hours up
  - Significant contribution of technology to output spectrum (40%)
- GR methodology applied to data from my RBC model:
  - Positive technology shocks imply hours down!
  - Insignificant contribution of technology to output spectrum

Don't Get Out What You Put In



	GR	TFP
Output	.28	.84
Hours	−.12	.43

Correlations

Why do GR get it so wrong?

- GR identification assumes
  - primitive shocks uncorrelated
  - two shocks only ("demand" and "technology")
  - certain stationarity restrictions
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Problems with structural VARs well known
(Cooley and Dwyer, J. Econometrics 1998)

Time to Move On

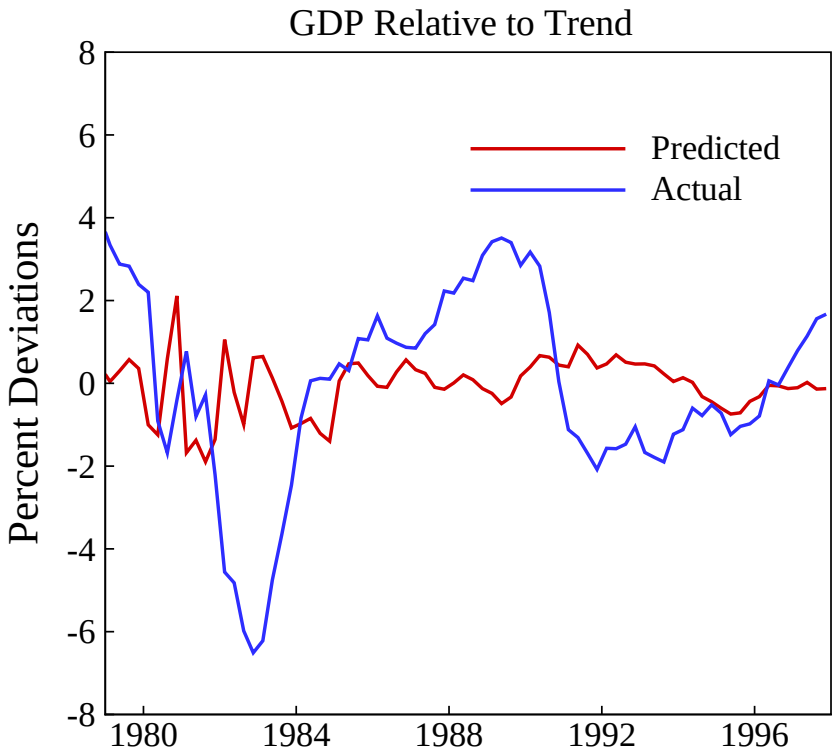
- VAR literature surveyed is stuck in the past
- Ignores 20 years of work since Kydland and Prescott (1982)
- Recent research looking to model sources of variation in TFP

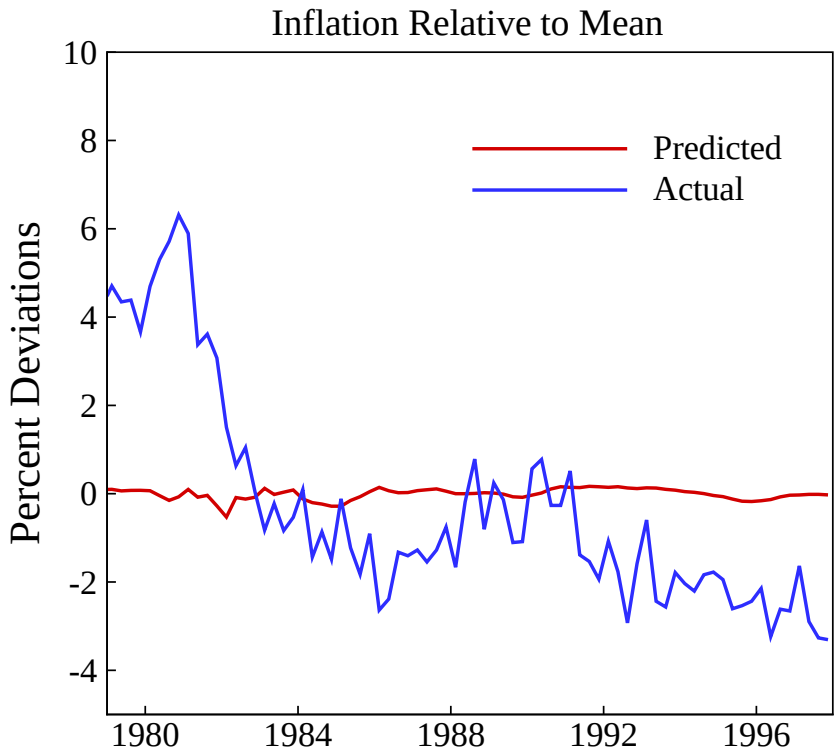
Now let's turn to factors that GR think are important....

After RBC models

- GR use VAR results to argue for a "triple-sticky" model:
  - Adding sticky prices, sticky wages, habit persistence
  - Subtracting investment, government spending, and net exports!
- Is point of triple-sticky model to have a role for money?
  - Nominal rigidities let money shocks have real effects
  - Habit persistence extends effects
- Is money the important demand shock?

Monetary Shocks Play Trivial Role





Predicted series from sticky model with monetary shocks from US data

Big Gap Left for Unobserved Factors

Contribution of Shocks to Total Variance

	Tech. Shocks	Money Shocks	Pref. Shocks	Price Markup	Wage Markup
Output growth	22.3	4.8	57.1	8.0	7.1
Inflation	6.1	27.1	36.3	13.7	14.7
Hours	0.8	0.4	70.0	17.6	9.6

Demand factors that matter

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  Counter: Just shifting black box from technology to preferences