Discussion of Liu, Wang and Zha (LWZ) "Land Price Dynamics and Macroeconomic Fluctuations"

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Federal Reserve Board

UCLA/FRBSF Conference on Housing and Macro, February 21, 2013

Summary of the paper

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- In KM, technology shocks that move asset prices relax investors' borrowing constraints, fueling a rise in investment and output.
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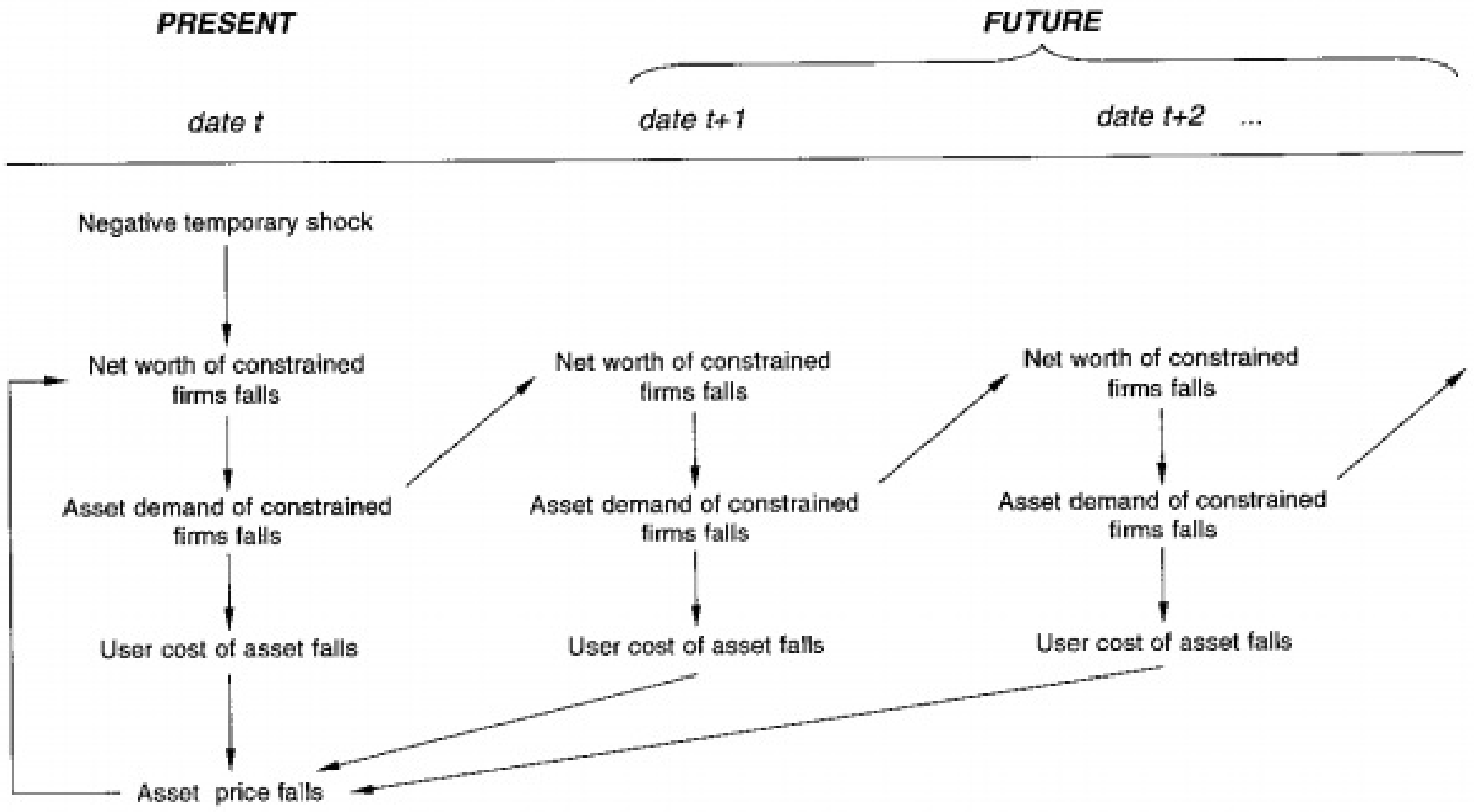
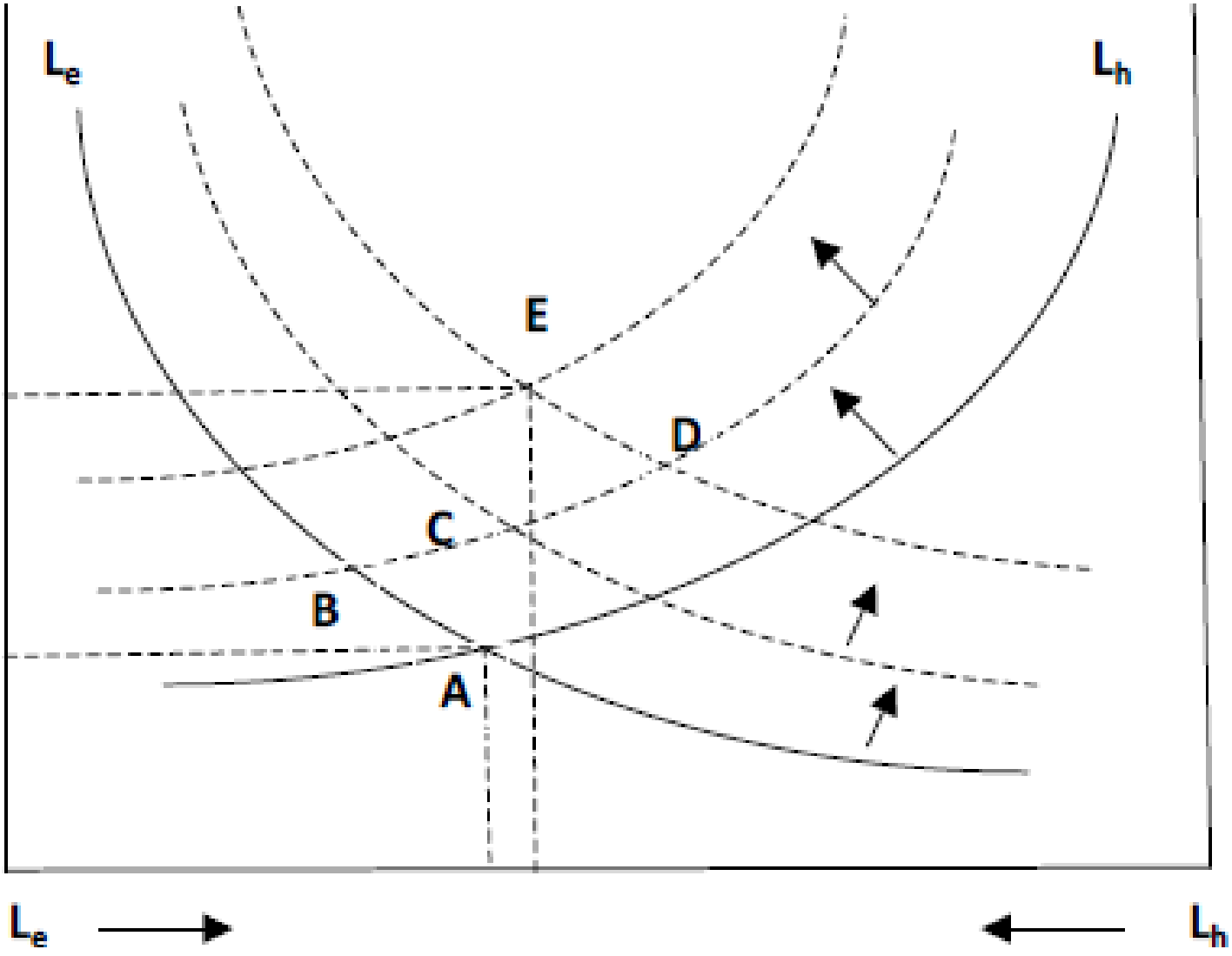
- LWZ reach different conclusions using a similar model. So what's different here?

Summary, Kiyotaki-Moore, 1997



Summary, LWZ, 2012



The key equations

- I pulled the key equations of LWZ from my earlier 2005 paper (a monetary version of KM with households and firms), although equations of this kind are ubiquitous in every borrower-saver model with households and firms.

$$\frac{q_t}{c_t^H} = \frac{\mathbf{j}}{h_t^H} + \beta E_t \left(\frac{q_{t+1}}{c_{t+1}^H} \right)$$

$$\frac{q_t}{c_t^E} = E_t \left(\frac{\gamma}{c_{t+1}^E} \left(\nu \frac{\mathbf{Y}_{t+1}}{h_t^E} + q_{t+1} \right) + \lambda_t m q_{t+1} \right)$$

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- The problem with KM was that movement in technology – which affect $\mathbf{Y}$ directly – are unlikely to move asset prices a lot.
- Instead, movement in $\mathbf{j}$ – housing demand shocks – can. LWZ emphasize these shocks as drivers of housing prices, and estimation gets lots of mileage out of them.

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- **nonlinearities?** the model is too complex to address them, and even if we do, they do not matter (footnote 14)
- Bottom line: you can bend us, but you will not break us

What Matters and What does Not

If results are robust to everything, it may mean that the model and the data do little to inform us about the strength of the particular mechanism in the paper
"the posterior distribution is full of thin winding ridges as well as local peaks"
However, what really seems to matter in the paper are two things

1. credit-constrained firms

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1. credit-constrained firms
2. loans b that respond one-for-one to changes in asset values q

$$b_t = \theta_t q_t L_t$$

...and the robustness checks that are not

In spite of all the robustness checks, the data are given little chance to single out counterfactual explanations

1. All firms (from Exxon Mobil and Apple to the richest households buying Lamborghinis) are credit–constrained in the model (durable expenditure only done by constrained agents). Why not letting unconstrained households to do part of the capital accumulation themselves?

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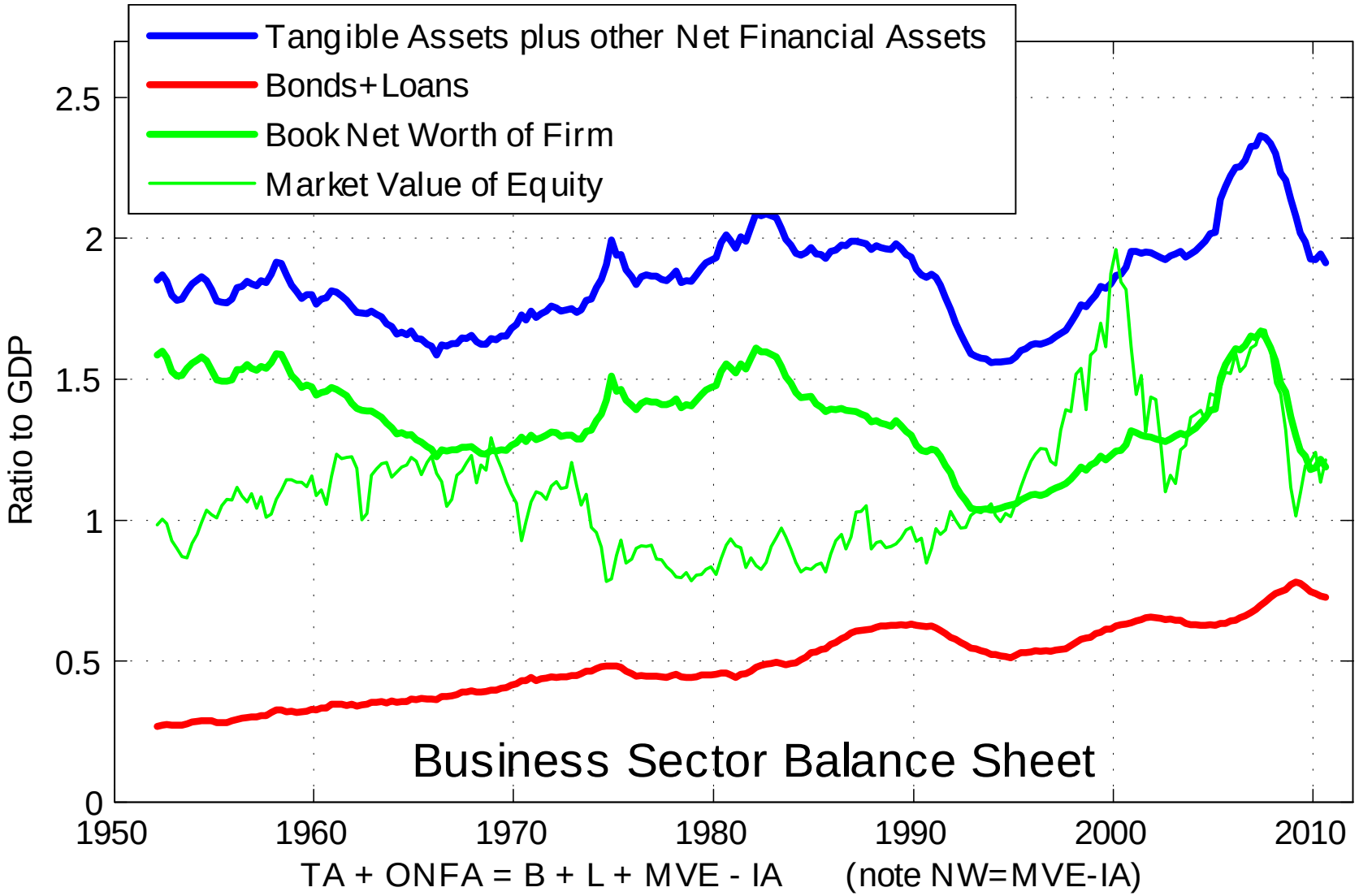
1. All firms (from Exxon Mobil and Apple to the richest households buying Lamborghinis) are credit–constrained in the model (durable expenditure only done by constrained agents). Why not letting unconstrained households to do part of the capital accumulation themselves?
2. In all estimation exercises, a 1% change in asset prices leads to a 1% change in credit. In the data, credit responds more sluggisly. Why not allowing for this?

$$b_t = \rho b_{t-1} + (1-\rho)\,\theta_t q_t L_t$$

In quarterly data, ρ close to $0.65 - 0.85$, depending on how you estimate it (see my paper "Financial Business Cycles")


Tangible Assets plus other Net Financial Assets
Bonds+Loans
Book Net Worth of Firm
Market Value of Equity
Ratio to GDP
2.5
2
1.5
1
0.5
0
1950
1960
1970
1980
1990
2000
2010
Business Sector Balance Sheet
TA + ONFA = B + L + MVE - IA (note NW=MVE-IA)

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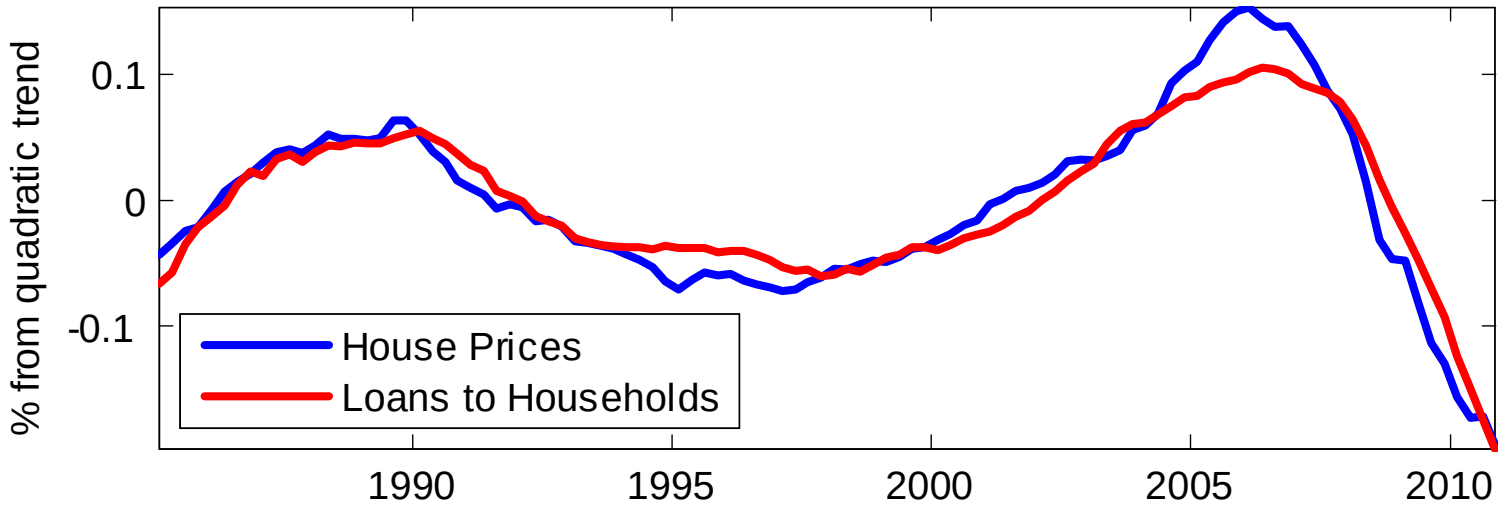
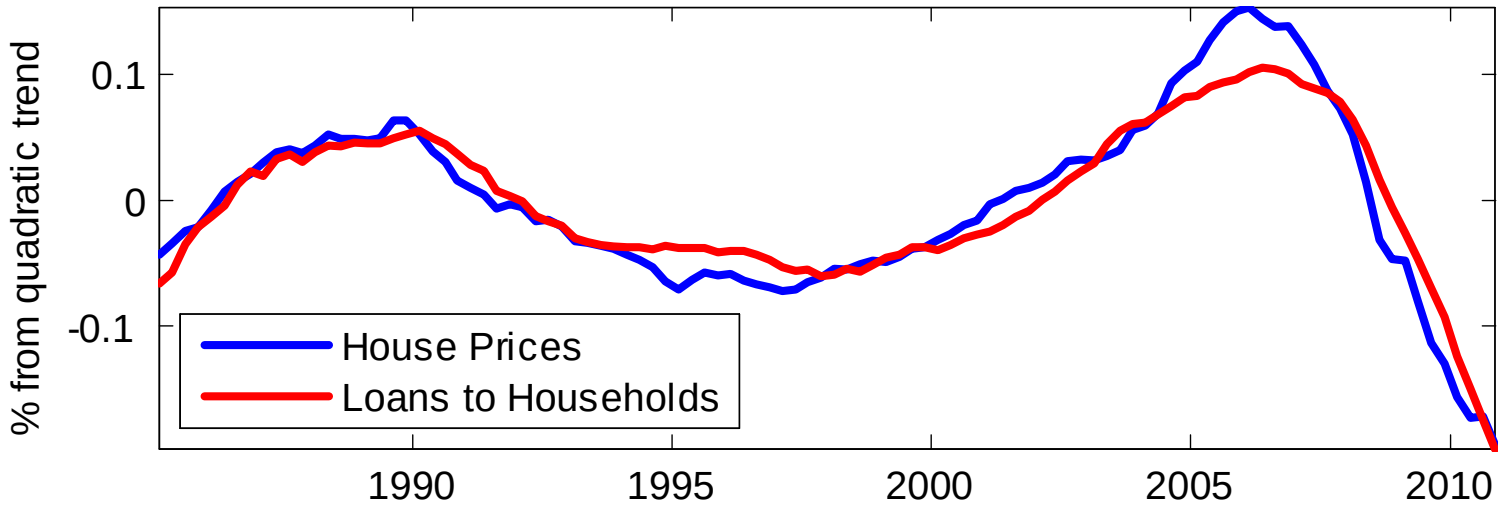
- House prices seem linked to lending and investment of firms through second round effects, rather than directly (see next figure)


% from quadratic trend
0.1
0
-0.1
House Prices
Loans to Households
1990
1995
2000
2005
2010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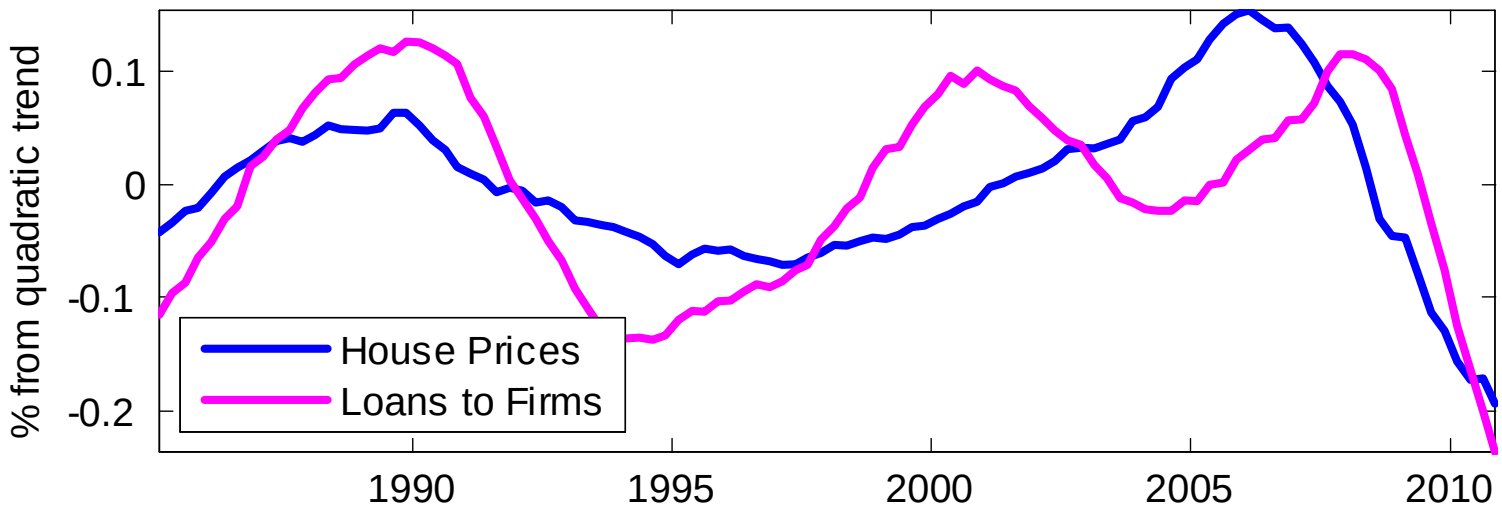
% from quadratic trend
0.1
0
-0.1
-0.2
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Three unanswered questions

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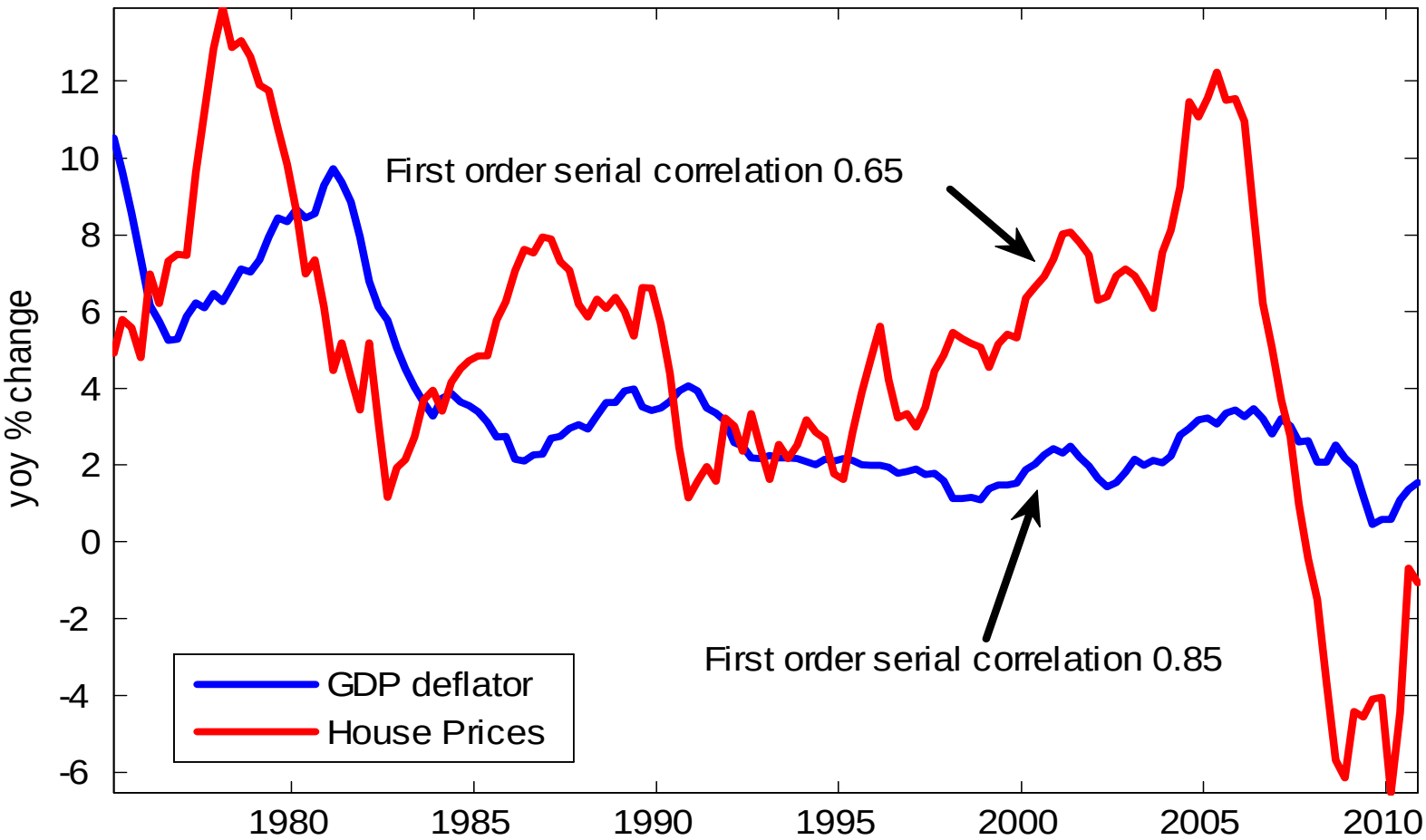
2. **Are the effects nonlinear?**
   No in the model, yes in the data.
3. **Don't housing busts hurt lenders** rather than borrowers when borrowers default ?
   Probably yes in the data, not in the model

1. Inflations Persistence

Table 2 shows that the two estimated financial shocks—a housing demand shock and a collateral shock—are both persistent and have large standard deviations relative to other shocks. The housing demand shock process is estimated to be very persistent mainly because the land price is a very persistent series. The 90% probability intervals indicate that all parameters in the model are tightly estimated.

Inflations Persistence: A Tale of Two Inflations



2. Are the Effects Nonlinear?

- So much as I love linearization, I am also Bayesian, and I have revised many of my priors following the financial crisis.
  One of my priors was that the shocks are small enough
  Of course, we can also rig the discount factors so that even with large shocks some constraints are always binding

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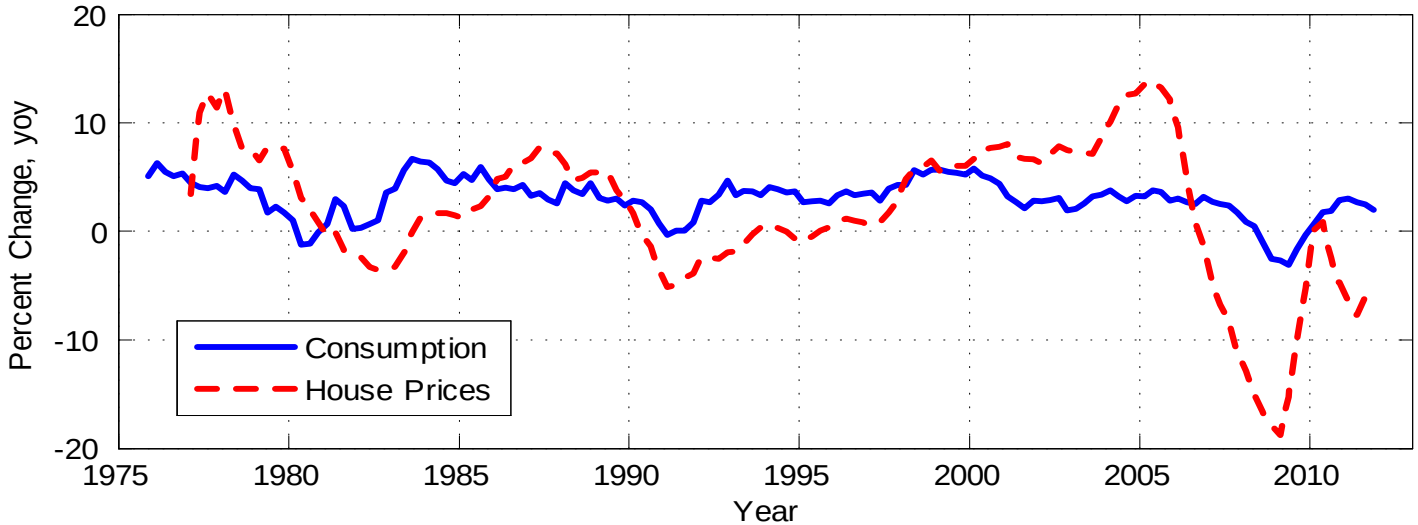
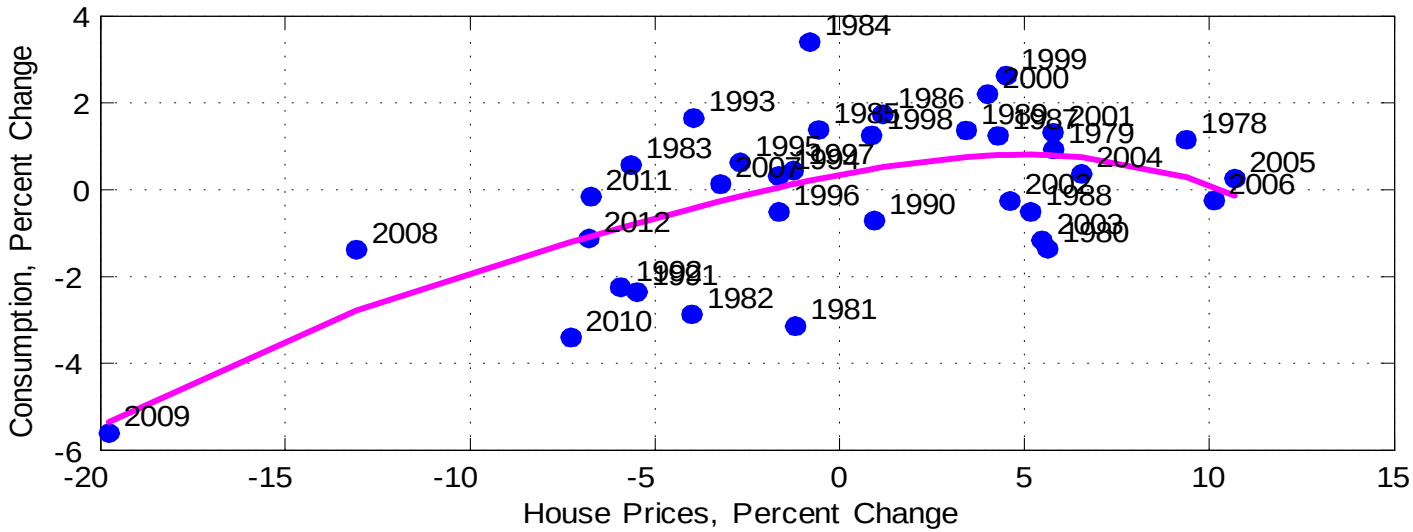
- When constraints are slack, model dynamics are inherently nonlinear
- If one does not model this aspect of the data, he/she will underestimate the fallout from a housing price decline as well as the policy implications of given measures geared at helping the housing market.

Are the Effects Nonlinear? Data



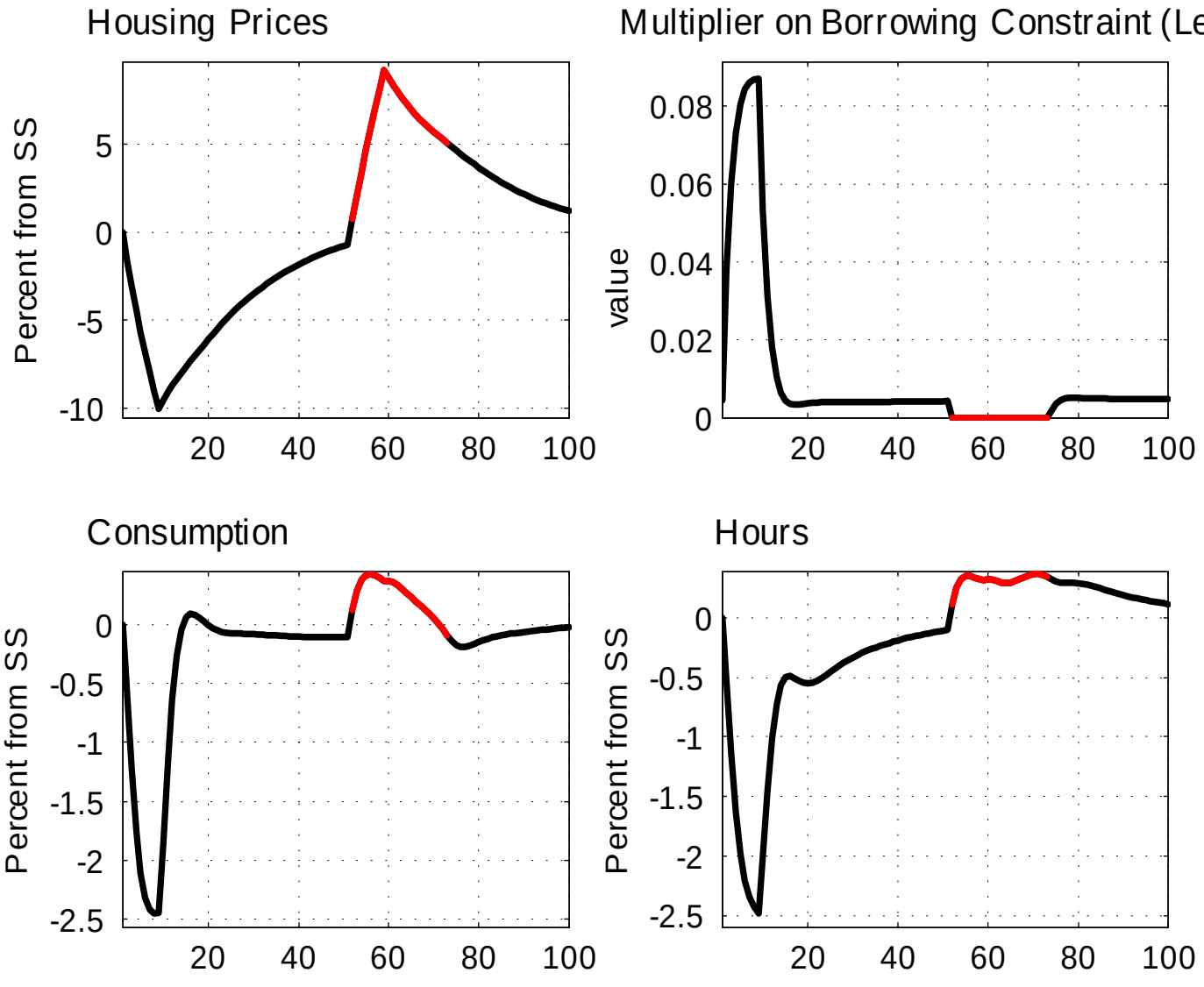


Are the Effects Nonlinear? Regressions

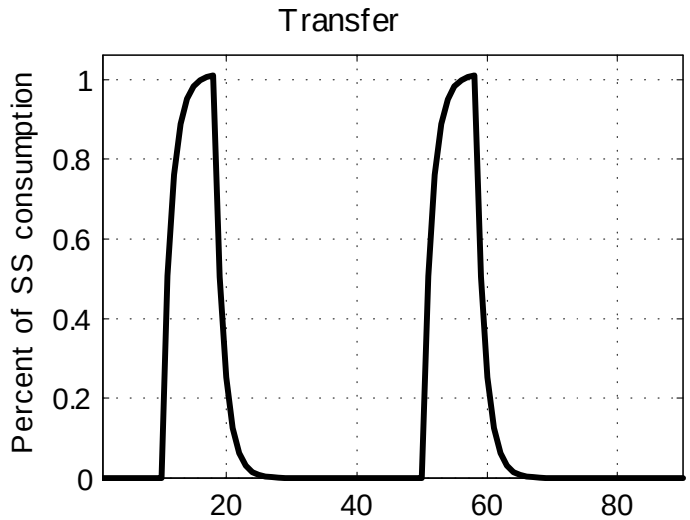
Table 6: MSA Level: Employment in Services and House Prices

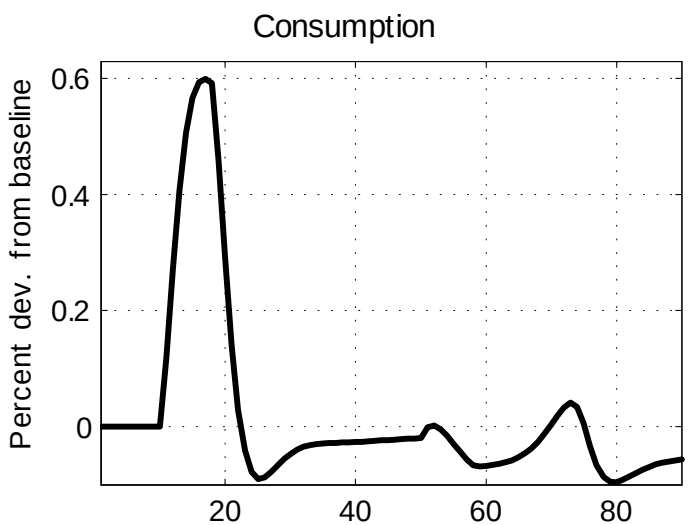
	% Change in Employment (Δemp_t)				
Δhp_{t-1}	**0.134*** **				
	(0.006)				
Δhp_high_{t-1}		**0.104*** **	**0.058*** **	**0.049*** **	**0.044*** **
		(0.008)	(0.007)	(0.008)	(0.008)
Δhp_low_{t-1}		**0.183*** **	**0.099*** **	**0.095*** **	**0.089*** **
		(0.009)	(0.008)	(0.010)	(0.010)
Δemp_{t-1}				**0.033**	**0.026**
				(0.041)	(0.041)
$\Delta income_{t-1}$					**0.040** **
					(0.019)
pval difference		**0.0000**	**0.0003**	**0.0001**	**0.0001**
Time effects	no	no	yes	yes	yes
Observations	5390	5390	5390	5147	5147
MSA	262	262	262	262	262
R-squared	0.09	0.10	0.37	0.39	0.40

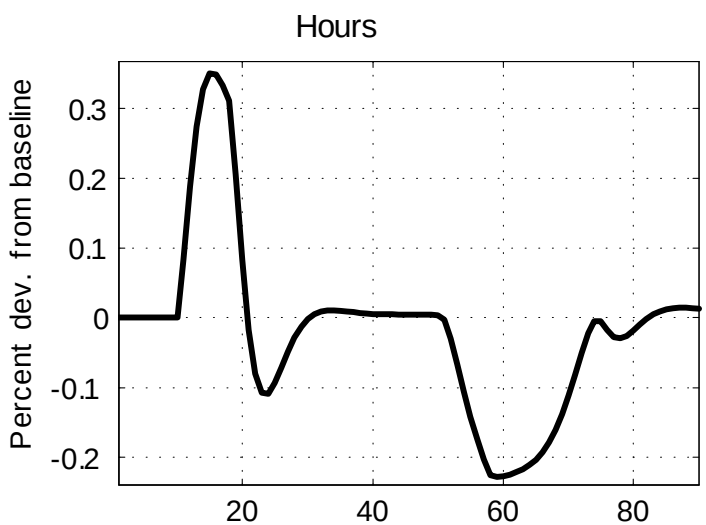
Are the Effects Nonlinear? Model



Nonlinear Effects? Model and Policy Experiments







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- Did firms get less access to credit because they had less collateral, or because banks had less capital?
- If banks are undercapitalized when house prices are low, modeling the financial sector becomes important

Conclusions

- This paper is a wonderful accomplishment
- It proves that collateral constraints matter not just qualitatively, but also quantitatively
- Hopefully, it will stimulate much needed further work in this area.