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

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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. The reaction by many papers to this idea was: cute, but quantitatively unimportant. Main problem with the KM paper was that TFP shock move asset prices very little. This led many to believe that credit cycles were not worth studying in quantitative DSGE models.
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- LWZ reach different conclusions using a similar model. So what’s different here?
CREDIT CYCLES

PRESENT

date $t$

Negative temporary shock

Net worth of constrained firms falls

Asset demand of constrained firms falls

User cost of asset falls

Asset price falls

FUTURE

date $t+1$

date $t+2$ ...

Net worth of constrained firms falls

Asset demand of constrained firms falls

User cost of asset falls

Net worth of constrained firms falls

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User cost of asset falls

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.

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

\[
\frac{q_t}{c_t^E} = E_t \left( \frac{\gamma}{c_{t+1}^E} \left( \nu \frac{Y_{t+1}}{h_t^E} + q_{t+1} \right) + \lambda_t q_{t+1} \right)
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- Instead, movement in \( j \) – 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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- The paper has several robustness checks on particular model assumptions, and it almost looks like nothing is crucial for the results
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Bottom line: you can bend us, but you will not break us
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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 Lamborghini) 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 sluggishly. Why not allowing for this?

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

In quarterly data, \( \rho \) close to 0.65 – 0.85, depending on how you estimate it (see my paper “Financial Business Cycles”)
TA + ON FA = B + L + MVE - IA

(\text{note NW}=\text{MVE-IA})

Tangible Assets plus other Net Financial Assets

Bonds + Loans

Book Net Worth of Firm

Market Value of Equity

Business Sector Balance Sheet

Ratio to GDP

0 0.5 1 1.5 2 2.5

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- Why not using the price of commercial real estate? (there are good data at least for the 1990 period and after...)

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

1. **Persistence in house price inflation.**
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2. **Are the effects nonlinear?**
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Three unanswered questions

1. **Persistence in house price inflation.**
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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.

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*The DSGE literature without financial frictions expects a wide range of the estimated values of the...
Inflations Persistence: A Tale of Two Inflations

First order serial correlation 0.65

First order serial correlation 0.85
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. Recent events suggest that more work will have to be done to capture important nonlinearities in the data. In Guerrieri and Iacoviello (2013), we find evidence that borrowing constraints could be slack during housing booms, tight during housing busts. 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.
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Are the Effects Nonlinear? Data
Are the Effects Nonlinear? Regressions

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

<table>
<thead>
<tr>
<th></th>
<th>% Change in Employment ($\Delta emp_t$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\Delta hp_{t-1}$</td>
</tr>
<tr>
<td></td>
<td>(0.006)</td>
</tr>
<tr>
<td></td>
<td>$\Delta hp_{high_{t-1}}$</td>
</tr>
<tr>
<td></td>
<td>(0.009)</td>
</tr>
<tr>
<td></td>
<td>$\Delta hp_{low_{t-1}}$</td>
</tr>
<tr>
<td></td>
<td>(0.041)</td>
</tr>
<tr>
<td></td>
<td>$\Delta income_{t-1}$</td>
</tr>
<tr>
<td></td>
<td>(0.019)</td>
</tr>
<tr>
<td>pval difference</td>
<td>0.0000</td>
</tr>
<tr>
<td>Time effects</td>
<td>no</td>
</tr>
<tr>
<td>Observations</td>
<td>5390</td>
</tr>
<tr>
<td>MSA</td>
<td>262</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.09</td>
</tr>
</tbody>
</table>
Are the Effects Nonlinear? Model

Housing Prices

Multiplier on Borrowing Constraint (Level)

Consumption

Hours
Nonlinear Effects? Model and Policy Experiments

Housing Prices

Transfer

Consumption

Hours
3. Do Price Declines Hurt Lenders or Borrowers?

- Did firms get less access to credit because they had less collateral, or because banks had less capital?
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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.