Is Housing the Business Cycle? A Multi-resolution Analysis for OECD Countries

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Summary

- Question: do measures of residential investment lead the business cycle, and if so, why?
- Addresses debate in the literature:
  - Leamer: housing is key leading indicator of business cycle.
  - Kydland, Rupert, Sustek: housing variables may be confounded with interest rates.
- Approach: decompose variables into cycles using wavelets.
  - Study correlations, estimate SVARs on a number of OECD countries.
- Main results:
  - Housing variables lead GDP.
  - SVARs: substantial variation explained by shocks that drive housing independent of interest rates.

Evaluation

- Question is important: does housing drive/predict the business cycle, or is it just picking up effect of interest rate changes faster?
  - Kydland, Rupert, Sustek: housing **starts or permits**, not investment, predictive in most countries.
  - Argue that all investment responds at the same time, but housing starts show up before nonresidential investment is completed.
- Wavelet decomposition seems like a novel and interesting tool.
- My comments:
  1. Is a two-sided filter safe for lead-lag correlations?
  2. Recursive identification scheme for SVARs might benefit from alternative interpretation.
  3. Could try local projections as a robustness check.

Wavelet Filter: Correlations

- Wavelet filter decomposes series into a trend component and many cycle components:

$$x_t = \underbrace{S_t}_{\text{trend}} + \underbrace{D_{1,t} + \cdots + D_{J,t}}_{\text{cycle}}.$$

- **Multiresolution** $\implies$ different cycle terms correspond to different frequency bands.
  - Advantage over e.g., HP filter which only produces a single cycle measure.
  - Overall, seems like a very useful tool for analysis of economic time series.

- Possible concern for this specification: filter appears **two sided**.
  - Incorporates future information into today's cycle estimates, could affect lead/lag?
  - Part of Leamer's point is that housing variables offer best indication of cycle **given today's data**.
  - Is it possible to use wavelets but restrict to one-sided information?

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SVAR Identification

- Structural VAR (SVAR) takes the form: $X_t = A_1 X_{t-1} + \ldots + A_k X_{t-k} + B e_t$
- "Structure" comes from identification of B (and structural shocks e_t).
  - Not a product of VAR estimation, needs additional assumptions.
- Authors use recursive identification scheme (lower triangular B):
  - Shock j out of n can affect variables $j, \ldots, n$ on impact, but not variables $1, \ldots, j-1$.
  - Essentially a **timing** assumption about which variables can affect each other within the period.
- Authors motivate SVARs using different proposed **causal** channels through which housing affects real activity, inspired by Mishkin (2007).
  - If causal chain runs from rates $\rightarrow$ housing starts $\rightarrow$ GDP, are we sure each step takes 1Q?
  - If housing variables move on their own, do interest rates react within the quarter?

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SVAR Identification: My Take

- Alternative interpretation: recursive ordering can be thought of as test of Kydland, Rupert, Sustek hypothesis that housing variables are driven by interest rates.
- Ordering housing after interest rates means that "housing shock" drives contemporaneous movement in housing uncorrelated with current changes in interest rates.
  - Conservative assumption, could be purging actual "housing" shocks that are correlated with interest rates through reverse causality.
  - But if remaining shock is still important, diminishes KRS critique.
- This already seems close to what the authors have in mind, but has different implications for what variables to include and ordering.
  - Instead of "causal pathway" just put variables you want to control for (interest rates) first, then housing variable, then other variables important to dynamics.

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Alternative: Local Projections

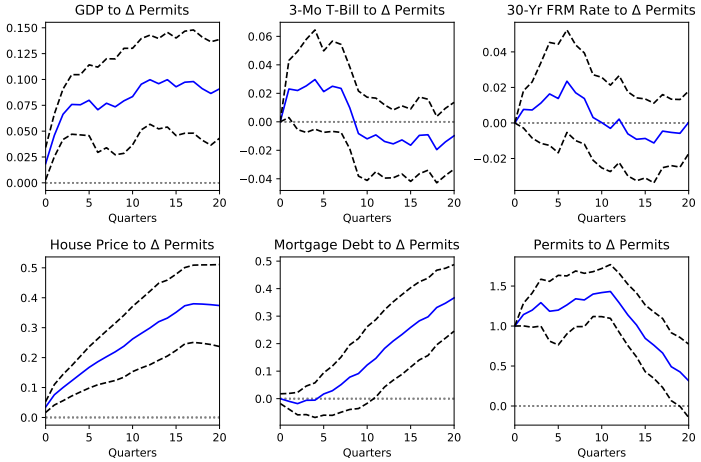
- As authors mention, SVAR analysis is only correct if true data generating process follows a VAR and the identifying assumptions for B.
- An alternative approach for robustness could be the local projections of Jorda (2005)

$$y_{t+h} = \text{const} + \beta\, \text{housing}_t + \theta(L)\, \text{rates}_t + \gamma' Z_{t-1} + \varepsilon_{t,t+h}$$

  where housing_t and rates_t are changes in housing and interest rate variables, and Z_{t-1} are controls (including y_{t-1}).
- Coefficient of interest: β.
- Should be more robust if VAR is misspecified, allows you to flexibly control for interest rate.

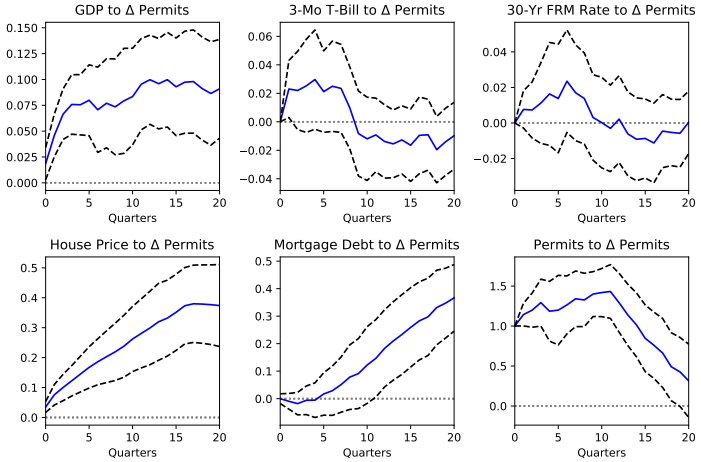
Alternative: Local Projections

- My (crude) attempt: use $\Delta \log \text{permits}_t$ as housing var, change in 3-Mo rate (+3 lags) and FRM rate as interest rate vars, put all other plotted variables in Z_{t-1}.



Alternative: Local Projections

- Finding that change in permits predicts GDP controlling for the interest rate holds up.



Conclusion

- Interesting paper using novel tool (wavelet decomposition) to take on important question.
- Main suggestions:
  - Check influence of two-sided filter.
  - Add more explanation of why wavelet decomposition differs from existing methods.
  - Directly describe SVAR identification assumption in terms of timing.