

Economics 742 Lecture 4:  
Housing III: Stabilization Policy  
Other Shocks I: Bartik and Monetary Shocks

Adam M. Guren

Boston University

Spring 2026

# Housing and Macro

1. Introduction
  - 1.1 Why is housing and macro interesting?
  - 1.2 How did I get to housing?
  - 1.3 My JMP: House Price Momentum
2. Question 1: How big are housing wealth effects? Why do they exist? Are they big in the aggregate?
3. Question 2: What explains the 2000s housing boom and bust (and rebound)?
4. Question 3: What types of housing market stabilization policy are effective?
5. Bonus: References for interesting topics I did not cover
  - 5.1 Monetary Policy and Housing Markets
  - 5.2 Behavioral Housing Economics
  - 5.3 Housing Supply

### Question 3:

What Types of Housing Market  
Stabilization Policies Are Effective?

## How Can Policy Limit House Price Cycles and Default?

- Big policy question, especially in a downturn.
- Start with a literature on what we can do *ex post*.
  - Given evidence on role of foreclosure, really about optimal foreclosure mitigation policy.
  - But also could do by looking at QE, etc. (won't do here, see Di Maggio, Kermani, and Palmer 2020).
  - Focus on evidence from two major government programs, HARP and HAMP.
- Given limitations and implementation frictions with *ex post* policy, will briefly touch on *ex ante* policy at the end.
- This is an area where in 2008 policy makers were flying blind and where research will make a big impact in the next crisis.

## What Was Done: HARP and HAMP

- Home Affordable Refinance Program (HARP)
  - Allow homeowners with GSE loans *who are current* to refinance even when underwater or above 80% LTV.
  - Initially limited take up; once remove frictions, takes off. 3 million refinancings with \$3k in annual savings.
  - Agarwal et al. (2022):
    - Regions more exposed saw increase in spending, lower foreclosures, higher consumption.
    - But limited by competitive frictions: borrowers favor existing lenders creating market power which reduces benefits 10-20%.
- Home Affordable Modification Program (HAMP)
  - Modify loans for delinquent borrowers to avoid foreclosure through financial incentives and gov't cost sharing.
  - Agarwal et al. (2017):
    - Reached only 1/3 of target due to low modification rate of a few large lenders. Also crowded out some private mods.
    - Regions more exposed to have lower foreclosures, higher house prices and consumption.

## Big Question: Principal Reduction or Payment Reduction?

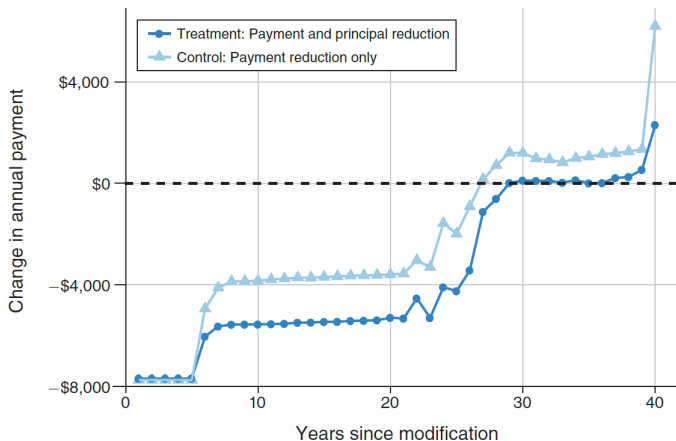
- Geithner: “The biggest debate was whether to try to reduce overall mortgage loans or just monthly payments.”
- Mian and Sufi: “The fact that ... the Obama administration did not push for debt write-downs more aggressively remains the biggest policy mistake of the Great Recession.”
- Obama in 2009 “invited seven of the world’s top economists...nearly all staid Obama should introduce a much bigger plan to forgive part of the mortgage debt owed by millions of homeowners who are underwater.”
- At same time, tea party movement started by people who do not want to bail out their recklessly borrowing neighbors (e.g. Rick Santelli’s “Chicago Tea Party” speech)
  - Obama’s response: The fire department puts out the fire rather than asking if it was caused by bad behavior.

## Principal or Payment: Ganong and Noel (2020)

- Difficulty in evaluating principal or payment: Most interventions do *both simultaneously* as mechanically linked.
- Ganong and Noel evaluate two natural experiments within HAMP which adjust each margin *separately*:
  1. Underwater borrowers who get the same payment reduction through principal reduction or other means (interest rate reduction and term extension).
    - RD for default probability.
    - Panel diff-in-diff for consumption for precision.
  2. Different reductions in short-term payments with same NPV of total mortgage payments due to private (more generous) vs. public (less generous) modification.
- Use data matching HAMP to credit reports and to JP Morgan Chase banking data.

## Principal or Payment: Ganong and Noel (2020)

- All HAMP loans reduce payment to 31% of income for 5 years.
- Can achieve through principal reduction or other means such as interest rate reduction and term extension.

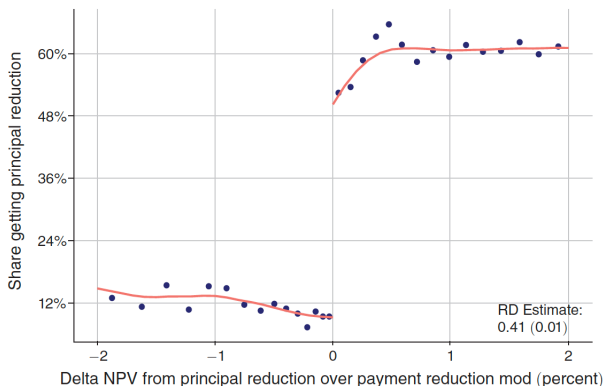




## Principal or Payment: Ganong and Noel (2020)

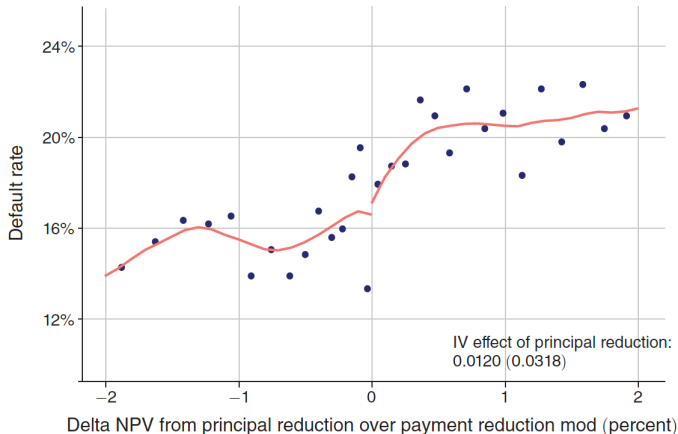
- Treasury calculates expected NPV to lenders of principal reduction (based on *ex post* wrong model).
- Ganong and Noel do a fuzzy RD on the Treasury's NPV:

Panel A. First stage: receive principal reduction



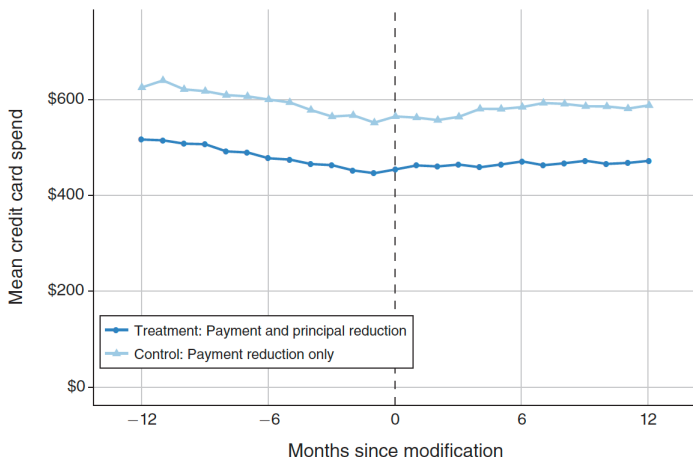
# Principal or Payment: Ganong and Noel (2020)

Panel B. Reduced form: mortgage default



- Precisely no effect of principal reduction on default.

# Principal or Payment: Ganong and Noel (2020)

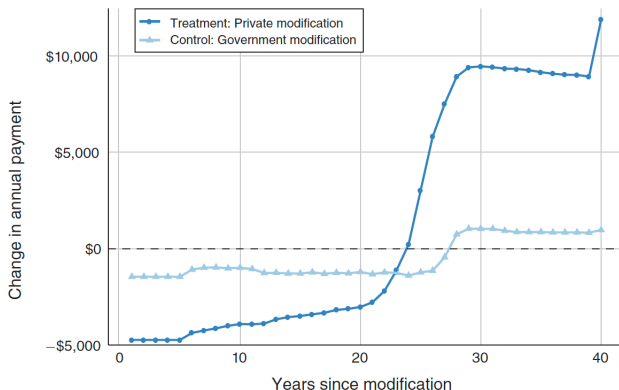


- Panel diff-in-diff shows precisely no effect of principal reduction on consumption.

## Principal or Payment: Ganong and Noel (2020)

- HAMP reduced payment to income to 31%. Private modifications reduce payments by more due to payment target.
- Reduce short-run payments by more by extending maturity, but leave NPV of total payments owed unchanged.

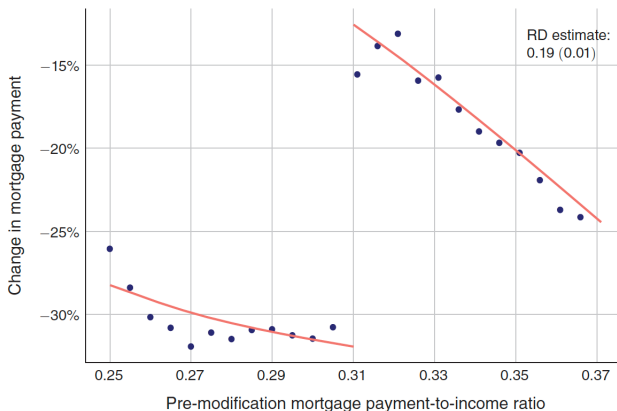
Panel A. Annual impacts on payments



# Principal or Payment: Ganong and Noel (2020)

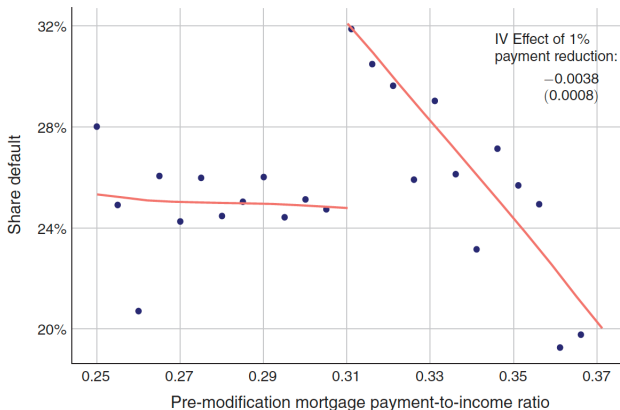
- Ganong and Noel do fuzzy RD on pre-modification PTI ratio:

Panel A. First stage: change in mortgage payment from modification



# Principal or Payment: Ganong and Noel (2020)

Panel B. Reduced form: mortgage default



- 1% payment reduction reduces default in two years post-modification by 0.38 percentage points, 1.2% of the mean 32% mean among modified loans.

## Ganong and Noel (2020) Take Aways

- Great example of interesting variation in housing micro-data; likely to have huge policy impact in the next foreclosure crisis.
- Clear economic interpretation:
  - Payment reduction relaxes constraints in the short-term.
  - Principal reduction gives wealth in states where housing market has already recovered, cannot tap in short run.
  - Constrained today → heavily discount these future states, eliminating short-run impact of principal reduction.
  - However, is likely that larger principal reduction to bring people above water may have stronger effects.
- Payment reductions through term extensions also much more cost effective, as principal reductions are expensive.
  - And very politically unpopular.

# Macroprudential Policy

- Given implementation frictions, recent literature has focused on policies that can be implemented *ex ante*.
  - Some empirical analysis of policies such as Dodd-Frank ability to pay rule (DeFusco et al., 2020).
  - Some analyses of policies like changing loan-to-value requirements, payment-to-income requirements, etc. often abroad (e.g., Greenwald, 2018, Allen and Greenwald, 2022, Garriga and Hedlund, 2022, etc.).
  - Also more general models of household macroprudential policy, e.g. Korinek and Simsek (2016).
  - Related to debate about whether credit affects house prices.
- Many open questions about optimal policy, although implementation limited by Congressional gridlock.



## Mortgage Design

- Other direction literature has gone: Contract design for *ex ante* stability, usually in structural life-cycle models.
- 1. Guren, Krishnamurthy, and McQuade (2021): Endogenous house prices and price-foreclosure spiral.
  - Lesson: Front-load payment reductions in recessions..
  - FRM→ARM convertible mortgage helps by switching to ARM when needed, refi back to FRM if advantageous.
- 2. Campbell, Clara, and Cocco (2021): Endogenous lender SDF.
  - Lesson: Term extension provides payment reductions in way that is attractive to risk-averse lender and minimizes up front costs to households.
- 3. Greenwald, Landvoigt, Van Nieuwerburgh (2021): Shared appreciation mortgages.
  - SAMs useful for geographic diversification and risk sharing, but aggregate SAMs hurt financial intermediary balance sheets in bad states and can be counterproductive.
- Worth revisiting in high-inflation environment.

# Conclusion

- That's all I have on housing, although in appendix at the end of the slides I included brief literature outlines for three additional topics:
  1. Monetary Policy and Housing Markets
  2. Behavioral Housing Economics
  3. Housing Supply
- I hope this was interesting and am happy to talk further!

# Other Sources of Micro Variation in Macro

# Outline

- For the next two lectures, I want to focus on sources of micro variation in macro that I have not covered in the housing unit.
- 1. Share-Shift “Bartik” Shocks
- 2. Monetary Shocks
- 3. Firm-Level Shocks
  - 3.1 Collateral and Bank Shocks
  - 3.2 Granular IV
  - 3.3 The Role of Credit in the Great Recession
- 4. Fiscal Multipliers
- Then on to aggregation of micro estimates.

## Share-Shift (“Bartik”) Shocks: Idea

- Popular shock because it uses *regional* data, which is more easily available.
- National-level shocks affect some regions more than others because they have a greater share of responsive agents.
- So consider a shock that interacts:
  - Initial *share* of responsive agents.
  - With the national shock, measured as the average shock across regions using a leave-out mean to prevent endogeneity.
- Often called a “Bartik Shock” because Blanchard and Katz (1992) cite Bartik (1991) as giving intuition.
- Used both as a shock and an instrument.
  - How are these different?

## Share-Shift (“Bartik”) Shocks: Examples

- “Classic” Bartik Shock to local employment is sum of local industry share  $\times$  national industry shock.
  - Intuitively, if steel nationally outside of Pittsburgh does badly, then Pittsburgh should do badly.
- Other “Industry” Share-Shift Shocks
  - Local wage shocks by worker skill (Diamond, 2016)
  - Decline of manufacturing (Charles et al., 2018)
  - Penetration of Chinese imports (Autor-Dorn-Hanson, 2013) or robots (Acemoglu and Restrepo, 2019)
  - Military spending shocks (Nakamura and Steinsson, 2014)
- Bank Share-Shift Shocks
  - Foreign bank shock (Peek and Rosengren, 2000)
  - Bank health in Great Recession  $\times$  bank locations prior to recession (Greenstone et al., 2020; Mondragon, 2020)
- MANY more.
  - Few year old econometrics papers have hundreds of cites.

## Share-Shift (“Bartik”) Shocks: Formalism

- Define the Bartik shock to location  $j$  at time  $t$  as

$$\Delta \log \hat{X}_{j,t} = \sum_{ind} (\log X_{ind,-j,t} - \log X_{ind,-j,t-1}) \frac{X_{ind,j,t_{base}}}{X_{j,t_{base}}}$$

- $-j$  is all locations but  $j$ .
  - Can do over any horizon.
  - $t_{base}$  can be  $t - 1$  but can also be a longer lag.
  - Need not be in logs
- “Classic” Bartik shock uses employment for  $X$  and is interpreted as labor demand shock.

## Example: Autor, Dorn, and Hanson (2013) “China Shock”

- What is the effect of import competition on labor markets?
  - Large increase in imports from China after it joined WTO.
  - Simultaneous decline in manufacturing in U.S.
  - Are these related?
- Approach: Look at local labor markets (commuting zones).
  - Shares: Industrial specialization within manufacturing.
  - Shift: Increase in Chinese imports by sub-industry due to differential Chinese comparative advantage.
- Change in Chinese import exposure per worker:

$$\Delta IPW_{uit} = \sum_j \frac{L_{ijt-1}}{L_{ujt-1}} \frac{\Delta M_{ucjt}}{L_{it-1}}$$

where  $u$  is U.S.,  $c$  is China,  $i$  is CZ, and  $j$  industry.

- Control for manufacturing share in regressions.



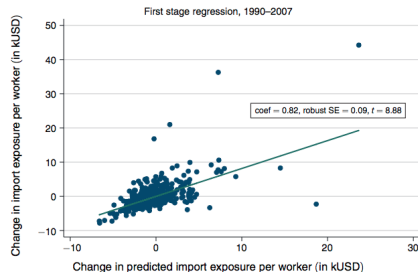
## Example: Autor, Dorn, and Hanson (2013) “China Shock”

- Chinese comparative advantage with U.S. is endogenous!
  - Instrument for U.S. import growth by industry with growth in imports by other high-income markets

$$\Delta IPW_{oit} = \sum_j \frac{L_{ijt-1}}{L_{ujt-1}} \frac{\Delta M_{ocjt}}{L_{i,t-1}}$$

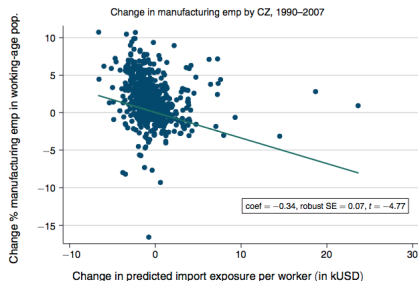
- 10 year lags to limit expectations of future trade.
- Turns out not to matter much.

Panel A. 2SLS first stage regression, full sample



## Example: Autor, Dorn, and Hanson (2013) “China Shock”

Panel B. OLS reduced form regression, full sample



- Relative to 25th percentile of exposure, 75th percentile has:
  - 4.5% fall in manufacturing employees.
  - 0.8 pp larger reduction in employment/population
  - 0.8% larger decline in wages.
  - 2-3.5% Increases in unemployment, disability, and transfer programs.

## Share-Shift (“Bartik”) Shocks: Basic Concerns

### 1. Pre-Shock Shares Correlated With Outcome

- If time lag is short and shocks are serially correlated.
- Endogeneity of shares.
  - Usually argue shares based on historical accidents.
  - Never clear to me if this is the dominant source of variation.

### 2. Shock is Correlated With Other Shocks

- For instance, bad banks go into worse areas, make worse loans, and then have worse national shocks.
- In “classic” Bartik, concern is corr with “labor supply shocks.”
  - Works if national growth rates are not correlated with the supply shock  $\Rightarrow$  industries are not too concentrated.
  - In reality, picks up mixture of supply and demand shocks.
  - E.g., If female labor supply expands nationally, Bartik shows it as demand shock to female-dominated industries.
- For OVB, need an omitted variable that is BOTH correlated with shares in cross section AND correlated with shocks in time series.

## Three Formalizations of Issues With Bartik

1. Adao, Kolesar, and Morales (2019): Inference, *shifts* random.
  - Cities have similar industrial shares; creates clustering problem.
  - Monte Carlos: Rejection rate for 5% CIs is 45-55%!
  - Novel standard errors to fix.
2. Borusyak, Hull, Jaravel (2021): Identification, *shifts* random.
  - Orthogonality between instrument and residual is equivalent to orthogonality between shocks and shock-level residual.
  - Valid when *shocks* idiosyncratic (quasi-random assignment), many, uncorrelated, and dispersed.
  - Tests: Placebos and first stage F statistics at level of shocks.
3. Goldsmith-Pinkham, Sorkin, and Swift (2020): Identification, *shares* random.
  - Reframe as coefficients from shock-weighted *share-level* IV.
  - Diff-in-diff exposure design with exposure based on *shares*.
  - Tests based on diff-in-diff interpretation, over ID, exog of shares. Provide weights to show what industries matter.
- Depends on setting, but my view is random shifts typically makes most sense.

# Monetary Shocks

- There are generally three approaches used:
  1. **VAR** Evidence of Christiano, Eichenbaum, and Evans (2005)
  2. **Narrative Approach** of Romer and Romer (1989, 2004)
  3. **High Frequency Identification**
- I discussed the VAR approach and Cholesky decomposition assumptions at length in 704, but only briefly discussed the later two approaches.
  - I want to go into some greater detail and discuss outstanding issues in the literature today, which will be useful for HANK.
  - Good reference on reconciling (1) and (2): Coibion (2012).
- Good but skeptical summary:  
Ramey (2016) Handbook of Macro Chapter
  - General Take: VAR and Local Projection across methods and time periods is unstable, doesn't know what to make of it.
  - I am more positive on usefulness of these methods.

## Romer-Romer Narrative Approach

- Really two approaches: 1989 Narrative and 2004 Shock Series.
- Narrative Approach (Romer-Romer 1989, Updated in 2023 AEA Presidential Address)
  - Go through transcripts and historical record, pick out Fed meetings where change in monetary policy is unrelated to state of economy (e.g., a change in the Fed's preferences).
  - Only determine 5 years after when transcripts released.
  - Just a set of dummy variables for a few meetings.  
Can run IRFs on these dummies.
- Examples:
  - Contractionary: In December 1988, change view of what level of inflation is acceptable and raise rates.
  - Expansionary: January 1972 think unemployment has settled at too high a level and lower rates.
- No monetary shocks 1988-2016, only one expansionary shock over entire series.
- Typically not what people use.

## Romer-Romer (2004) Shocks

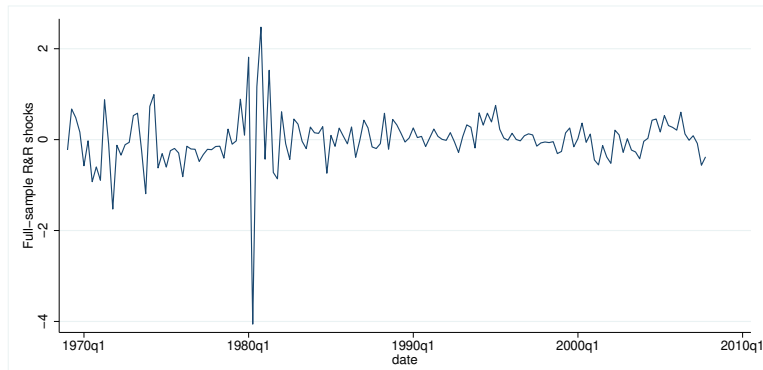
- Fed staff produces “Greenbook” forecast for each meeting. Shock is change in fed funds rate unrelated to forecast.

$$\begin{aligned}\Delta ff_m = & \alpha + \beta ffb_m + \sum_{i=-1}^2 \gamma_i \Delta \tilde{y}_{mi} + \sum_{i=-1}^2 \lambda_i (\Delta \tilde{y}_{mi} - \Delta \tilde{y}_{m-1,i}) \\ & + \sum_{i=-1}^2 \phi_i \tilde{\pi}_{mi} + \sum_{i=-1}^2 \theta_i (\tilde{\pi}_{mi} - \tilde{\pi}_{m-1,i}) + \rho \tilde{u}_{mo} + \varepsilon_m\end{aligned}$$

- $\Delta ff_m$  is change in intended FFR at meeting
  - $ffb_m$  is level before meeting.
  - $\tilde{y}$ ,  $\tilde{\pi}$ , and  $\tilde{u}$  are forecasts of output, inflation, and unemp.
  - Use both forecasts and change in forecasts since last meeting.
- Then  $\varepsilon_m$  is the Romer-Romer shock which is typically used
    - Updated version 1969-2007 on Johannes Wieland's website is what people frequently use as “Romer-Romer shocks.”

## Romer-Romer (2004) Shocks

- Advantages: Large and statistically powerful shocks.
- Most of variation from Volcker, some from pre-Volcker. Little variation since 1988.
  - Unclear if advantage or disadvantage.
  - In a few years when 2021 and 2022 Greenbooks released we may have more shocks!



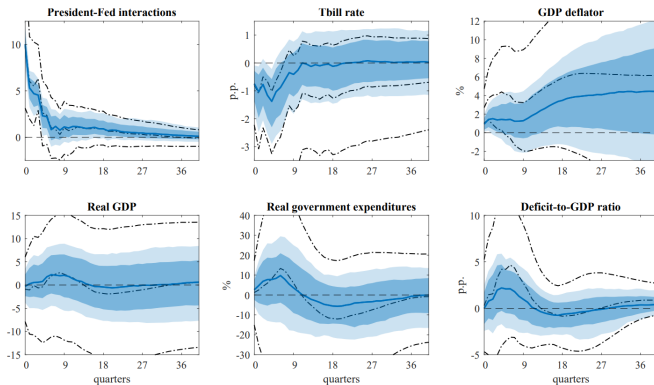


## Narrative Approach: Large Shocks

- Can also use narrative approach to argue large changes are exogenous.
  - E.g., Friedman and Schwartz (1963), Mussa (1986) discussed in 704.
- Example: Coglianesse, Olsson, and Patterson (2025).
  - In 2010-11, the Riksbank raised rates nearly 2% despite below target inflation and above target unemployment due to financial stability concerns.
  - Use amazing Swedish data to look at effect on unemployment.
  - Tests to rule out confounders, argue it was monetary shock.
- Findings:
  - Unemployment rose 1-2 pp.
  - Sectors with nominal wage rigidity drove response.
  - Find it was highly regressive.

# Narrative Approach: Other Shocks

- Drechsel (2026) uses narrative approach to look at impact of political pressure on Fed.
  - Narrative approach using Nixon's pressure on Burns 1971-3.
  - Shows it affects inflation but not output. Nixon's pressure increased price level 14% over 10 years.

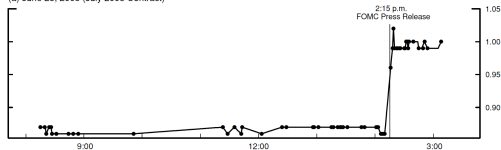


## High Frequency Identification

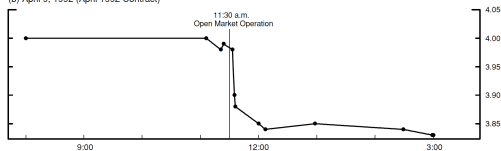
- Monetary policy news is lumpy and revealed at FOMC meetings.
  - How can we use this for identification?
  - Zoom in on tight (15-30 min) windows around Fed policy announcements. Response of Fed Funds futures in these windows reflects “surprise” component of monetary policy.
- Assumption: Unexpected changes in those windows are only due to Fed, not other factors.
- Most credible identification, but lower power because:
  - Shocks are small
  - Sample is short since late 80s and does not include Volcker.
- 2 Versions of this:
  1. Look at high frequency financial variables in same window.
    - More successful.
  2. Time aggregate the shocks and look at infrequent outcomes.
    - More skepticism warranted, but potentially more interesting.

# High Frequency Identification

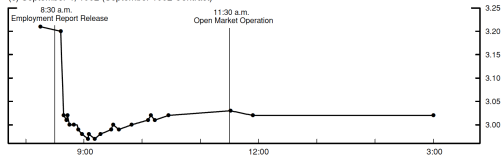
(a) June 25, 2003 (July 2003 Contract)



(b) April 9, 1992 (April 1992 Contract)



(c) September 4, 1992 (September 1992 Contract)



Source: Gurkaynak, Sack, and Swanson (2005)

## High Frequency Identification: High Frequency Outcomes

- Gurkaynak, Sack, and Swanson (2005)
  - Split into “target” factor (unexpected changes in current FFR) and “path” factor (“changes in future rates orthogonal to current”) using principal components.
  - Path matters more for response of long-term Treasury yields.
- Nakamura-Steinsson (2018)
  - Show monetary news leads to large and persistent changes in real rates and small changes in expected inflation.
    - Strong evidence for non-neutrality.
  - Method: Compare response of Treasuries and TIPS over yield curve to policy news shock (first principal component of change in 5 Fed Funds Futures; similar to GSS “path”).
  - But survey estimates of expected output growth *rise* in response to news shock that raises term structure of real rates!
  - Explanation: **“Fed Information Effect.”** Fed not only revealing future policy but also macroeconomic information.

## High Frequency Identification: Low Frequency Outcomes

- Angrist, Jorda, and Kuersteiner (2017), Ramey (2016): High frequency shocks with non-parametric methods (e.g. local projection) are **under-powered**.
- Gertler and Karadi (2015): **External Instruments VAR**
  - Intuition: Use VAR structure to make high frequency approach much more powerful.
  - Time-aggregated high frequency shocks used as instruments using Stock and Watson “external instrument VAR” or “proxy SVAR” method. Iterate VAR to get IRF.
  - Find statistically significant non-neutrality.
- See also Gorodnichenko and Weber (2016), Wong (2021), Ottonello and Winberry (2020), etc.
  - Even if shocks small and imprecise for aggregates, differential responses by groups can elucidate MP transmission.
- **Have to think carefully about standard errors.**
  - Especially in a panel.

# High Frequency Identification: Most Recent Literature

- **Predictability of High Frequency Shocks**
  - Cieslak (2018) and Bauer and Swanson (2023) show shocks corr with macro data announcements that precede FOMC.
  - Bauer and Swanson (2022, Macro Annual) orthogonalize on financial data to create more exogenous series.
- **Revisiting the Information Effect:**
  - Acosta (2023): Splits monetary and information shocks by looking at how FFR and GDP expectations respond.
  - Bauer-Swanson (2023) argue Fed information effect is really a Fed response to news.
    - If control for news, output response flips sign.
    - Survey forecasters and say revise in response to news not Fed.
- **Speeches:** Bauer and Swanson (2022) incorporate press conferences, speeches, and testimony by Fed Chair.
  - More important than FOMC; increases statistical power

## High Frequency Identification: Most Recent Literature

- **State of the Art:** Use monetary shocks *orthogonalized on news series*.
  - Bauer and Swanson (2023) good reference for best practices.
- However, there is a lot of **controversy** about how to do this.
  - Concerns about over-controlling for things that should not be orthogonalized.
  - For instance, Bauer and Swanson control for S&P 500 returns, change in yield curve slope and commodity prices, and bond yield skewness. Are these all things we want to purge?
  - Finally, Amodeo (2025) argues that the details of the time aggregation of the orthogonalization matters.
- I suggest using multiple series for robustness.
  - Not all shocks work, especially when time aggregated.
- High frequency shocks have also been used creatively in non-monetary contexts, such as climate change (Kanzig, 2026) or fiscal policy (Yding, 2025).



## High Frequency Identification: LP vs. SVAR

- Plagborg-Moller and Wolf (2021)
  - **LP and VAR( $\infty$ ) estimate the same IRFs in population.**
  - Implications:
    1. LP and VAR are two different dimension reduction techniques for finite samples.
    2. Structural estimation with an IV can be carried out by ordering instrument first in a recursive VARs.
- Li, Plagborg-Moller, and Wolf (2024)
  - **Bias-variance tradeoff** between LP (lower bias) and VAR (lower variance at intermediate and long horizons).
  - Unless overwhelmingly concerned with bias, LP is not optimal.
  - Mean squared error prefers VARs. Shrinkage via Bayesian VAR or penalized LP is attractive.
  - Intuition: Reduce bias a lot by taking advantage of “smoothing” of IRFs.
- Best summary of external instruments SVAR method: Watson discussion of Bauer and Swanson (2022).

## The Next Frontier? Text For Monetary Shocks

- Finally, recently several interesting papers using text as data to study monetary policy.
  - Tarek is world expert on text as data!
- Two recent interesting papers:
  1. Aruoba and Drechsel (2025): New shock series in spirit of Romer-Romer, but use full text of Fed briefing materials rather than only numerical forecasts.
    - Argue fewer and smaller but better identified monetary shocks.
    - Stronger results than typical R-R shocks in a Bayesian VAR.  
Really like this!
  2. Cieslak, Hansen, McMahon, and Xiao (2024): Use text to create a measure of policy maker uncertainty.
    - Increase in uncertainty leads to more hawkish stance orthogonal to fundamentals.
    - Potentially a useful measure?

# Bonus Material: Literature Guides For Related Topics

## Today I Could Not Cover Everything

- Lots of other interesting topics in housing and macro.
- Wanted to provide a brief literature guide to three:

# Monetary Policy and Housing Markets

- Empirical
  - Di Maggio et al. (2017, AER): Rate resets and consumption
  - Beraja et al. (2019, QJE): Regional heterogeneity and QE
- Transmission through housing markets
  - Wong (2021, WP): Refinancing and Transmission of MP to Consumption by Age
  - Greenwald (2018, WP): Mortgages and MP transmission with PTI constraints
- Limited ammunition when people have low mortgage rates
  - Berger et al. (2021, AER)
  - Eichenbaum-Rebelo-Wong (2022, AER)

# Behavioral Housing Economics

- Loss aversion:
  - Genesove and Mayer (2001, QJE): The original
  - Andersen et al (2022, AER): Structural behavioral estimation with amazing data to disentangle things. Highly recommend
- Failure to Refinance
  - Andersen et al. (2020, AER)
- Expectations
  - Kuchler-Piazzesi-Stroebel (2022, Handbook) Survey
  - Armona-Fuster-Zafar (2019, Restud) Clever informational experiment to show how people update
  - Kuchler-Zafar (2019, JF) Personal experience and expectations
  - Kindermann et al. (2021, WP): Expectational differences for renters vs. owners

# Housing Supply

- Bedrock and canonical topic
- Saiz (2010) discussed above.
- Ed Glaeser is the expert here
  - Glaeser-Gyourko (2018, JEP) is outstanding literature guide, as is Gyourko and Molloy (2015).
  - Glaeser-Gyourko (2005) is a favorite.
- Baum-Snow and Han (2024): Excellent recent paper estimating housing supply elasticities at county and tract level.
  - Lower than Saiz due to more recent period.