Discussion of Garriga, Kydland and Sustek
“Mortgages and Monetary Policy”

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Federal Reserve Board

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The views expressed in this paper are solely the responsibility of the author and should not be interpreted as reflecting the views of the Board of Governors of the Federal Reserve System or of any other person associated with the Federal Reserve System.
Summary of the Paper

1. This paper studies monetary policy transmission in a housing model with prices that are fixed for 30 years.

2. In certain circles, assuming nominal rigidities of this size is considered a major crime.

3. Interesting spin: the nominal rigidity here applies to mortgage payments.

4. Unlike price rigidity, this is a rigidity that is harder to question, and needs no fairy to be justified.
Main Findings of the Paper

Monetary policy characterized by **shifts in the inflation target**.

Two channels of monetary policy transmission:

1. **Price channel** (tilt/frontloading effect): higher inflation increase current real payments relative to future real payments $\Rightarrow$ hurts borrowers, even if it is neutral for investors

2. **Wealth effect channel**: higher inflation reduces current and expected future real payments on outstanding mortgage debt and thus increases disposable income.
   - ARM: high inflation, higher interest rates, higher real payments (price channel dominates)
   - FRM: high inflation, lower real payments (wealth channel dominates)
Central Element of Transmission and Main Findings

Responses to 1 percentage point rise in inflation
Central Element of Transmission and Main Findings

- Monetary Policy Redistributes Wealth under Market Incompleteness (Figure 4 in the paper)

- ARM: High Inflation $\rightarrow$ Higher Debt Payments on Impacts $\rightarrow$ Borrowers’ Wealth Drops $\rightarrow$ Borrowers’ Consumption Drops $\rightarrow$ Borrowers’ Hours Increase $\rightarrow$ GDP up (relatively by a lot)

- FRM: High Inflation $\rightarrow$ Lower Debt Payments on Impacts $\rightarrow$ Borrowers’ Wealth Increases $\rightarrow$ Borrowers’ Consumption mildly rises $\rightarrow$ Borrowers’ Hours slightly fall $\rightarrow$ GDP down (relatively by little)
Discussion

- My discussion will focus on two main issues
Discussion

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- (1) Beauty
Discussion

- My discussion will focus on two main issues
- (1) Beauty
- (2) Truth
Beauty

- The channel and mechanisms by which surprises in inflation redistribute wealth is a classic.

A partial and incomplete list includes: Algan-Ragot, Auclert, Bernanke, Brunnermeier-Salnikov, Camera-Chien, Doepke-Schneider, Fischer-Modigliani, Fisher, Gornemann-Kuester-Nakajima, Meh-Rios-Rull-Terajima, myself, Sheedy, Sterk-Tenreyro, Tobin GKS give proper and ample credit to many of them...

- What is new (and brilliant) in this paper is:
  - the illustration of the key channels
  - the quantitative application to one of the key markets where unanticipated inflation matters, both in the simple 2-period model and in the infinite–horizon version
Beauty (continued)

- The model is beautiful and perhaps true too, as it beautifully seems to fit moments
Beauty (continued)

Table 2: Nonstochastic steady state and long-run averages of data

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Model</th>
<th>Data</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normalized:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$Y$</td>
<td>1.0</td>
<td>N/A</td>
<td>Output</td>
</tr>
<tr>
<td>Targeted in calibration:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$K$</td>
<td>7.06</td>
<td>7.06</td>
<td>Capital stock</td>
</tr>
<tr>
<td>$H$</td>
<td>5.28</td>
<td>5.28</td>
<td>Housing stock</td>
</tr>
<tr>
<td>$X_K$</td>
<td>0.156</td>
<td>0.156</td>
<td>Capital investment</td>
</tr>
<tr>
<td>$X_S$</td>
<td>0.054</td>
<td>0.054</td>
<td>New housing structures</td>
</tr>
<tr>
<td>$N$</td>
<td>0.255</td>
<td>0.255</td>
<td>Hours worked</td>
</tr>
<tr>
<td>$\frac{M}{(wN - \Psi T)}$</td>
<td>0.185</td>
<td>0.185</td>
<td>Debt-servicing costs (pre-tax)</td>
</tr>
<tr>
<td>$t^M$</td>
<td>0.0233</td>
<td>0.0233</td>
<td>Mortgage rate</td>
</tr>
<tr>
<td>Not targeted:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aggregate mortgage variables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\bar{D}$</td>
<td>1.61</td>
<td>2.35†</td>
<td>Mortgage debt</td>
</tr>
<tr>
<td>$\gamma$</td>
<td>0.0144</td>
<td>0.0118†</td>
<td>Amortization rate</td>
</tr>
</tbody>
</table>
## Beauty (continued)

Table 3: Business cycle properties

<table>
<thead>
<tr>
<th></th>
<th>US data</th>
<th>Model</th>
<th></th>
<th>US data</th>
<th>Model</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>FrM</td>
<td>ARM</td>
<td></td>
<td>FrM</td>
<td>ARM</td>
</tr>
<tr>
<td><strong>Std(Y)</strong></td>
<td>1.92</td>
<td>0.94</td>
<td>1.04</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Rel. std</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>0.42</td>
<td>0.42</td>
<td>0.35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Xs</td>
<td>6.94</td>
<td>9.48</td>
<td>8.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Xk</td>
<td>2.45</td>
<td>1.76</td>
<td>3.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\pi)</td>
<td>0.58</td>
<td>0.85</td>
<td>0.81</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(i)</td>
<td>0.58</td>
<td>0.85</td>
<td>0.85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(i^F)</td>
<td>0.35</td>
<td>0.77</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(i^F - i)</td>
<td>0.42</td>
<td>0.21</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(q)</td>
<td>0.58</td>
<td>0.18</td>
<td>0.15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(p_H)</td>
<td>1.57</td>
<td>1.13</td>
<td>0.97</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Corr with Y</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>0.79</td>
<td>0.88</td>
<td>0.94</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Xs</td>
<td>0.60</td>
<td>0.99</td>
<td>0.85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Xk</td>
<td>0.73</td>
<td>0.92</td>
<td>0.83</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\pi)</td>
<td>0.14</td>
<td>0.23</td>
<td>0.41</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(i)</td>
<td>0.36</td>
<td>0.32</td>
<td>0.48</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(i^F)</td>
<td>0.01</td>
<td>0.09</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(i^F - i)</td>
<td>-0.49</td>
<td>-0.98</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(q)</td>
<td>0.41</td>
<td>0.99</td>
<td>0.85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(p_H)</td>
<td>0.55</td>
<td>0.99</td>
<td>0.85</td>
<td></td>
<td></td>
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</table>

Note: All U.S. moments are for HP-filtered series, post-Korean war data. Interest and inflation rates are annualized. The 10-year government bond yield is used as a proxy for \(i_l^F\) due to its longer time availability; the inflation rate of the GDP deflator is used for \(\pi_l\); the 3-month T-bill yield is used for \(i\); the ratio of the residential investment deflator to the
Truth

- Can the channels in the model make sense of one specific business cycle event in U.S. macroeconomic history?
- Can the channels in the model explain some conditional correlations, not just unconditional moments?
Inflation and Housing Prices
Housing Prices in the Model

- One would like to better understand how the model fares in this dimension.
- This is what a 1ppt change in inflation does in the model to housing prices.
Housing Prices in the Model

One would like to better understand how the model fares in this dimension.

is negatively correlated with output, as in the data. The model is also consistent with a pro-cyclical behavior of the relative price of new residential structures and new homes. The volatility of new home prices in the model is about 60 – 70% as high as in the data. The
Inflation and Business Cycles
Inflation and Business Cycles in the Model

Around the early 1980s

- Inflation dropped from 10 to 2 percent in 5 years
- Output fell 6 percent below trend for 4 years
- At the time, the prevalent debt instrument was the fixed-rate mortgage (ARMs did not take off until after banks were allowed to provide them under title VIII of the Garn-St. Germain Depository Institutions Act)
- According to the paper, disinflation should have hurt substantially borrowers, benefited savers, made borrowers work more, led to a rise in output....
Paul Volcker
Economist
Volcker Disinflation
Volcker Disinflation
Volcker Disinflation

Graphs showing trends in inflation (APR) and GDP (% from trend) from 1980 to 1988.
How Inflation affects Borrowers (C) and Savers (C*)

- Inflation benefits borrowers under FRM, hurts them under ARM
- Model is an empirical success along this dimension (see e.g. in Di Maggio, Kermani and Ramcharan)
However, for output to move, labor supply must move...

- ...and it moves in counterintuitive ways in this model
- those who are better off after changes in the inflation target, become lazy, and work less
The Volcker disinflation under FRM

- Inflation drops
- Nominal mortgage payments do not adjust
- Borrowers under FRM are worse off and spend less
- As their wealth drops, they work more
- Output may rise
Tension in the Model between Consumption Effects and Labor Supply Effects

- The Consumption Effects are right and sensible
- The labor supply and output effects are sort-of-strange

increase in income). The behavior of output reflects predominantly the behavior of labor. In particular, output increases in the second period in the case of ARM as homeowners compensate the decline in their disposable income by working more. In the FRM case, a gradual decline in labor, due to the positive wealth effects, leads to a gradual decline in output.

- One could get rid of wealth effects with the appropriate preferences, but then there would be no business cycles
Tension in the Model between Consumption Effects and Labor Supply Effects

- At the macro level, the model might get some unconditional correlations right
- But some micro correlations might be wrong
- It is a beautiful mechanism, but perhaps needs a bit more to become quantitatively important
- Could other forms of stickiness fix that? Let me bring in nominal rigidities
Inflation Shocks without Nominal Rigidities

Target shocks in Guerrieri and Iacoviello’s estimated housing model (all mortgages are short-term and ARM)
Inflation Shocks with Nominal Rigidities

Target shocks in Guerrieri and Iacoviello’s estimated housing model (all mortgages are short-term and ARM)
Suggestions

The Modeling of the FRM vs ARM is a gem: it should part of the toolkit of every macroeconomist working on housing and debt in quantitative models.

Would like to have more tangible evidence that the model fits the data.

1. Can fixed-rate mortgages account for the delayed effects of monetary policy shocks?
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2. Is the current prevalence of FRM the reason why QE is not working?
3. Was the unusually high prevalence of ARM the reason why the tightening in 2005 produce a housing recession?
4. To what extent can 30 years of mortgage rigidities substitute for 1/2 years price and wage rigidities in the standard textbook model? (say, after a 1% permanent rise in money supply)