Discussion of “The Transmission of Monetary Policy through Redistributions and Durables Purchases” by Silvana Tenreyro and Vincent Sterk

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Federal Reserve Board
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What this paper does

This paper:
▶ Provides impulse responses to monetary policy shocks without constraining impact price effect, following Gertler and Karadi (2015)
▶ Rationalizes these responses in a flexible price model in which nominal redenomination provides a key redistributive impulse
▶ Brings back focus on nature of open market operations in implementation of monetary policy

This discussion:
▶ Focuses on the model mechanism and its quantitative importance
▶ Identifies another channel that could act in the other direction
Key facts from S-VAR exercise

Figure 1: Responses to an Expansionary Monetary Policy Shock in the VAR.

- Gertler-Karadi high-frequency identification, monthly data
- $\hat{P}_0$ is unrestricted
  - “better” than Cholesky
- 75bp identified fall in $i \Rightarrow$
  - 0.5% sustained $P$ increase
  - 1-2% D increase
  - 0-0.5% ND increase
  - 1.5% fall in B
- But GK find $\hat{P}_0 \simeq 0$
  - Difference?

Note: horizontal axes denote months after the shock.
Key mechanism

- Overlapping generations of households (HH), all nominal savers
- Government (G) nominal borrower
- OMO: $M \uparrow \Rightarrow P \uparrow$, redistributes from HH to G
- G gains not fully rebated to the currently alive (OLG+fiscal policy rule) $\Rightarrow$ negative wealth effect
  - Labor supply $\uparrow$, Consumption $\downarrow$
  - Real rate $r \downarrow$ to clear markets
  - In equilibrium:
    - Labor and output $\uparrow$, durables $\uparrow$, nondurables $\downarrow$
    - $i \downarrow$
  - Qualitatively consistent with data, except for nondurables
  - Quantitative responses are very small in benchmark model
Key results from calibrated model

Figure 2: Responses to an Expansionary Monetary Policy Shock in the Baseline Model and the Model with Search and Matching Frictions.

- 75bp identified fall in $i \Rightarrow$
  - 2% reversing $P$ increase
  - 0.3% D increase
  - 0.1% ND decrease
  - 0.02% Y increase
  - 1.5% fall in B

Note: horizontal axes denote quarters after the shock.
Outline

1. Simplified version of model
2. Model mechanism and quantification
3. Alternative mechanism and conclusion
Simplified version: OLG model

- Two groups: young $y$ and old $o$.
  - $y \rightarrow o$ with probability $\rho_0$
  - Old die with probability $\rho_x$
  - Steady-state: $\nu y$ agents and $1 - \nu o$ agents
  - First death draw at retirement: $\rho_x = 1$ limit is $\nu = 1$
- Calibration: $\frac{1}{\rho_0} = 40$ years, $\frac{1}{\rho_x} = 20$ years, $\nu \simeq \frac{2}{3}$
- **No annuity markets:** self-save for retirement
- Simplified model with only nondurable consumption:
  $$\mathbb{E} \left[ \sum \beta^t \frac{c^{1-\sigma}}{1-\sigma} \right]$$
- One real bond, gross real rate $R$.
- Endowment: $y = 1$ for young, $0$ for old
- Calibration: $R = 4\%$ annual, $\beta^{-1} - 1 = 11\%$ annual, $\sigma = 1$
Old problem (Fisher (1930), Yaari (1965))

- solve:

\[ V^o(a) = \max \frac{c^{1-\sigma}}{1-\sigma} + \beta (1-\rho_x) V^o(a') \]

\[ c + \frac{a'}{R} = a \]

**Fisherian solution:** \( \ln \left( \frac{c_{t+1}}{c_t} \right) \approx \frac{r-\rho-\rho_x}{\sigma} \approx \frac{4-11-5}{1} = -12\% \)

\[ c_{t+1} = \left[ \beta R (1-\rho_x) \right]^{\frac{1}{\sigma}} c_t \]

\[ c_t = \gamma a_t \]

Marginal propensity to consume:

\[ \gamma = 1 - \left[ \beta (1-\rho_x) \right]^{\frac{1}{\sigma}} R^{\frac{1}{\sigma}-1} \approx 0.039/\text{quarter} \]
Young problem

- $y$ solve:

\[
V^y(a) = \max \frac{c^{1-\sigma}}{1-\sigma} + \beta (1 - \rho_0) V^y(a') + \beta \rho_0 (1 - \rho_x) V^o(a')
\]

\[
c + \frac{a'}{R} = a + y
\]

Euler equation shows **precautionary savings**

\[
c_t^{-\sigma} = \beta R (1 - \rho_0) c_{t+1}^{-\sigma} + \beta R \rho_0 (1 - \rho_x) (\gamma a_{t+1})^{-\sigma}
\]

- Insert $c_t = a_t - \frac{a_{t+1}}{R} + y$, find second-order ODE in $a_{t+1}$

- Steady state has buffer stock $a^* = y \left( \gamma \left[ \frac{\beta R \rho_0 (1 - \rho_x)}{1 - \beta R (1 - \rho_0)} \right]^{-\frac{1}{\sigma}} + \frac{1}{R} - 1 \right)^{-1}$

  - $a^* = 1.80 \times \text{annual income}$

- Shooting solution: given $a_0$, find $a_1$ such that $a_\infty = a^*$
Solution assuming young starts at $a = a^*$

- Representative young agent
- Large $c$ jump at retirement
- $\Rightarrow \beta R \ll 1$ in steady-state
Simplified version of model

Solution assuming young starts away from $a^*$

- Long transition to $a^*$
- Explains slow unwind of $P^\uparrow$

- Depressed $c$ in transition
Explaining the model mechanism

- Wealth distribution has closed-form solution. Total
  \[ a = \nu a^* + (1 - \nu) (.3) a^* \]
  - young own 87% of wealth
- In full calibrated model, wealth is
  \[ a = (1 - \delta) d + m + Rb \]
  - \((1 - \delta) d\): durables, real, 155% of annual GDP
  - \(m\): money, nominal, 16% of annual GDP
  - \(Rb\): government debt, nominal, 60% of annual GDP
- OMO: \(P \uparrow \Rightarrow a_i \downarrow\) with \(da_i = -(m_i + Rb_i) \frac{dP}{P} \equiv -NNP_i \frac{dP}{P}\)
  - \(NNP_i\): \(i\)'s net nominal position (Doepke-Schneider)
  - \(\Rightarrow\) prolonged \(c \downarrow\) and \(n \uparrow\)
  - \(\Rightarrow\) \(r \downarrow\), imbalance correction from **durables** (substitution effect)
Explaining the model mechanism

- Doepke-Schneider (2006) evidence

### TABLE 1

**Net Nominal Positions of U.S. Households in 1989**

<table>
<thead>
<tr>
<th>Type of Instrument</th>
<th>Age Cohort</th>
<th>≤ 35</th>
<th>36–45</th>
<th>46–55</th>
<th>56–65</th>
<th>66–75</th>
<th>&gt; 75</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. All Households</td>
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<tr>
<td>Short-term</td>
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<tr>
<td>Bonds</td>
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<tr>
<td>Mortgages</td>
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<td>Equity</td>
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<tr>
<td>Total NNP</td>
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</tbody>
</table>

- NNPs are *negative* for most working agents! (mortgages)
- They experience a *positive* wealth effect of \( P \uparrow \)
Why are the responses small?

- In the calibration $MPH_i = -MPC_i$
- So individual $c$ and $h$ respond to $\frac{dP}{P}$ by

$$dc_i \simeq -MPC_i \times NNP_i \times \frac{dP}{P}$$
$$dh_i \simeq MPC_i \times NNP_i \times \frac{dP}{P}$$

- Here: $\frac{dP}{P} = 2\%$, $MPC = 5\%$, $NNP = 76\% \times 4$
  - total $dh_i, dc_i$ less than 0.3\% even though $\frac{dP}{P}$ large
  - GE: government rebate and $r \downarrow$ dampen even more!

- Root cause of small aggregate effect
  - small MPCs and MPHs
  - short asset durations

- But MPCs are not small in the (nonlinearized) model

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Implications for the cross-section of young agents

- Concave (Carroll-Kimball)
- Aggregation only if all at $a^*$

- SS: MPC = 0.051/quarter
- Away: huge heterogeneity
Plausible alternative mechanism

- MPCs are large for the young, negative-NNP agents
- MPCs are small for the old, positive-NNP agents
  1. Within-household redistribution pushes **up** consumption (Fisher effect)
  2. Households as a whole lose to government, pushes **down** consumption (Pigou effect)

- Which effect dominates?
  - Depends on $\text{Cov}(MPC, NNP)$ and government fiscal rule
  - Empirical evaluation is possible

- Very different role for $P$ redistribution in transmission of MP:
  - Under 1 it is an *amplification mechanism*
  - Under 2 it is a *source* of real interest rate effects of MP
Conclusion

- Very nice and tractable framework, very well written paper
- Plausible mechanism that explains effects of monetary policy with flexible prices (great)
- Allows one to think about consequences of MP implementation via OMOs vs Helicopter Drops (nice)
- Benchmark effects are small, higher MPCs and MPHs would increase them
- Going forward: more work needs to be done to evaluate Fisher vs Pigou hypotheses