Does a Low-Interest-Rate Regime Punish Savers?

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Applications of Behavioural Economics and Multiple Equilibrium Models to Macroeconomic Policy Conference

July 3, 2017
London, United Kingdom

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Overview

THIS TALK

- This is an academic talk, and the arguments presented here are preliminary and theoretical in nature.
- In the model presented here, household credit markets will play an essential role in the economy.
- There are no "sticky prices." Instead, the key friction in the economy is non-state contingent nominal contracting (NSCNC) in household credit markets.
- Monetary policy will be able to overcome this friction entirely by using a version of nominal GDP targeting.
- There will be a high-interest-rate and a low-interest-rate regime.
- Under the optimal monetary policy, the allocation of resources will be first-best in either the high or the low regime.
- In this sense, a low-interest-rate regime will not be detrimental to savers (or any other households).
- I will discuss important caveats to this conclusion.

Low Interest Rates and Saving

LOW INTEREST RATES AND SAVING

- Since the 2007-2009 financial crisis and recession, interest rates in advanced economies have been exceptionally low compared with postwar norms.
- A criticism of monetary policy in advanced economies following the crisis has been that the low-interest-rate regime has been detrimental for savers.
- I have been sympathetic to this criticism, but I did not have, nor have I seen, an analysis that I thought got to the core of the issue.
- I now have what I think is a better analysis, and it has tempered my views on this issue somewhat.
- This presentation sketches the argument and provides a list of important caveats at the end.

LOW INTEREST RATES EMPIRICALLY

FIGURE: Source: Federal Reserve Board, U.S. Department of the Treasury, Bank of England, European Central Bank and Japan's Ministry of Finance. Last observation: June 26, 2017.

Credit Market Friction

THE RETURN OF HOUSEHOLD CREDIT MARKETS

- The 2007-2009 financial crisis increased attention on household credit markets.

- Could monetary policy be used to help keep household credit markets working well?

HOUSEHOLD CREDIT IN A DSGE MODEL

- I study an economy with a large private credit market that is *essential* to good macroeconomic performance.
  - This market has an important friction: NSCNC.
- The role of monetary policy will be to keep this large credit market functioning properly (i.e., complete).
- When large and persistent negative shocks hit the economy, the zero lower bound (ZLB) will threaten.
- The monetary authority can maintain a smoothly operating credit market even when the ZLB threatens.
- I will not emphasize ZLB issues in this talk (see Azariadis, Bullard, Singh and Suda, 2015).

INCOME AND WEALTH INEQUALITY

- There is a lot of income and wealth inequality in this stylized model.

- The role of credit markets, if they work correctly, will be to reallocate uneven income across the life cycle into perfectly equal per capita consumption.

- The model equilibrium will naturally rank the wealth Gini coefficient as the highest, the income Gini coefficient as somewhat lower, and the consumption Gini coefficient as the lowest.

How large are these markets?

- According to Mian and Sufi (*AER*, 2011), the ratio of household debt to GDP in the U.S. was about 1.15 before it ballooned to 1.65 during the 2000s.

- In today's dollars, that would be equivalent to going from about $19.5 trillion to about $28 trillion in household debt, comprised mostly of mortgage debt.

- Disrupting these markets might be quite costly for the economy, so the NSCNC friction could be quite important.

What I Do

WHAT I DO

- Simple, stylized, endowment DSGE T-periods (quarterly) life-cycle model of *privately-issued* debt, real interest rates and inflation.
- Privately-issued debt = "mortgage-backed securities."
- The economy has a large credit sector and a small cash sector. In this paper, the cash sector $\rightarrow 0$.
- Friction: NSCNC.
- Aggregate labor productivity growth is the only source of uncertainty. This will follow a regime-switching process.
- Monetary policy can substitute for the missing state-contingent contracts by choice of the price level.
- Labor supply will be heterogeneous but independent of monetary policy choices. For more on this, see Bullard and Singh (2017).

THE MONETARY POLICY IMPLICATIONS

- Optimal monetary policy is a version of "nominal GDP targeting"—countercyclical price level movements.
- The stochastic driving process has high productivity growth and low productivity growth.
- These will be associated with relatively high real interest rates and relatively low real interest rates, respectively.
- The optimal monetary policy will work well (perfectly) in either the high- or the low-real-interest-rate regime.
- In particular, savers will get as good an allocation as they can in either regime—the low-rate regime does not "punish savers."
- These results may help inform the debate on monetary policy in a low-real-interest-rate environment.

Environment

SEGMENTED MARKETS

- Standard T-periods (quarterly) DSGE life-cycle endowment economy with segmented markets. Any $T \geq 3$ will work; I prefer $T = 241$ (quarterly); odd values are convenient.

- Households are divided into two types: "participants" in the credit markets and "non-participants." I set the non-participant sector $\rightarrow 0$.

- There are two assets in the model: *privately-issued* debt (consumption loans) and currency. I set currency $\rightarrow 0$ ("cashless limit").

- In this cashless limit, we can simply think of the monetary policymaker as controlling the price level directly.

PREFERENCES

- All participant households entering the economy at date t have log preferences with no discounting

$$V_t = E_t \sum_{j=0}^{T} \left[\eta \ln c_t \left(t+j \right) + \left(1-\eta \right) \ln \ell_t \left(t+j \right) \right],$$

where $\eta \in (0,1]$, $c_t \left(t+j \right) > 0$ is the date $t+j$ consumption of the household born at date t, and $\ell_t \left(t+j \right) \in (0,1)$ represents the fraction of a unit time endowment devoted to leisure.

- Households that entered the economy at previous dates have similar preferences and carry a net-asset-holding position into date t.

- Other assumptions: Within-cohort agents are identical, no population growth, no capital, no default, flexible prices, no borrowing constraints.

KEY FRICTION: NSCNC

- *Loans are dispersed and repaid in the unit of account—that is, in nominal terms—and are not contingent on income realizations.*

- There are two aspects to this friction: (1) The non-state contingent aspect means that real allocations will be perturbed by this friction, and (2) the nominal aspect means that the monetary authority may be able to repair the distortion.

STOCHASTIC STRUCTURE

- Aggregate real output is produced as $Y(t) = Q(t) L(t)$, where $L(t)$ is the labor input and $Q(t)$ is the level of technology. The technology improves at stochastic rate $\lambda(t, t+1)$.

- Labor supply with $\eta \in (0, 1)$ will turn out to be independent of the real wage.

- The real wage $w(t)$ is then given by

$$w(t+1) = \lambda(t, t+1) w(t), \tag{1}$$

where $w(0) > 0$.

- I assume the mean of $\lambda(t, t+1) > 1$, so that the economy grows on average.

- For sufficiently large, negative shocks to λ, the ZLB will threaten and policy would have to respond (see Azariadis, Bullard, Singh and Suda, 2015).

REGIME SWITCHING

- I follow Bullard and Singh (*IER*, 2012, Section 2.4) to define a two-state regime-switching process for λ.
- There is a high-growth state with mean λ^H and a low-growth state with mean λ^L.
- Within each regime, there is additive noise described by $\sigma\epsilon(t)$, where σ is a scale factor and $\epsilon(t) \sim i.i.d.\ N(0,1)$.
- A latent variable $s(t)$ determines the regime and follows a first-order Markov process.
- The resulting process for $\lambda(t, t+1)$ can be written as an $AR(1)$ process with a nonstandard error term.

TIMING PROTOCOL

- At the beginning of date t, nature moves first and chooses $\lambda(t-1,t)$, which implies a value for $w(t)$.
- The policymaker moves next and chooses a value for the price level, $P(t)$.
- Households then decide how much to consume and save.

COMPLETE MARKETS WITH NSCNC

- For convenience, I assume a net inflation target of zero.
- The countercyclical price level policy rule delivers complete markets allocations:

$$P\left(t\right) = \frac{E_{t-1}\left[\lambda\left(t-1, t\right)\right]}{\lambda^r\left(t-1, t\right)} P\left(t-1\right), \tag{2}$$

  where λ^r indicates a realization of the shock.
- This is similar to Sheedy (*BPEA*, 2014) and Koenig (*IJCB*, 2013).
- Households will consume equal amounts of available production in the credit sector. This is "equity share contracting," which is optimal under the homothetic preferences assumed here.
- Consumption and asset holdings fluctuate from period to period, but in proportion to the value of $w\left(t\right)$.
- This price level rule renders the households' decision problem deterministic because it insures the household against future shocks to income.

LIFE-CYCLE PRODUCTIVITY

- All participant households are endowed with an identical productivity profile over their lifetime.
- The profile begins at a low value, rises to a peak in the middle period of life, and then declines to the low value.
- I assume the "low value" is bounded away from zero for this talk.
- Agents can sell productivity units in the labor market at the competitive wage.
- The productivity profile is symmetric.

LIFE-CYCLE PRODUCTIVITY = CROSS SECTION

FIGURE: A schematic productivity endowment profile for credit market participants also represents the cross section of households at date t. The profile is symmetric and peaks in the middle period of the life cycle. About 50 percent of the households earn 75 percent of the labor income in the credit sector for $\eta = 1$.

LABOR INCOME CHANGES IN CROSS SECTION

FIGURE: How labor income changes across cohorts when the real wage increases 10 percent for $\eta = 1$.

Nominal Interest Rates

NOMINAL INTEREST RATE

- Participant households contract by fixing the nominal interest rate one period in advance.
- The non-state contingent nominal interest rate, the contract rate, is given by

$$R^n (t, t+1)^{-1} = E_t \left[\frac{c_t (t)}{c_t (t+1)} \frac{P(t)}{P(t+1)} \right]. \tag{3}$$

- This rate depends on the expected rate of consumption growth and the expected rate of inflation.
- In the equilibrium I study, consumption growth rates are the same for all households, so this condition is also the same for all households.

STATIONARY EQUILIBRIA

- We let $t \in (-\infty, +\infty)$.
- We only consider stationary equilibria under the perfectly credible policy rule governing $P(t)$.
- We let $R(t)$ be the gross real rate of return in the credit market.
- Stationary equilibrium is a sequence $\{R(t), P(t)\}_{t=-\infty}^{+\infty}$ such that markets clear, households solve their optimization problems, and the policymaker credibly adheres to the stated policy rule.
- The key condition is that net aggregate asset holding, $A(t)$, nets out among participant households.

Graphs

NET ASSET HOLDING

FIGURE: Net asset holding by cohort along the complete markets balanced growth path with $\eta = 1$. Borrowing, the negative values to the left, peaks at stage 60 of the life cycle (age ~35), while positive assets peak at stage 180 of the life cycle (age ~65). About 25 percent of the population holds about 75 percent of the assets.

CHANGE IN NET ASSET HOLDING

FIGURE: How net asset holding changes by cohort when the real wage increases by 10 percent when $\eta = 1$.

CONSUMPTION

FIGURE: Schematic representation of consumption, the flat line, versus labor income, the bell-shaped curve, by cohort along the complete markets balanced growth path with $w(t) = 1$ and $\eta = 1$. The private credit market completely solves the point-in-time income inequality problem.

CHANGE IN CONSUMPTION

FIGURE: How labor income and consumption change by cohort when the real wage increases by 10 percent with $\eta = 1$.

HOUSEHOLD LABOR SUPPLY

FIGURE: Schematic hump-shaped labor supply and U-shaped leisure by cohort under log-log preferences and interior solutions. Participant households in peak earning years work more, and those at the beginning and end of the life cycle work less, independent of consumption choices. The vertical axis is percent of available household time per period.

Complete Markets

COMPLETE MARKETS VIA NGDP TARGETING

- I have assumed a regime-switching process for productivity growth in this paper, and this corresponds to high- and low-real-interest-rate regimes.

- In principle, this economy could be mired in the low-interest-rate regime for a long time, depending on assumptions concerning the persistence of the regimes.

- Nevertheless, monetary policy can deliver first-best allocations via the price level rule described earlier.

- This occurs both within regimes and across regimes.

- The policymaker is undoing the NSCNC friction and restoring the Wicksellian natural rate of interest.

- There is no sense in which savers are "hurt" in the low-interest-rate regime (nor are borrowers "helped").

CAVEATS

- The policymaker here is allowed to observe the shock and then offset it with the appropriate setting for $P(t)$. This is unrealistic, but similar to baseline New Keynesian models in which policymakers can appropriately offset incoming shocks.

- The low-real-interest-rate regime is associated with a slower rate of growth in real wages and real output. Households would rather be in the higher growth regime in this sense. But the productivity growth regime is taken as an exogenous process chosen by nature here.

- Monetary policy cannot switch the economy to the high-growth regime, but it can conduct an optimal policy given the regime. Monetary policy can be useful, but not so useful as to create high real growth.

CAVEATS

- I focus on an equilibrium where the real interest rate equals the output growth rate every period in the stochastic economy. There may be other equilibria.

- The policymaker and the private sector agents have rational expectations, meaning they understand the nature of the regime-switching process driving the economy. What if they had a misspecified model in which they expected the economy to return to a fixed mean? This may be occurring in actual monetary policy.

POLICYMAKER PERCEPTIONS

FIGURE: Source: Federal Reserve Board and author's calculations. Last observation: May 2017.

PRIVATE SECTOR PERCEPTIONS

FIGURE: Source: FRB of Philadelphia and author's calculations. Last observation: 2017-Q2.

Conclusions

CONCLUSIONS

- The desire behind many actual policy choices over the last several years has been to help credit markets perform better.

- This paper features a credit market that is essential to good macroeconomic performance. The friction in the market is NSCNC.

- The credit market here can be interpreted as a residential mortgage market—"mortgage-backed securities."

- Monetary policy can alleviate this friction and restore the smooth functioning of the credit market.

- This policy result remains even if the economy switches infrequently between high- and low-real-interest-rate regimes.

NATURAL VS. UNNATURAL REAL INTEREST RATES

- Here the monetary policymaker can restore the first-best allocation of resources by moving the price level to achieve the Wicksellian natural real rate of interest for the economy, with the natural rate itself fluctuating according to a regime-switching process.

- This analysis can provide a good baseline for thinking about the current situation in advanced economies if low real interest rates can be mostly attributed to factors exogenous to monetary policy.

- However, if low real interest rates are attributed to monetary policy itself (as many critics no doubt would argue), then it may be the case that those rates are distortionary and could hurt some segments of society. That could be analyzed here, say by having the policymaker set the "wrong value for $P(t)$" each period. That would require a computational solution as opposed to the pencil-and-paper solution used in this talk.