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ENVIRONMENT
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A STORY OF DEBT OVERHANG
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Is U.S. Monetary Policy "Punishing Saving"?

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School of Economics & Finance, University of St. Andrews
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Any opinions expressed here are mine and do not necessarily reflect those of other Federal Open Market Committeee participants.

THIS TALK

- This talk concerns a current monetary policy issue.
- The analysis is only partially complete and is part of joint work with Aarti Singh and Jacek Suda.
- The model is for illustrative purposes only and is exploratory.
- Suggestions for ways to get at the key issues more directly are welcome.

THE STATE OF PLAY

- Large recession 2008-2009 associated with financial crisis.
- Large liquidity programs 2008-2009, ended in 2010 Q1.
- Policy rate near zero since December 2008.
- Commitments to keep the policy rate near zero far into the future.
- Quantitative easing: outright asset purchases using base money.
- *Net effect: very low real interest rates expected far into the future.*

OUR JOB AS ECONOMISTS

- We ask: Could the existing policy be far away from the optimal policy?
- If so, the existing policy may be exacerbating, not mitigating, the situation.
- Change to the proper policy could bring large welfare gains.
- But how could keeping real rates very low be the wrong reaction to a large recession?

CRITICISM

- Contemporary criticisms of current policy include the idea that monetary policy is "punishing savers."
- Example: William F. Ford and Polina Vlasenko (2011) "The Downside of Monetary Easing," *AIER Research Reports*.
  - They suggest the income lost to savers is very large, probably dwarfing any other type of benefit coming from a low real interest rate policy.
- Glover, Heathcote, Krueger, and Rios-Rull (2011) consider intergenerational redistribution due to a recession. They find that those late in the life cycle, savers, suffer substantial welfare losses due to depressed real interest rates.

"PUNISHING SAVERS" ... WHAT COULD IT MEAN?

- Everyone has access to the same investment opportunities.
  - In this sense monetary policy is egalitarian.

- But ... what if there is some important heterogeneity?
- In particular, certain types of households need to borrow, others need to save, and changing real rates disturbs the equilibrium in this market.
  - In short, it is a statement about *economically meaningful borrowing and lending.*

MAIN IDEAS

- There are natural savers and natural borrowers in the economy.
- Current policy means real rates are very low today and are expected to remain low.
- Optimism from the tech bubble led to "overborrowing" and "debt overhang."
- Is the low real rate policy helpful or harmful in this situation?
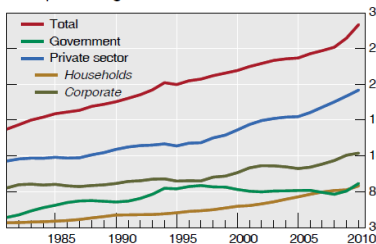
REAL INTEREST RATES
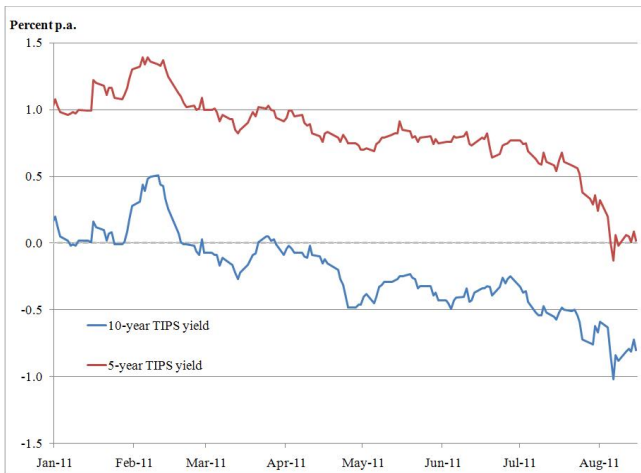
DEBT

Graph 1

Non-financial sector debt
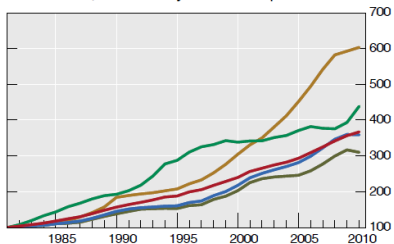
¹ Simple averages for 18 OECD economies.   ² Rebased to 1980 = 100; simple average of 16 OECD economies, including the United States.

Source: Cecchetti, Mohanty, and Zampolli (2011), "The Real Effects of Debt," manuscript, presented at Jackson Hole, Wyoming, 26 August 2011.

A SIMPLE MODEL

- The Fed is perceived as having a lot of influence over real yields.
  - *Simply assume it in this model.*
- Simple, stripped down structure.
  - But, more elaborate versions could be constructed.
- Three-period life cycle.
- This will create natural borrowers and natural lenders.

PREFERENCES

- The preferences of a household entering the economy at date t are

$$V = \ln c_t(t) + \ln c_t(t+1) - \vartheta \ln \ell_t(t+1) + \ln c_t(t+2). \quad (1)$$

- No discounting.
- Here c is consumption and ℓ is labor supply.
- Households supply one unit of labor inelastically in the first and last period, and $\ell_t(t+1) \approx 1$ in the middle period.
- We consider the limiting case where $\vartheta \to 0$, the marginal disutility of middle-age labor supply is vanishingly small.

PRODUCTIVITY ENDOWMENTS AND LABOR SUPPLY

- The productivity profile of households entering the economy at date t is

$$\{1, \gamma_t\,(t+1)\,, 1\}. \tag{2}$$

- Here, $\gamma_t\,(t+1) > 1$ can be thought of as the level of middle-age productivity.
- We think of $\gamma \approx 2\ \forall t$ as a baseline.
- The productivity γ would be explicitly stochastic in a more elaborate version.

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OUTPUT

- Output at date t is given by

$$
\begin{aligned}
Y(t) &= C(t) & (3) \\
&= 1 + \gamma_{t-1}(t)\,\ell_{t-1}(t) + 1 & (4) \\
&= c_{t-2}(t) + c_{t-1}(t) + c_t(t) & (5)
\end{aligned}
$$

CAPITAL AS A SUBTEXT

- In today's version there are only consumption loans.
- However, the model easily accommodates capital in positive supply.
- Punishing saving might then be understood to reduce the level of capital and output.
- Aside: There is no outside asset in this version.
  - The condition for a valued outside asset is that first period income is greater than third period income, which does not hold here since I have set them equal.

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BUDGET CONSTRAINTS

- The budget constraints of a household entering the economy at date t are

$$
\begin{aligned}
c_t\,(t) &\leq 1 + b_t\,(t) && (6) \\
c_t\,(t+1) + a_t\,(t+1) &\leq \gamma_t\,(t+1)\,\ell_t\,(t+1) - R\,(t)\,b_t\,(t) && (7) \\
c_t\,(t+2) &\leq 1 + R\,(t+1)\,a_t\,(t+1) && (8)
\end{aligned}
$$

- Here $b_t\,(t) > 0$ is the amount of borrowing, $a_t\,(t+1)$ is the amount of assets held into the last period, $R\,(t)$ is a gross interest factor from date t to $t+1$.

- I have assumed debt must be repaid. For the implications of endogenous debt constraints in a related framework, see Azariadis and Lambertini (*RES*, 2003).

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HOUSEHOLD CHOICES

- These assumptions imply $c_t(t+1) = R(t) c_t(t)$, $c_t(t+2) = R(t) R(t+1) c_t(t)$, and

$$c_t(t) = \frac{1}{3}\left[1 + \frac{\gamma_t(t+1)\,\ell_t(t+1)}{R(t)} + \frac{1}{R(t)R(t+1)}\right]. \quad (9)$$

- The households would prefer to consume $1/3$ of the present discounted value of three-period income in each period of life.

- To fix ideas, in the baseline steady state $\ell = 1$, $\gamma_t(t+1) = 2 \ \forall t$, and $R = 1$. Then $c = 4/3$ in each life cycle stage.

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EQUILIBRIUM

- The equilibrium condition is

$$a_{t-1}(t) = b_t(t). \tag{10}$$

- The saving, or asset-holding, of the middle-aged finances the borrowing of the entering generation.

- On the right hand side is borrowing:

$$b_t(t) = \frac{1}{3}\left[1 + \frac{\gamma_t(t+1)\,\ell_t(t+1)}{R(t)} + \frac{1}{R(t)\,R(t+1)}\right] - 1 \tag{11}$$

- The partial derivative w.r.t. $R(t)$ is negative, so that lower real interest rates increase the amount of borrowing, all else equal.

PUNISHING SAVING

- On the left hand side is middle-aged saving,

$$a_{t-1}(t) = \gamma_{t-1}(t)\,\ell_{t-1}(t) + R(t-1)$$
$$- 2R(t-1)\frac{1}{3}\left[1 + \frac{\gamma_{t-1}(t)\,\ell_{t-1}(t)}{R(t-1)} + \frac{1}{R(t-1)R(t)}\right]. \quad (12)$$

- The partial derivative w.r.t. $R(t)$ is positive, so that lower real interest rates discourage saving, all else equal.
- This could be viewed as "low real interest rate policy punishes saving."
- Thus the model has some of the flavor of the criticism discussed earlier.

A BASELINE STEADY STATE

- Suppose labor supply is inelastic, so that middle-age labor supply is $1 \ \forall t$.
- Suppose midde-age productivity $\gamma_t (t+1) = 2 \ \forall t$.
- This means total income is 4 units, two of which are earned in the middle period.
- Then the steady state interest factor $R = 1$ solves equation (10).

CONSUMPTION AND SAVING IN THE STEADY STATE

- In this steady state, households smooth consumption exactly:

$$c_{t-2}(t) = c_{t-1}(t) = c_t(t) = \frac{4}{3} = \bar{c}. \qquad (13)$$

- Households are moving the extra unit of middle-age income to first and third period consumption.
- To do this, they need to borrow $b = 1/3 = \bar{b}$ in the first period.
- This could be viewed as pulling some housing consumption forward.
- *How much they wish to borrow depends on their expectations of middle period income.*
- The middle-aged save $\bar{a} = 1/3$ to finance the borrowing of the entering households.

THE ROLE OF POLICY

- We postulate that the policy authority controls the sequence $\{R(t)\}$.

- Equation (10) then determines middle period labor supply in a small neighborhood of $\ell = 1$.

- This environment has interesting features, but I do not think it has an interesting general equilibrium in its current form.

- Instead, I will use the model to tell a story of debt overhang.

A NARRATIVE, PART 1

- The economy is initially in the baseline steady state with $\gamma = 2$.
- News arrives. The society now expects high middle period productivity $\gamma_s (s + 1) > 2$, $\forall s > t$.
- They also expect to supply $\ell_s (s + 1) = 1$, a normal amount of labor, $\forall s > t$.
- Accordingly, entering households now wish to borrow more to smooth consumption.

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A NARRATIVE, PART 1.5

- The policymaker maintains $R = 1$ and creates expectations for the future at this value.
- Current labor supply adjusts to $\ell_{t-1}(t) > 1$ in order to clear the market for loans.
- The entering generation gets to borrow the desired amount.
- This sounds like ... "The tech boom causes increases in borrowing for housing services consumption."

A NARRATIVE, PART 2

- At the next date, the news turns out to be false.
- Middle period productivity is now understood to be $\gamma = 2 \ \forall t$.
- The middle-age group now has a "debt overhang" which is "too large" given actual middle age income.
    - The middle-age group has to pay back debt $b > \bar{b}$.
- At $R = 1$, the middle-age group has to either work more, $\ell > 1$, consume less, $c < \bar{c}$, and/or save less, $a < \bar{a}$, for their third period.

A NARRATIVE, PART 2.5

- The entering group has expectations of middle age productivity at $\gamma = 2$ and labor supply at $\ell = 1$.
- They wish to borrow the steady state amount, which is $\bar{b}$.
- At $R = 1$, the amount they wish to borrow is more than the amount the middle-age group is likely to save, because of "debt overhang."

QUESTION

- Question: Should the policymaker lower the real interest rate below the steady state level, making $R(t) < 1$, in this situation?
- I think the answer is no.

A NARRATIVE, PART 3

- The lower real interest factor would discourage additional saving by the middle-aged.
- And, the lower real interest factor would encourage greater than the steady state level of borrowing by the entering generation.
- This would make it *more difficult* to clear the market for loans.
  - Policy would be exacerbating the natural tensions in this situation.
- If there were capital in the model it may also reduce capital formation.
- *So low real interest rates, $R(t) < 1$, would be "punishing saving" in a way that may have important welfare consequences.*

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- This narrative offers one way to think about the sources and implications of "debt overhang."
- However, this narrative does not establish an equilibrium.
- The narrative also does not establish an optimal policy against which alternatives can be compared.

RELATED WORK

- Krugman and Eggertsson (2010) consider a Bewley model with an exogenous borrowing constraint, and look at the implications of a tighter constraint.
- Guerrieri and Lorenzoni (2011) consider an Aiyagari model in which borrowers smooth idiosyncratic labor income shocks, subject to a borrowing constraint.
  - A tighter constraint causes real interest rates to fall, and households deleverage by consuming less.
- In the present model, a suddenly tighter borrowing constraint would not create a "debt overhang."
  - There would be "too little" borrowing given preferences and income patterns. The middle-aged would have "too much saving."
  - This may suggest, incorrectly, that more middle-age consumption is warranted. More consumption would be warranted only for the young generation, but they are borrowing constrained.

CONCLUSION

- In this talk I looked at a model environment that contains some interesting features.
- The features include a vital economic role for borrowing and lending.
- The amount of desired borrowing depends on future income, leaving it susceptible to news shocks.
- Too much borrowing can occur if the news signal is not confirmed.
- Low real interest rates are probably unhelpful in resolving the difficultly associated with debt overhang, and may be welfare-reducing.
- This could be interpreted as saying current G-7 monetary policy is far from optimal.
- The discussion here stops short of establishing an equilibrium or an optimal policy.