Shotgun Wedding: Fiscal and Monetary Policy

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¹The views herein represent those of the authors and not necessarily those of the Federal Reserve Bank of Minneapolis or the Federal Reserve System
Main Themes of the Survey

- Monetary and Fiscal policy are intertwined in multiple ways
  - Common budget constraint
  - Multiple instruments that generate liquidity
  - Swaps of money for bonds
  - Enforcement of private vs. public loans

- Drawing a line on purely economic grounds is arbitrary

- But societies do it, the line shifts all the time, and it matters
What I Will Discuss Today

- Government budget arithmetics when $r < g$
  - There is a government budget constraint even if $r < g$
Should we Worry about Debt?

- Darby (1984): Some pleasant monetarist arithmetic
- Modern monetary theory: debt and money are the same thing
- Blanchard (2019): “Put (too) simply, the signal sent by low rates is not only that debt may not have a substantial fiscal cost, but also that it may have limited welfare costs.”
Roadmap

- Set up an economy in which $r < g$
- Study the government budget
- Show that debt expansion may lead to winners and losers even with $r < g$
- Show that some people prefer $r < g$
- Change labels, turn fiscal policy into monetary policy
Setup

- Similar to Sargent and Wallace (1982, Real bills)
- Overlapping generations living two periods
- Two types of agents in each generation, with different endowment:
  - “Savers:” \((\alpha, \epsilon)\)
  - “Borrowers:” \((\epsilon, \gamma)\)
- \(\epsilon \approx 0\)
- Pure exchange economy
- Preferences: \(\log c_{yt} + \log c_{o t+1}\)
- Borrowers are anonymous, repayment of private debt cannot be enforced
Government: Policy Instruments, Version 1

- Can issue bonds
- Can implement lump-sum taxes $\tau_t$ and transfers on everybody alive (but taxes are limited to $\epsilon$)
Timing

- Government auctions bonds promising a payment of $b_{t+1}$ units of good in $t + 1$
- Auction price: $1/\rho_{t+1}$
- Government implements lump-sum transfers/taxes to repay maturing debt, according to
  \[ b_t = \tau_t + b_{t+1}/\rho_{t+1} \]
- (May default if taxes are insufficient, but we do not consider this equilibrium)
Household budget constraints

- Young:
  \[
  \frac{b_{t+1}^i}{\rho_{t+1}} = e_{yt}^i - c_{yt}^i - \tau_t,
  \]

- Old:
  \[
  c_{o_{t+1}}^i - e_{o_{t+1}}^i = b_{t+1}^i - \tau_{t+1},
  \]

Without government intervention, we get autarky: borrowers cannot borrow (anonymity), savers cannot lend to anyone.

In equilibrium, savers buy all of government debt, borrowers consume after-tax endowment.

Gov’t borrowing substitutes for private borrowing (in addition to intertemporal redistribution).
Steady States

- Analyze welfare in steady state
- There are welfare effects on transition cohorts (e.g., extra debt is good for transition cohorts)
- For our purposes, enough to show that there are winners and losers from changes in debt
- Bond demand for each saver:
  \[ b_{SS}^S = \frac{1}{2} \left[ \alpha - \tau_{SS}(\rho_{SS} - 1) \right] . \] (36)

- Gov’t budget constraint:
  \[ \tau_{SS} = b_{SS}^S \left( 1 - \frac{1}{\rho_{SS}} \right) \]

- Equilibrium taxes/transfers per saver:
  \[ \tau_{SS} = b_{SS}^S - \frac{\sqrt{b_{SS}^S(\alpha + 2b_{SS}^S)}}{2} \] . (37)
Taxes as a Function of Debt in Steady State
Characterization of Taxes and Interest Rates

- Can compute $\tau_{SS}, \rho_{SS}$ as a function of $b_{SS}^S$.
- $\rho_{SS} < 1$ and $\tau_{SS} < 0$ iff $b_{SS}^S < \alpha/2$ (for $\epsilon \approx 0$)
- $\tau_{SS}$ convex in $b_{SS}^S$, with a unique minimum, at interior point $b_{min} < \alpha/2$
- Note: gov’t faces a budget constraint even when $\rho_{SS} < 1$ ($r < g$): more debt $\Rightarrow$ smaller transfers
- What matters is the marginal interest rate, not the average interest rate on government debt
Borrowers’ Preferred SS Level of Debt

\[ c_Y^B = \epsilon - \tau_{SS}, \]

\[ c_o^B = \gamma - \tau_{SS}. \]

- Want to choose \( b_{SS}^S = b_{\text{min}} \)
Borrowers’ Preferred SS Level of Debt

\[ c^B_{\gamma SS} = \epsilon - \tau_{SS}, \]
\[ c^B_{\circ SS} = \gamma - \tau_{SS}. \]

- Want to choose \( b^S_{SS} = b_{\min} \)
- Do not want to push to \( \rho_{SS} = 1 \) \( (r = g) \). True even if \( \gamma > \alpha \)
- Want some borrowing from gov’t, but not full replacement of missing market (Yared, 2013, Azzimonti and Yared, 2017)
Borrowers’ Preferred SS Level of Debt

\[
c_{y}^{BSS} = \epsilon - \tau SS, \\
c_{o}^{BSS} = \gamma - \tau SS.
\]

- Want to choose \( b_{SS}^{S} = b_{\text{min}} \)
- Do not want to push to \( \rho_{SS} = 1 (r = g) \). True even if \( \gamma > \alpha \)
- Want some borrowing from gov’t, but not full replacement of missing market (Yared, 2013, Azzimonti and Yared, 2017)
- Want gov’t to act as a cartel of the borrowers: restrict demand, get better price
Borrowers’ Preferred SS Level of Debt

\[ c_y^{\text{SS}} = \epsilon - \tau_{\text{SS}}, \]

\[ c_o^{\text{SS}} = \gamma - \tau_{\text{SS}}. \]

- Want to choose \( b_{SS}^S = b_{\text{min}} \)
- Do not want to push to \( \rho_{SS} = 1 \) (\( r = g \)). True even if \( \gamma > \alpha \)
- Want some borrowing from gov’t, but not full replacement of missing market (Yared, 2013, Azzimonti and Yared, 2017)
- Want gov’t to act as a cartel of the borrowers: restrict demand, get better price
- Do not want enforcement of private debt: Bhandari et al. (2017)
Savers’ Preferred SS Level of Debt

- Mirror image: would like gov’t borrowing over $\gamma/2$
- Here, limited by constraint $\tau_{SS} \leq \epsilon$
Changing Labels: From Fiscal to Monetary Policy

- Same economy as before
- Government issues “money,” pieces of paper that are never redeemed
- Helicopter money injections, given to all households alive:
- Gov’t budget constraint:

\[-T_t = M_t - M_{t-1}\]

- Household budget constraints:

\[M_t^i = P_t(e_{yt}^i - c_{yt}^i) - T_t,\]

\[P_{t+1}(c_{o t+1}^i - e_{o t+1}^i) = M_t^i - T_{t+1}\]
This Is just a Change in Variable

- $P_t / P_{t+1} \iff \rho_{t+1}
- \frac{M_t}{P_t} \iff b_{t+1} / \rho_{t+1}
- T_t / P_t \iff \tau_t

debt is money in this economy
helicopter money is fiscal policy

Bassetto and Sargent (Mpls Fed, NYU)
Shotgun Wedding
This Is just a Change in Variable

- \( \frac{P_t}{P_{t+1}} \Leftrightarrow \rho_{t+1} \)
- \( \frac{M_t}{P_t} \Leftrightarrow \frac{b_{t+1}}{\rho_{t+1}} \)
- \( \frac{T_t}{P_t} \Leftrightarrow \tau_t \)
- debt is money in this economy
This Is just a Change in Variable

- \( P_t/P_{t+1} \iff \rho_{t+1} \)
- \( M_t/P_t \iff b_{t+1}/\rho_{t+1} \)
- \( T_t/P_t \iff \tau_t \)

- debt is money in this economy
- helicopter money is fiscal policy
Monetary Policy Interpretation

- Borrowers like some inflation
- Savers would like deflation, limited by gov’t ability to tax
Conclusion

- Fiscal policy and monetary policy are not distinct economically
- To draw a distinction, we need political economy...
- ... but they will always try to elope when push comes to shove
Surprise Inflation: A Simple Model

- Simple model
- Demand for money:
  \[ 1 = \beta E_t \left[ \frac{P_t}{P_{t+1}} v' \left( \frac{M_t}{P_{t+1}} \right) \right] \]
- Euler equation (linear utility in credit goods):
  \[ 1 = \beta R_t E_t \left[ \frac{P_t}{P_{t+1}} \right] \]
- PV budget balance:
  \[ \frac{B_t + M_{t-1}}{P_t} = E_t \sum_{s=t}^{\infty} \beta^{s-t} \left[ \frac{T_s}{P_s} - g_s + \frac{M_s}{P_s} \left( 1 - \frac{1}{R_s} \right) \right] . \]
No uncertainty

Get an equilibrium seigniorage amount:

\[ L(\pi_{s+1}) := \frac{M_s}{P_s} \left( 1 - \frac{1}{R_s} \right) = v'^{-1} \left( \frac{\pi_{s+1}}{\beta} \right) \left( 1 - \frac{\pi_{s+1}}{\beta} \right) \]

Together with PV budget balance:

\[
\sum_{s=0}^{\infty} \beta^s L(\pi_{s+1}) = \frac{B_0 + M_{-1}}{P_0} - \sum_{s=0}^{\infty} \beta^s \left[ \frac{T_s}{P_s} - g_s \right].
\]

- Consider a class of equilibria in which RHS is fixed
- PV of seigniorage is pinned down, timing undetermined (Sargent and Wallace)
- Define \( \bar{\pi} \) so that

\[
\sum_{s=0}^{\infty} \beta^s L(\bar{\pi}) = \frac{B_0 + M_{-1}}{P_0} - \sum_{s=0}^{\infty} \beta^s \left[ \frac{T_s}{P_s} - g_s \right].
\]

- \( \bar{\pi} \): inflation target (Chisini mean of inflation), fiscally determined
Unanticipated Inflation

\[
(B_t + M_{t-1}) \left( \frac{1}{P_t} - E_{t-1} \frac{1}{P_t} \right) = E_t \sum_{s=t}^{\infty} \beta^{s-t} \left[ \frac{T_s}{P_s} - g_s + \frac{M_s}{P_s} \left( 1 - \frac{1}{R_s} \right) \right] 

- E_{t-1} \sum_{s=t}^{\infty} \beta^{s-t} \left[ \frac{T_s}{P_s} - g_s + \frac{M_s}{P_s} \left( 1 - \frac{1}{R_s} \right) \right]
\]

True whether FTPL holds or not
Unanticipated Inflation

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\]

- True whether FTPL holds or not
- Suppose that a shock moves one of the variables unexpectedly (say \( g_t \))
- Could adjust \( \{ T_s \} \)
- Could adjust \( \{ g_s \}, s > t \)
- Could adjust future seigniorage
Unanticipated Inflation

\[(B_t + M_{t-1}) \left( \frac{1}{P_t} - E_{t-1} \frac{1}{P_t} \right) = E_t \sum_{s=t}^{\infty} \beta^{s-t} \left[ \frac{T_s}{P_s} - g_s + \frac{M_s}{P_s} \left( 1 - \frac{1}{R_s} \right) \right] \]

\[ - E_{t-1} \sum_{s=t}^{\infty} \beta^{s-t} \left[ \frac{T_s}{P_s} - g_s + \frac{M_s}{P_s} \left( 1 - \frac{1}{R_s} \right) \right] \]

- True whether FTPL holds or not
- Suppose that a shock moves one of the variables unexpectedly (say \(g_t\))
- Could adjust \(\{T_s\}\)
- Could adjust \(\{g_s\}, s > t\)
- Could adjust future seigniorage
- If none of this adjusts, then price level adjusts (with long-term debt, innovation to current and future inflation)
A Hedging Theory of Government Debt, based on Bhandari et al. (2016)

- Suppose that using taxes and seigniorage to absorb shocks is costly
- Take inflation process as given
- What is the amount of nominal debt to issue?
- Answer: want to hedge optimally

\[
\frac{B_t + M_{t-1}}{P_{t-1}} = \frac{\text{Cov}_{t-1}(\pi_{t-1}^{-1}, PV_t(\tau - g))}{\text{Var}_{t-1}(\pi_{t-1}^{-1})} \\
= \text{Corr}_{t-1}(\pi_{t-1}^{-1}, PV_t(\tau - g)) \sqrt{\frac{\text{Var}_{t-1}(PV_t(\tau - g))}{\text{Var}_{t-1}(\pi_{t-1}^{-1})}},
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\]

\[
= \text{Corr}_{t-1}(\pi^{-1}_t, PV_t(\tau - g)) \sqrt{\frac{\text{Var}_{t-1}(PV_t(\tau - g))}{\text{Var}_{t-1}(\pi^{-1}_t)}},
\]

- Ramsey outcome will converge to this value
Currency/GDP ratio

U.S. Currency in Circulation (% of GDP)

Source: FRED