The Fiscal Footprint of Macroprudential Policy

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THE FISCAL FOOTPRINT OF MONETARY POLICY

- Cutting interest rates:
  - $\rightarrow$ increases demand for banknotes, produces seignorage,
  - $\rightarrow$ creates unexpected inflation, debases debt,
  - $\rightarrow$ lowers debt rollover costs,
  - $\rightarrow$ raises economic activity, tax revenues.
  - $\rightarrow$ Fiscal dominance: inflation control sacrificed for fiscal revenue.

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- Commitment: central bank independence

Do such unpleasantries affect macroprudential policy?

- What is its fiscal footprint?
  - $\rightarrow$ Channels?
  - $\rightarrow$ Comparison with monetary policy?
  - $\rightarrow$ Effect on fiscal surpluses?
  - $\rightarrow$ Interaction with fiscal authorities and crises?

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- What is its fiscal footprint?
  - → Channels?
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  - → Effect on fiscal surpluses?
  - → Interaction with fiscal authorities and crises?

- Policy debates
  - → Indian elections and RBI lending standard requirements.
  - → Should macropru regulator be inside CB or Treasury?
  - → Central bank independence with an FPC.

THIS PAPER'S FOCUS

- Policy tool is government bonds held by banks β_t:
  - $\rightarrow$ Strictly speaking, liquidity requirements and reserve requirements.
  - $\rightarrow$ Proxy for *one* effect of macropru: bank demand for safety.
  - $\rightarrow$ Feature that is historically taken over during fiscal crises.

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- Focus on resources the government must raise, or fiscal burden:
  - $\rightarrow$ Positive footprint if tighten government budget constraint
  - $\rightarrow$ Unlike macropru literature on Pigouvian taxes (e.g., Farhi Werning, 2016, Bianchi Mendoza, 2018, Jeanne Korinek, 2019)
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- Builds on Krishnamurthy and Vissing-Jorgensen (2015), Bolton Jeanne (2015), Bordo Meissner (2016), Farhi Tirole (2018).

2. The footprint via the bond market

The footprint

$$\frac{q_{t+1}B_{t+1}}{p_{t+1}} \geq \delta_{t+1}\left(\frac{B_t}{p_{t+1}}\right) - z_{t+1} - s_{t+1} \equiv \Phi$$

- The fiscal burden: Φ
- The footprint: $\partial\Phi/\partial\beta_t$

BOND MARKET

- Downward-sloping demand for bonds from households:

$$q_t = \ell'(b_t/p_t) + \frac{\delta_{t+1}}{1 + i_t^d}$$

- From representative household maximizing:

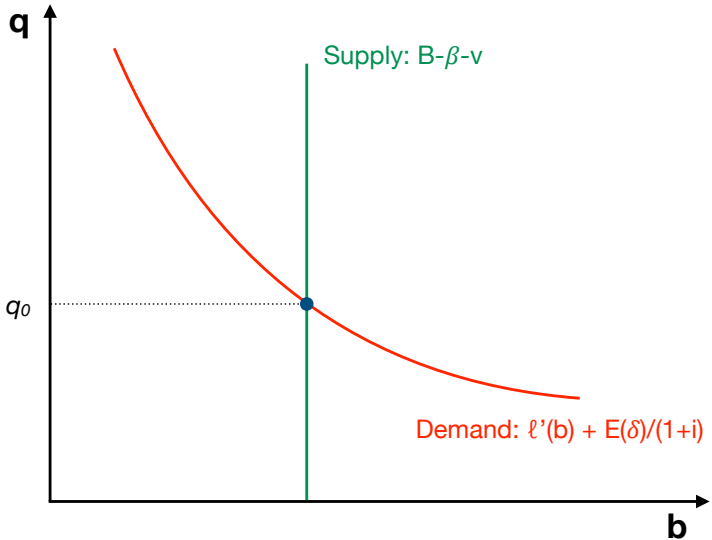
$$\sum_{t=0}^{\infty} \psi^t u\left(c_t + \ell(b_t/p_t)\right) \quad \text{subject to:}$$

$$p_t c_t + d_t + q_t b_t \leq (1 + i_{t-1}^d) d_{t-1} + b_{t-1}\delta_t + w_t$$

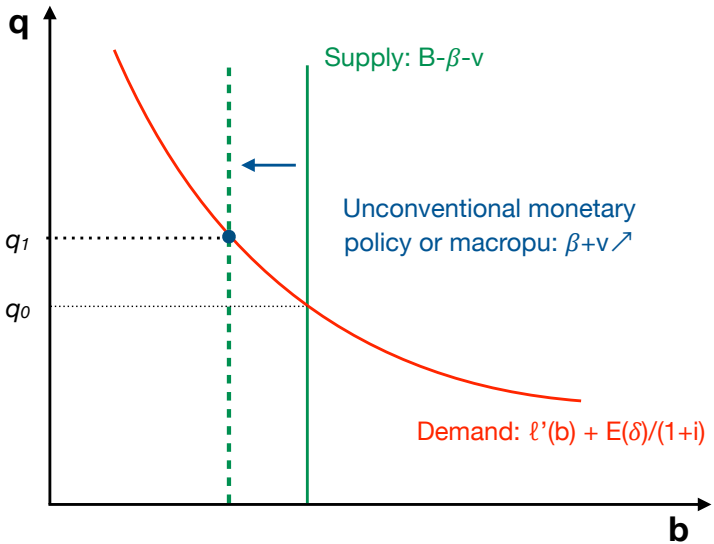
- Vertical supply, government issues B, central bank buys v, macropru sets β for banks

$$B_t = b_t + \beta_t + v_t$$

Supply and demand



MACROPRUDENTIAL POLICY



THE FISCAL FOOTPRINT

- Macroprudential policy β_t is an ex ante policy, set at date t. No effect on $q_t B_t / p_t$.

$$\frac{\partial}{\partial \beta_t} \left(\frac{\delta_{t+1} B_t}{p_{t+1}} \right) \Bigg|_{\delta_t, \pi_{t+1}} = - \left(\frac{\delta_{t+1} B_t}{p_{t+1}} \right) \left(\frac{\partial q_t / \partial \beta_t}{q_t} \right) < 0$$

Macroprudential policy raises the price of government bonds, allows the government to roll over its debt at a better price, negative footprint.

3. Macroprudential versus monetary policy

MONETARY POLICY

- Net income of central bank

$$p_{t+1}z_{t+1} = [\delta_{t+1} - (1 + i_t^v)q_t]\, v_t = \mathcal{L}(\beta_t, v_t)v_t$$

- Conventional monetary policy: target π_{t+1}, by setting interest rates, which requires $\partial i^d / \partial \pi < 0$

- Unconventional monetary policy: choosing v_t while keeping inflation π_t fixed.

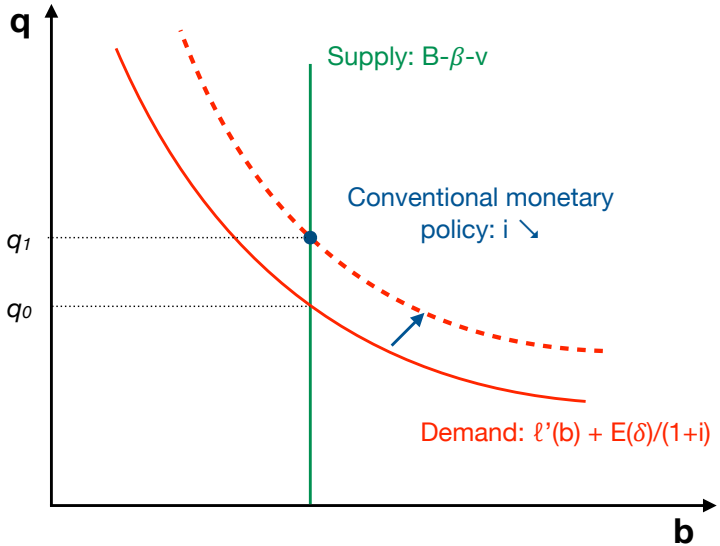
FOOTPRINT OF MACROPRUDENTIAL

The fiscal footprint of macro-prudential policy (β_t) while keeping the fiscal policy (s_t, δ_{t+1}) and monetary policy (π_{t+1}, v_t) both fixed is:

$$\left.\frac{\partial \Phi}{\partial \beta_t}\right|_{s_t,\delta_{t+1},\pi_{t+1},v_t} = -\left(\frac{\delta_{t+1}B_t}{p_{t+1}}\right)\left(\frac{\partial q_t/\partial \beta_t}{q_t}\right) - \left(\frac{v_t/p_t}{\pi_{t+1}}\right)\left(\frac{\partial \mathcal{L}(\beta_t, v_t)}{\partial \beta_t}\right)$$

- First term: same
- Second term: if tighter macro-prudential regulation lowers the return earned on bonds relative to the return earned on reserves, it lowers net profits of central bank.

Footprint of conventional M policy

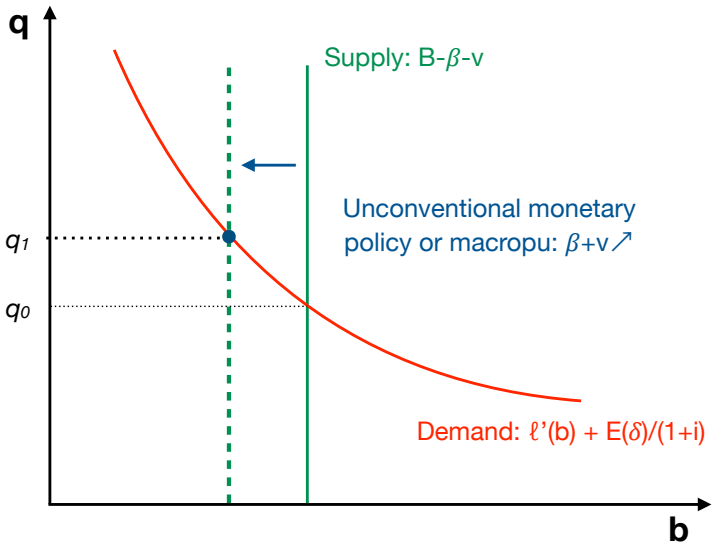


FOOTPRINT OF CONVENTIONAL M POLICY

$$\left.\frac{\partial \Phi}{\partial \pi_{t+1}}\right|_{s_t,\delta_{t+1},v_t,\beta_t} = -\left(\frac{\delta_{t+1}B_t}{p_{t+1}}\right)\left(\frac{\partial q_t/\partial i_t^d}{q_t}\right)\left(\frac{\partial i_t^d}{\partial \pi_{t+1}}\right) + \mathcal{L}(\beta_t, v_t)\left(\frac{v_t/p_t}{\pi_{t+1}^2}\right) - \left(\frac{\delta_{t+1}B_t}{p_{t+1}}\right)\left(\frac{1}{\pi_{t+1}}\right)$$

- First term: same if fame price impact
- Second term: inflation lowers real value of any positive profits of the central bank.
- Third term: inflating away some of the public debt.

Footprint of unconventional M policy



Footprint of unconventional M policy

$$\left.\frac{\partial \Phi}{\partial v_t}\right|_{s_t,\delta_{t+1},\pi_{t+1},\beta_t} = -\left(\frac{\delta_{t+1}B_t}{p_{t+1}}\right)\left(\frac{\partial q_t/\partial v_t}{q_t}\right) - \frac{\mathcal{L}(\beta_t, v_t)/p_t}{\pi_{t+1}} - \frac{v_t/p_t}{\pi_{t+1}}\left(\frac{\partial \mathcal{L}(\beta_t, v_t)}{\partial \beta_t}\right)$$

- First term: same if fame price impact
- Second term: larger CB balance sheet.
- Third term: change in profit margin of CB

LESSON AND MOVING FORWARD

Monetary policy has an extra negative footprint than macroprudential policy, although not huge difference

- A government that is solely focussed on the fiscal footprint would turn to monetary policy first

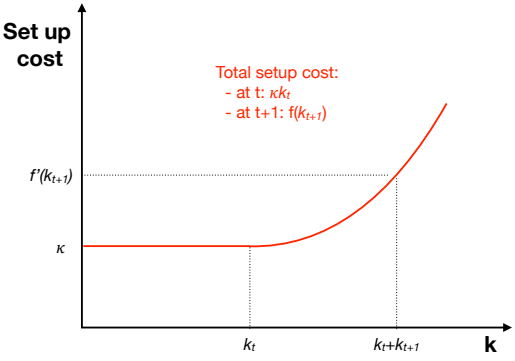
- Why it is so often used during extreme fiscal crises, leading to hyperinflation

From now onwards: $v_t = 0, \pi_{t+1} = 1$

4. Footprint via fiscal surpluses

FIRMS AND PRODUCTION

- Measure one entrepreneurs, each produce on net A_{t+1}
- Firm set up capital at date t: investment κ, return $(A_{t+1} - \kappa)k_t > \psi^{-1}$
- If only set up firm at $t+1$ with make-do capital k'_{t+1}, cost higher and convex in amount financed, net return: $A_{t+1}k'_{t+1} - f(k'_{t+1})$



BANKS AND CREDIT

- Measure one bankers, only ones that can monitor the entrepreneurs, collect payment.

- Have net worth, collect deposits:

$$\kappa k_t + q_t \beta_t = n_t + d_t$$

- Incentive constraint if can abscond with share $1 - \gamma$ of loan payments:

$$\underbrace{(1-\gamma)(1-\tau_{t+1})(A_{t+1}-\kappa)k_t}_{\text{default, keep share of loans}} \leq \underbrace{(1-\tau_{t+1})(A_{t+1}-\kappa)k_t + \delta_{t+1}\beta_t - (1+i_t^d)d_t}_{\text{pay deposits, keep bonds and loans}}$$

FINANCIERS AND INTERBANK MARKET

- Measure one of financiers, had net worth n' but could not find a firm to fund at date t, can lend its capital at $t+1$ before closing down.

- Interbank market matches financiers with banks but require margin:

$$(1-\xi)x_{t+1} \leq \beta_t \delta_{t+1}$$

- Moral hazard because of bailouts:

$$T_{t+1} = \max\{f(k^*_{t+1}) - x_{t+1}, 0\},$$

THE FISCAL SURPLUS

- Tax revenues:

$$R(\tau_{t+1}, \beta_t, \delta_{t+1}) = \underbrace{\tau_{t+1}(A_{t+1} - \kappa)k_t}_{\text{regular inv}} + \underbrace{\tau_{t+1}(A_{t+1}k^*_{t+1} - f(k*_{t+1}))}_{\text{make-do inv}}$$

- Government bailouts:

$$T(\beta_t, \delta_{t+1}) = \max\left\{f(k^*_{t+1}) - \frac{\beta_t \delta_{t+1}}{1-\xi}, 0\right\}$$

- Primary surplus

$$s_{t+1} = R(\tau_{t+1}, \beta_t, \delta_{t+1}) - T(\delta_{t+1}, \beta_t) - g_{t+1}$$

FISCAL FOOTPRINT OF MACROPRU

- Benefit of macropru, reduce bailouts:

$$\frac{\partial T(.)}{\beta_t} = -\delta_{t+1}/(1-\xi) \text{ if } \beta_t < \bar{\beta} \text{ , and zero otherwise} \leq 0$$

- Cost of macropru, lowers credit, activity, revenues:

$$\frac{\partial R(.)}{\beta_t} = -\tau_{t+1}(A_{t+1}/\kappa - 1)\left(\frac{\delta_{t+1}(\ell_t' + \beta_t \ell_t'')}{1 - \psi\gamma(A_{t+1}/\kappa - 1)(1-\tau_{t+1})}\right) \leq 0$$

- Fiscal footprint positive if:

$$\partial T(.)/\beta_t > \partial R(.)/\partial \beta_t$$

If no financial crisis $T_{t+1} = 0$, then for sure positive.

5. Interaction between fiscal and macroprudential policy

CRISES

- A financial crisis is a time when $T_{t+1} > 0$. Ruled out by high enough β_t

- A fiscal crisis occurs when $\delta_{t+1} < 1$. May be triggered by too high β_t if there is a limit $\tau < \bar{\tau} < 1$,

QUIET TIMES

PROPOSITION

If there is no fiscal or financial crisis, then tighter macropru (higher β) leads taxes to rise (higher τ) to keep the fiscal burden fixed if the crowding-out of lending is larger than the price impact, which happens if the elasticity of the safety premium is small enough:

$$\frac{\tau_{t+1}(A_{t+1}/\kappa - 1)}{1 - \psi\gamma(1 + \tau_{t+1}(A_{t+1}/\kappa - 1)} > \left(- \frac{\ell_t''(.)}{\ell_t'(.) + \beta_t \ell_t''(.)} \right) \times \frac{B_t}{q_t}.$$

- Fiscal footprint on bond prices is negative and felt at t: lowering costs of rolling over debt.

- Fiscal footprint on tax collection is positive and felt at $t + 1$: lowering tax base.

The present-biased politician

- If care more about t, want tighter macroprudential policy / financial repression.

- Coalition governments, high electoral turnover, higher public debt and more use of financial repression

- Well before the election, the government will want to loosen macroprudential regulation in order to increase bank lending, real activity, and tax collections later. RBI 2018.

SECOND CASE: FINANCIAL CRISIS

PROPOSITION

If $\delta = 1$, but $T(.) > 0$ then tighter macroprudential policies (higher β) lead taxes to rise (higher τ) if the crowding-out of lending exceeds the price impact plus the lowering of the bailout size:

$$\frac{\tau_{t+1}(A_{t+1}/\kappa - 1)}{1 - \psi\gamma(1 + \tau_{t+1}(A_{t+1}/\kappa - 1)} > \left(-\frac{\ell_t''(.)}{\ell_t'(.) + \beta_t \ell_t''(.)} \right) \times \frac{B_t}{q_t} + \frac{1}{1 - \xi}.$$

Tighter policy lowers the size of the needed bailout, which lowers the fiscal burden. $\partial\tau/\partial\beta$ is unambiguously lower, tighter policy is more likely to be fiscally beneficial

The present absence of conflict

- Following the financial crisis of 2008-10, macroprudential policies became tighter in most financial centres.

- New macroprudential authorities, independent from Treasury (FPC, PRA, SSM)

- Movement of power because prospect of a new financial crisis. No conflict between the fiscal and macroprudential policymakers, financial and fiscal goals coincided.

THIRD CASE: FISCAL CRISIS

PROPOSITION

If $T = 0$, but $\tau = \bar{\tau}$, then tighter macropru (higher β) makes the fiscal crisis more severe (lower δ) if the price impact is smaller than the crowding-out of lending, as in proposition 1.

Same channels but now effect on default rather than tax rate

UNPLEASANT MACROPRUDENTIAL ARITHMETICS

- Say fiscal authority commits to low taxes. How? (i) election of fiscally irresponsible politician, (ii) civil unrest harming tax collections, (iii) realization debt due is higher than though.

- If the regulator wants to avoid a fiscal crisis, it must use macropru's fiscal footprint. "Tax" the banks. Under pressure to generate fiscal revenues, central bank lose their independence and this reflects itself as much in high inflation as it does in using regulatory tools to leave a negative footprint.

- Latin America in the 1980s:
  - $\rightarrow$ Large and actively used reserve requirements
  - $\rightarrow$ Requirement percentage of assets in government bonds
  - $\rightarrow$ In data, positive association between financial repression and inflation

6. The diabolic loop

TWIN CRISES

- Government budget constraint: higher bailout, more spending, more default

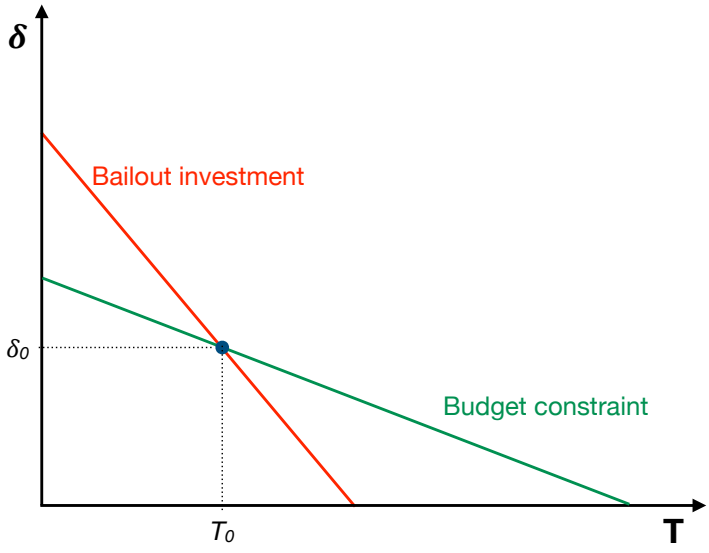
$$\left(\frac{\delta_{t+1}}{\ell'(.)+\psi\delta_{t+1}}\right)(q_t B_t) = R(\tau_{t+1},\beta_t,\delta_{t+1}) - T_{t+1} - g_{t+1} + \Phi$$

- Financing of make-do investment: more default, less collateral, higher bailout

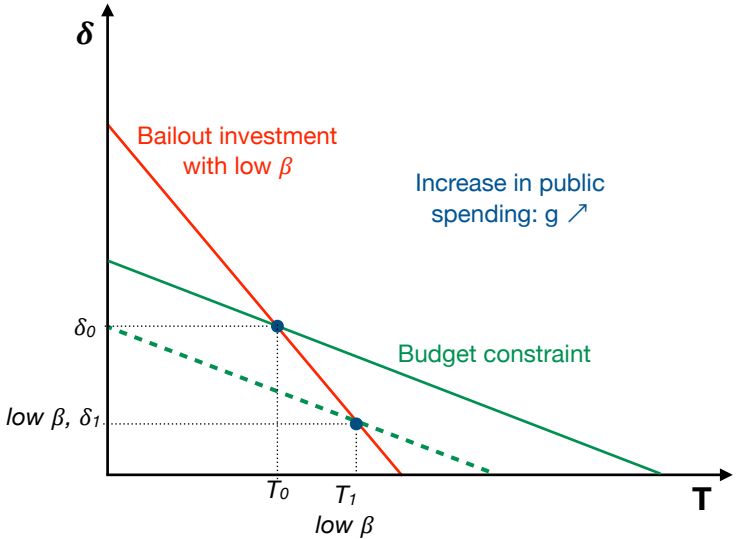
$$T_{t+1} = f(k^*_{t+1}) - \frac{\delta_{t+1}\beta_t}{1-\xi}$$

- Both negative relation (T, δ)

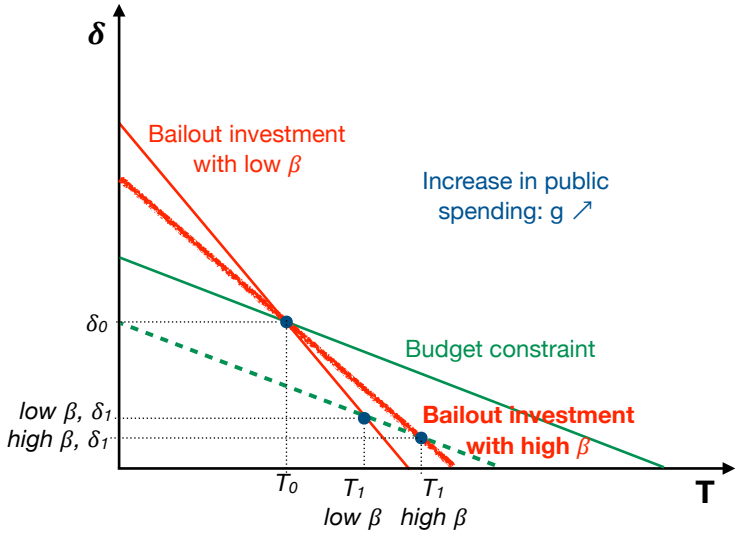
THE TWIN CRISIS



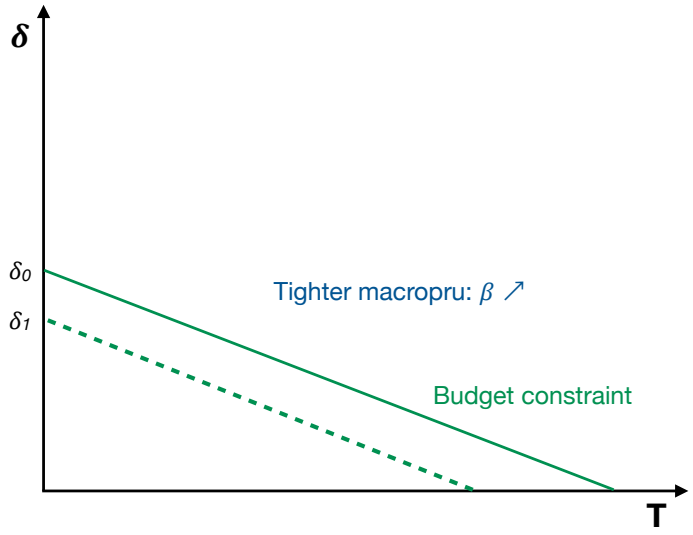
THE DIABOLIC LOOP



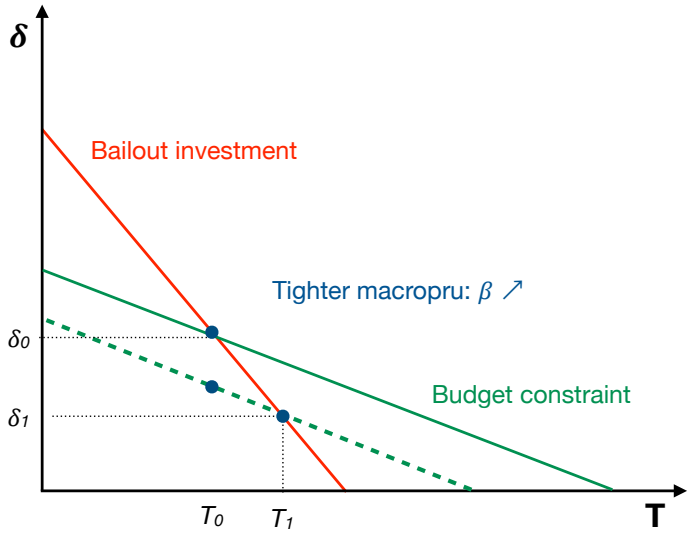
THE DIABOLIC LOOP: MACROPRU AMPLIFIER



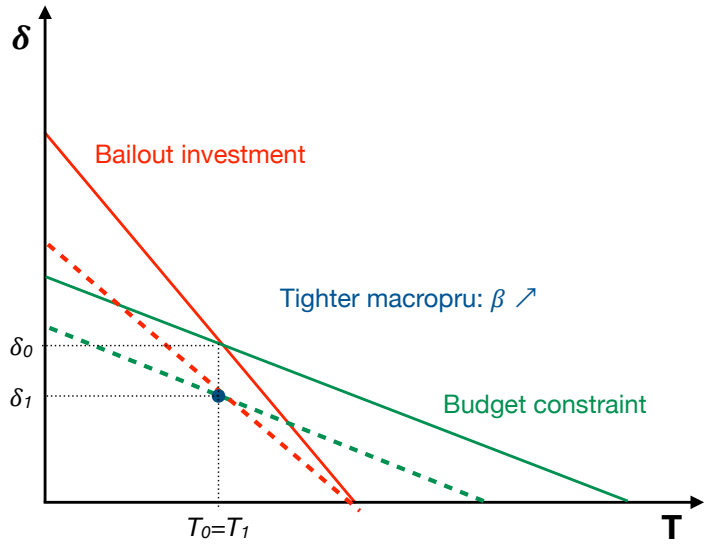
FISCAL FOOTPRINT WITHOUT FINANCIAL CRISIS



Amplification of footprint



MACROPRU WORKING THE OTHER DIRECTION



The European Banking Union

- Following sovereign debt crisis of 2010-12, diabolic loop at center of discussions.

- Reform: concentration limits on the amount of national debt a bank can hold, should national sovereign debt should stop receiving a zero risk weight in banking regulation.

- Argument in favor: g shocks attenuate, stabilize economies

- Arguments against: use policy or "moral suasion" to fill fiscal shortfalls.

7. Conclusion

Conclusion

- Three channels for the fiscal footprint of tighter macro-prudential policy:
  - → Makes rolling over debt cheaper
  - → Lowers lending, real activity, and tax collections in the future
  - → Lowers bailout costs, or likelihood.

- Comparison with monetary: macropru has a lower fiscal footprint

- Independent macropru regulator:
  - → Precent biased politician wants tighter macropru
  - → Unpleasant macropru arithmetics in a fiscal crisis
  - → If financial risk domimates, tight macropru is unchallenged
  - → With diabolic loop, mean variance tradeoff.