The Fiscal Footprint of Macroprudential Policy

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THE FISCAL FOOTPRINT OF MONETARY POLICY

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

The fiscal footprint of monetary policy

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- Commitment: central bank independence

WHAT ABOUT MACROPRUDENTIAL POLICY?

- What is its fiscal footprint?
    - $\rightarrow$ The channels?
    - $\rightarrow$ The interaction with fiscal and financial crises?
    - $\rightarrow$ Unpleasant macroprudential arithmetics and fiscal dominance?

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    - $\rightarrow$ Unpleasant macroprudential arithmetics and fiscal dominance?

- Policy debates
    - $\rightarrow$ Indian elections and RBI lending standard requirements.
    - $\rightarrow$ Should macropru regulator be inside CB or Treasury.
    - $\rightarrow$ 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)
    - $\rightarrow$ Unlike macropru literature on redistribution (e.g., Svensson, 2018, Peydro, Tripathy, Rodriguez, 2019)

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- Builds on Krishnamurthy and Vissing-Jorgensen (2015), Bolton Jeanne (2015), Bordo Meissner (2016), Farhi Tirole (2018).

1. A simple model of the bond market and policy and the direct fiscal footprint

THE BOND MARKET

- Downward-sloping demand for bonds from households:
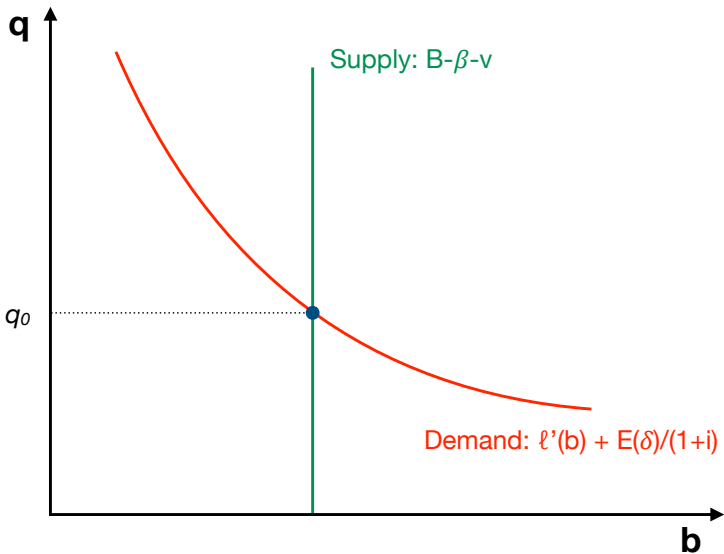
$$q_t = \ell'(b_t/p_t) + \frac{\delta_{t+1}}{1 + i_t^d}$$

- From representative household maximizing:

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

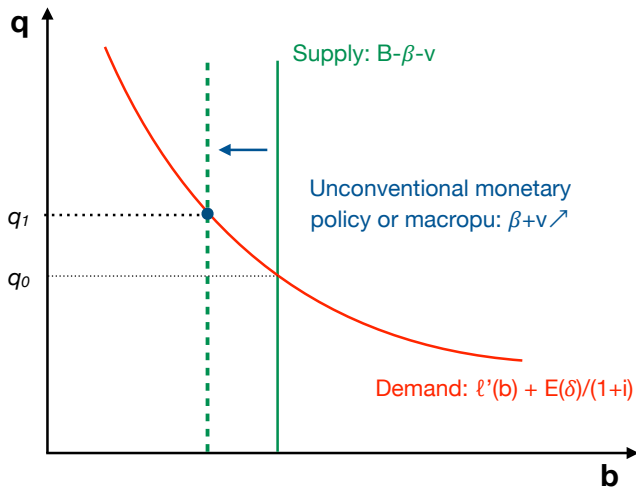$$p_t c_t + d_t + q_t b_t \leq (1 + i_{t-1}^d)d_{t-1} + b_{t-1}\delta_t + z_t)$$

- Vertical supply, as government issues B, central bank buys v with reserves, macropru sets minimum β for banks
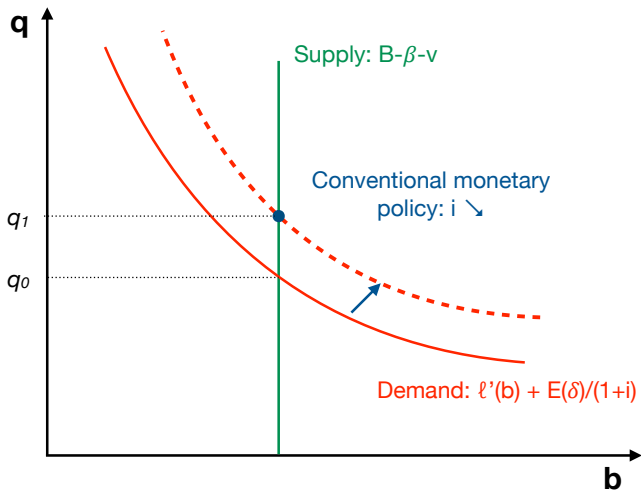
$$B_t = b_t + \beta_t + v_t$$

SUPPLY AND DEMAND

Supply: B-β-v

Demand: ℓ'(b) + E(δ)/(1+i)

MACROPRU AND MONETARY POLICY

Supply: B-β-v

Unconventional monetary
policy or macropru: β+v ↗

Demand: $\ell'(b) + E(\delta)/(1+i)$

q_1

q_0

q

b

MACROPRU AND MONETARY POLICY

q

Supply: $B - \beta - v$

Conventional monetary policy: $i \searrow$

q_1

q_0

Demand: $\ell'(b) + E(\delta)/(1+i)$

b

DEFINING THE FISCAL FOOTPRINT

- Government budget constraint

$$p_t s_t + p_t d_t + q_t B_t \geq \delta_t B_{t-1}$$

- Macroprudential policy β_t set at t, taking s_t, δ_t, d_t as given.

$$\frac{q_{t+1} B_{t+1}}{p_{t+1}} + s_{t+1} \geq \underbrace{\frac{\delta_{t+1} p_t}{q_t p_{t+1}} \left[\frac{\delta_t B_{t-1}}{p_t} - s_t - d_t \right] - d_{t+1}}_{\text{fiscal burden}}$$

The direct fiscal footprint of a policy is the change in the fiscal burden of the fiscal authority, holding default as given.

Macroprudential policy

> **Proposition**
>
> *Tighter macroprudential policy (higher β_t) has a negative direct fiscal footprint:*
>
> $$-\left(\frac{\delta_{t+1}p_t}{q_t^2 p_{t+1}}\right)\left(\frac{\delta_t B_{t-1}}{p_t} - s_t - d_t\right)\left(\frac{\partial q_t}{\partial \beta_t}\right) < 0.$$

Macroprudential policy raises price of government bonds, makes rolling over of debt cheaper.

Identical policies: if same price impact on $1/q$.

> **LEMMA**
>
> *A conventional monetary policy with the same price impact as a macroprudential policy exceeds its fiscal footprint by:*
>
> $$-\left(\frac{\delta_{t+1}p_t}{q_t p_{t+1}^2}\right)\left(\frac{\delta_t B_{t-1}}{p_t} - s_t - d_t\right)\left(\frac{\partial p_{t+1}}{\partial i_t^v}\right)\left(\frac{\partial q_t}{\partial i_t^v}\right)^{-1} \leq 0.$$
>
> *An unconventional monetary policy with the same price impact as a macroprudential policy exceeds its fiscal footprint by:*
>
> $$\mathcal{L}_t + \mathcal{L}_t'(.)v_t + \mathbb{E}_t(\delta_{t+1}) - \delta_{t+1}.$$

Inflation, relative liquidity, unexpected default. All likely small, although conventional monetary policy's edge makes it first line.

2. Model of production and financing and the indirect fiscal footprint

FIRMS AND PRODUCTION

- Measure one entrepreneurs, each produce on net π_{t+1}

- Firm set up capital at date t: investment κ, return $(\pi_{t+1} - \kappa)k_t > 0$

- If only set up firm at $t+1$ with make-do capital k'_{t+1}, cost higher and convex in amount financed, net return: $\pi_{t+1}k'_{t+1} - f(k'_{t+1})$

Total setup cost:
- at t: κk_t
- at t+1: $f(k_{t+1})$
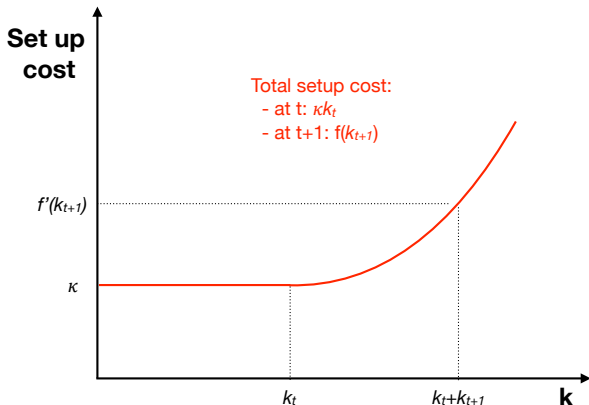
BANKS AND CREDIT

- 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:

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

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:

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

INDIRECT FISCAL FOOTPRINT

- Tax revenues:

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

- Government bailouts:

$$T(\delta_{t+1}, \beta_t) = \max\{f(k_{t+1}^*) - \beta_t\delta_{t+1}/(1-\xi), 0\}.$$

- Primary surplus

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

The indirect fiscal footprint is the increase in the tax rate $\tau_{t+1} < \bar{\tau}$ required to keep the fiscal surplus s_{t+1} unchanged in response to an increase in β_t.

COSTS AND BENEFITS OF MACROPRU

- Banks only hold bonds they are forced to hold. Fiscal benefit of macropru:

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

- Tighter macroprudential policy reduces investment since:

$$\frac{\partial R(.)}{\partial \beta_t} = -\tau_{t+1}\left(\frac{\pi_{t+1}}{\kappa} - 1\right)\left(\frac{\ell'(1+i_t^d)}{1+i_t^d - \gamma(\pi_{t+1} - \kappa)(1 - \tau_{t+1})}\right) < 0$$

INDIRECT FISCAL FOOTPRINT OF MACROPRU

PROPOSITION

The indirect fiscal footprint of macroprudential policy can be positive or negative, as its sign is the sign of

$$\frac{\partial T(.)}{\partial \beta_t} - \frac{\partial R(.)}{\partial \beta_t}.$$

3. Interaction between fiscal and macroprudential policy

CRISES

- A fiscal crisis occurs when $\delta_{t+1} < 1$

- A financial crisis is a time when $T_{t+1} > 0$.

FIRST CASE: QUIET TIMES

PROPOSITION

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

$$\tau_{t+1}\left(\frac{\pi_{t+1}}{\kappa}-1\right)\times\frac{1+i_t^d}{1+i^d-\gamma(1+\tau_{t+1}(\pi_{t+1}-\kappa))} > \left(-\frac{\ell_t''(.)}{q_t\ell_t'(.)}\right)\times\frac{B_{t-1}-s_t}{q_t}.$$

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

- Indirect 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.

- Latin America in the 1980s:
    - $\rightarrow$ High electoral turnover
    - $\rightarrow$ Large and actively used reserve requirements
    - $\rightarrow$ Central banks subordinated to fiscal needs

Second 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 the previous proposition.*

Same channels but now effect on default rather than tax rate

Unpleasant macroprudential arithmetics

- Say fiscal authority commits to low taxes, or spendthrift in charge, or higher debt, so fiscal crisis likely

- If the regulator wants to avoid a fiscal crisis, it must use macropru's fiscal footprint.

- "Tax" the banks.

THIRD 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 <u>plus</u> the lowering of the bailout size:

$$\left(\frac{\pi_{t+1}}{\kappa} - 1 \right) \frac{\tau_{t+1}(1 + i_t^d)}{1 + i^d - \gamma(1 + \tau_{t+1}(\pi_{t+1} - \kappa))} > \left(-\frac{\ell_t''(.)}{q_t \ell_t'(.)} \right) \frac{B_{t-1} - s_t}{q_t} + \frac{1}{1 - \xi}.$$

Tighter policy lowers the size of the needed bailout, which lowers the fiscal burden.

The current post-crisis consensus

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

- New macroprudential authorities, independent from Treasury

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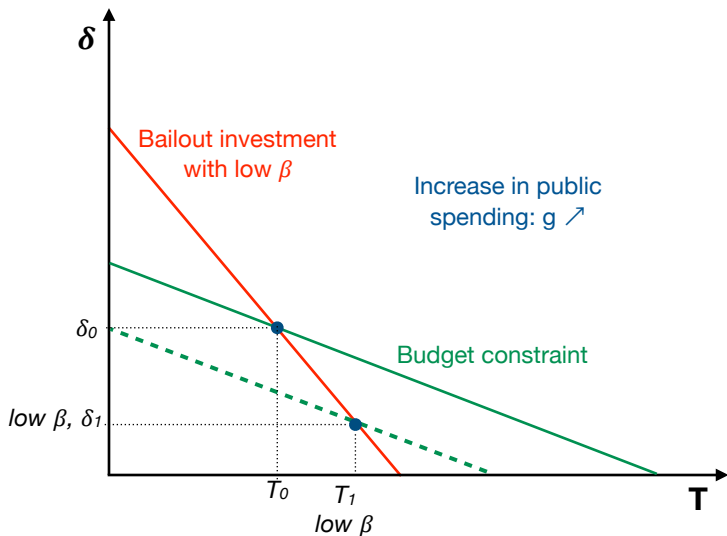
FOURTH CASE: TWIN CRISES

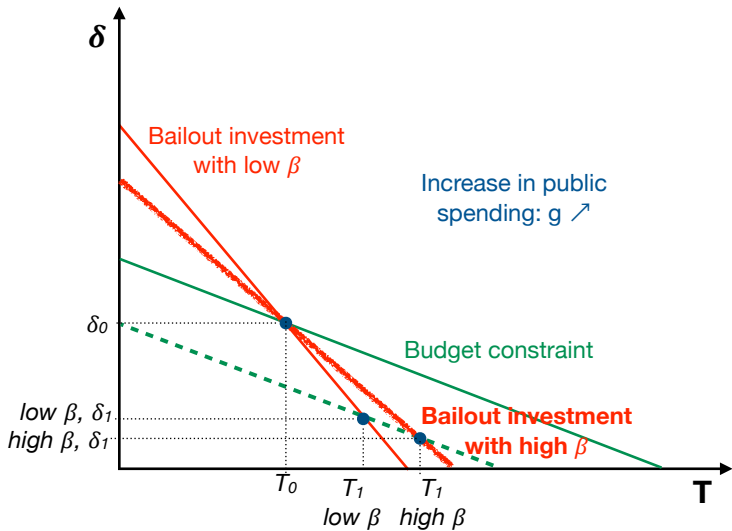Government budget constraint: higher bailout, more spending, more default

Financing of make-do investment: more default, less collateral, higher bailout
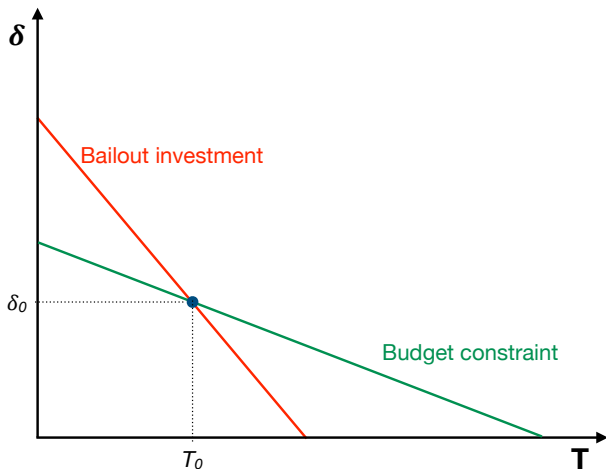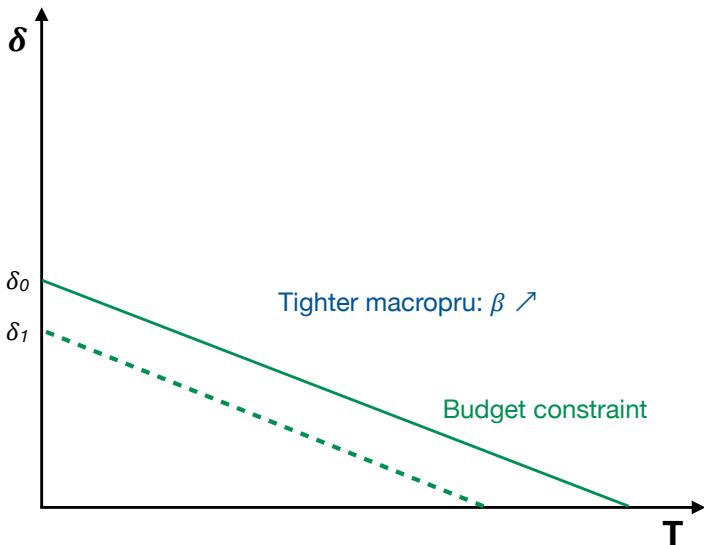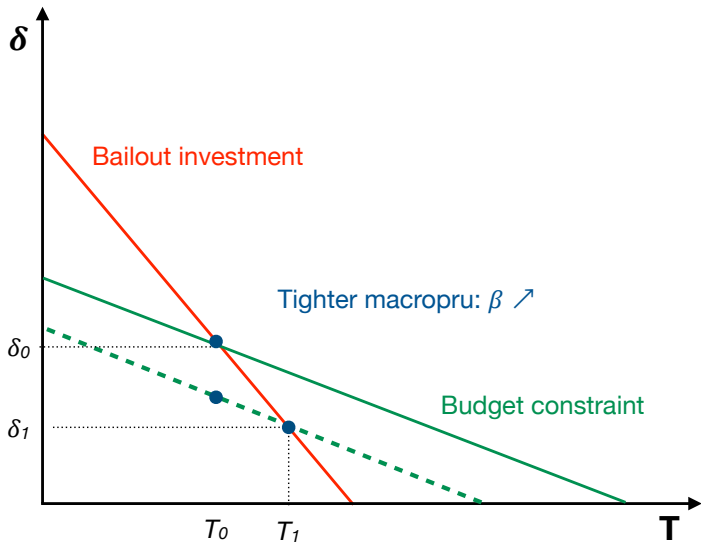
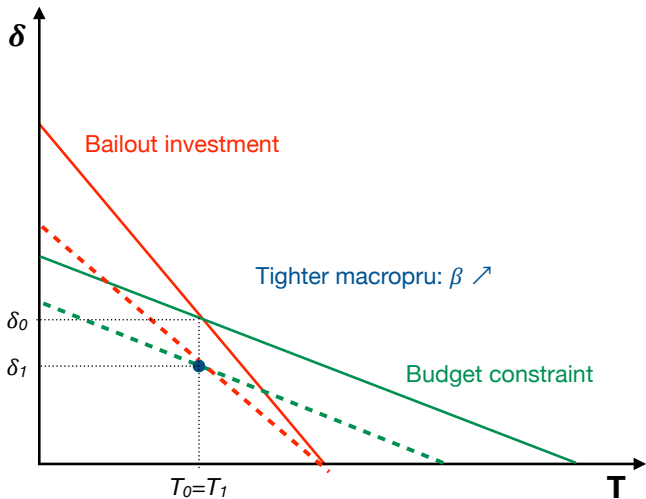# THE DIABOLIC LOOP

THE DIABOLIC LOOP: MACROPRU AMPLIFIER

FISCAL FOOTPRINT WITHOUT FINANCIAL CRISIS

The figure shows axes with δ on the vertical axis and T on the horizontal axis. Two downward-sloping green lines originate from δ_0 (solid, labeled "Budget constraint") and δ_1 (dashed). The solid line is annotated "Tighter macropru: $\beta \nearrow$".

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.

4. 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.