Fiscal Rules and the Sovereign Default Premium

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1. Motivation

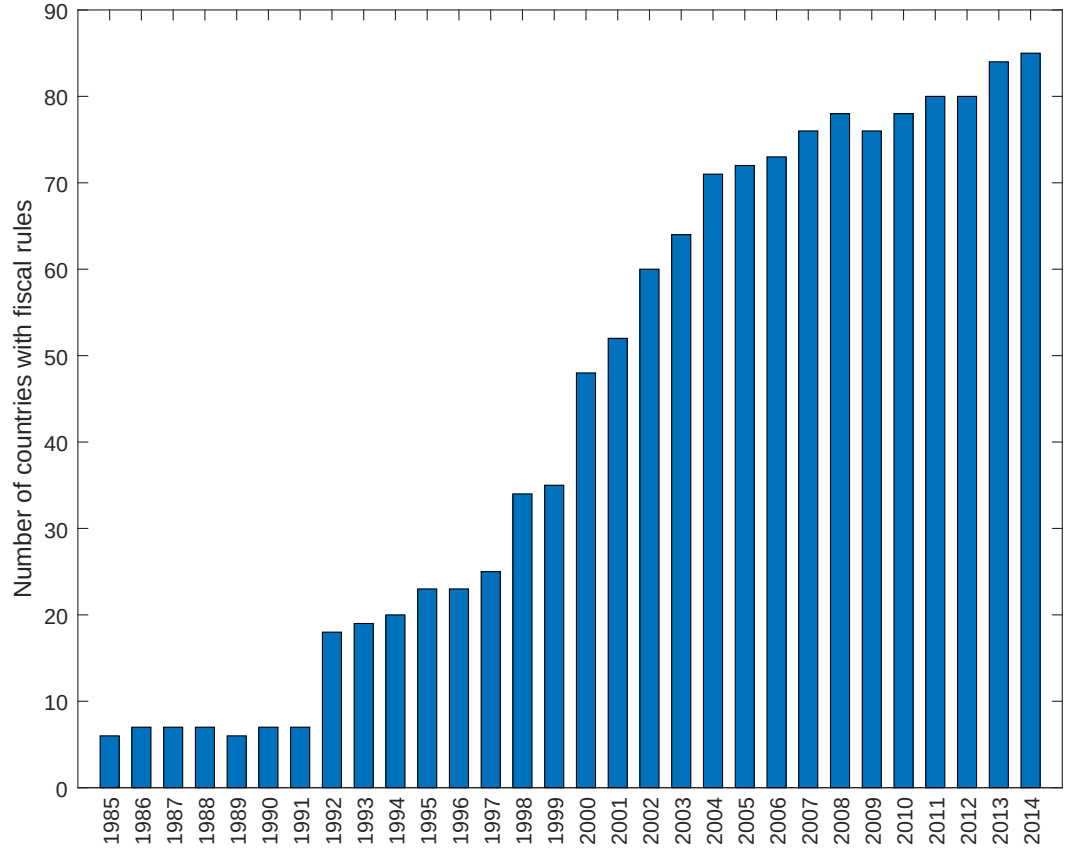
FISCAL ANCHORS

- Fiscal policy frameworks do not have an **anchor to manage expectations about future policies** (unlike frameworks used for monetary analysis; Leeper 2010).
- This paper:
  - Having a fiscal anchor could be important.
  - The sovereign **spread** (and not the **debt** level) should be the anchor.

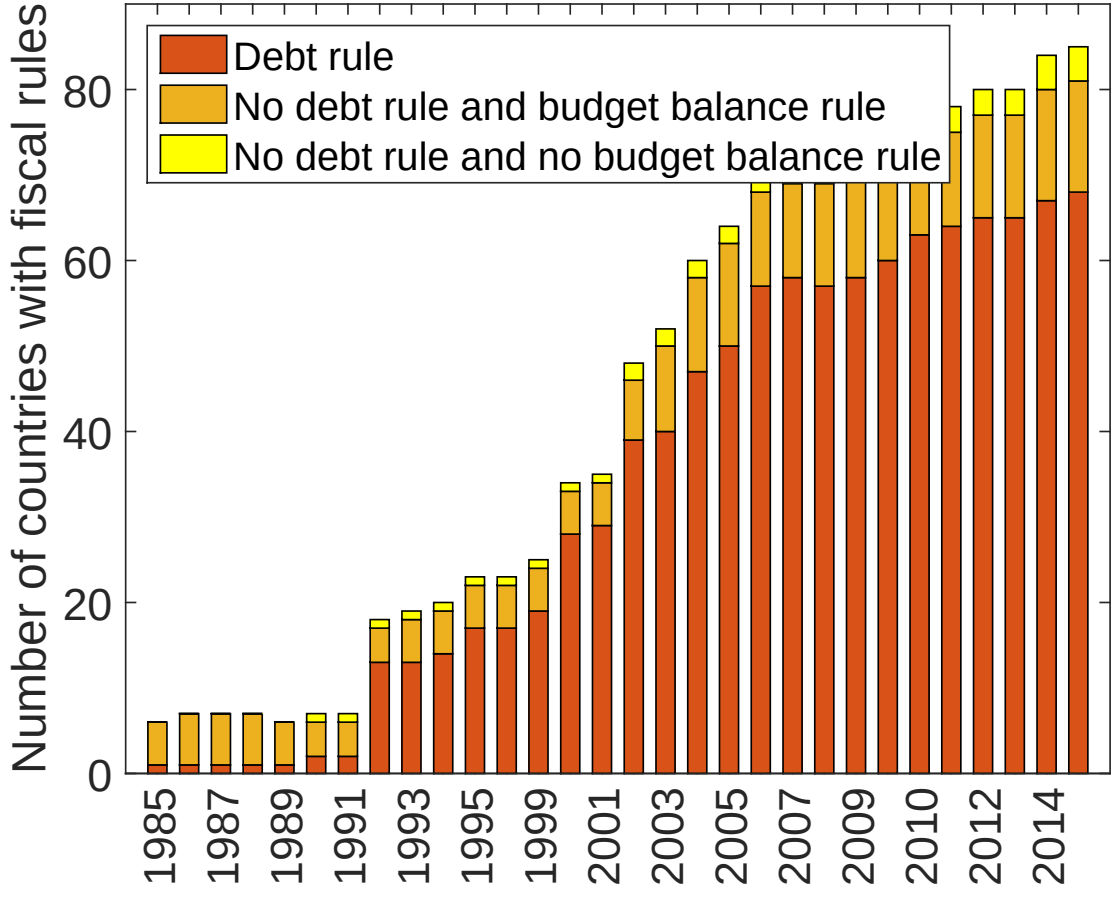
1. Better common anchor (SGP).
2. More robust anchor/policy advice (Spain?).
3. Better ownership/more credible/easier to commit too.

FISCAL RULES COULD PROVIDE FISCAL ANCHORS

A large and increasing number of countries have fiscal rules with numerical targets.



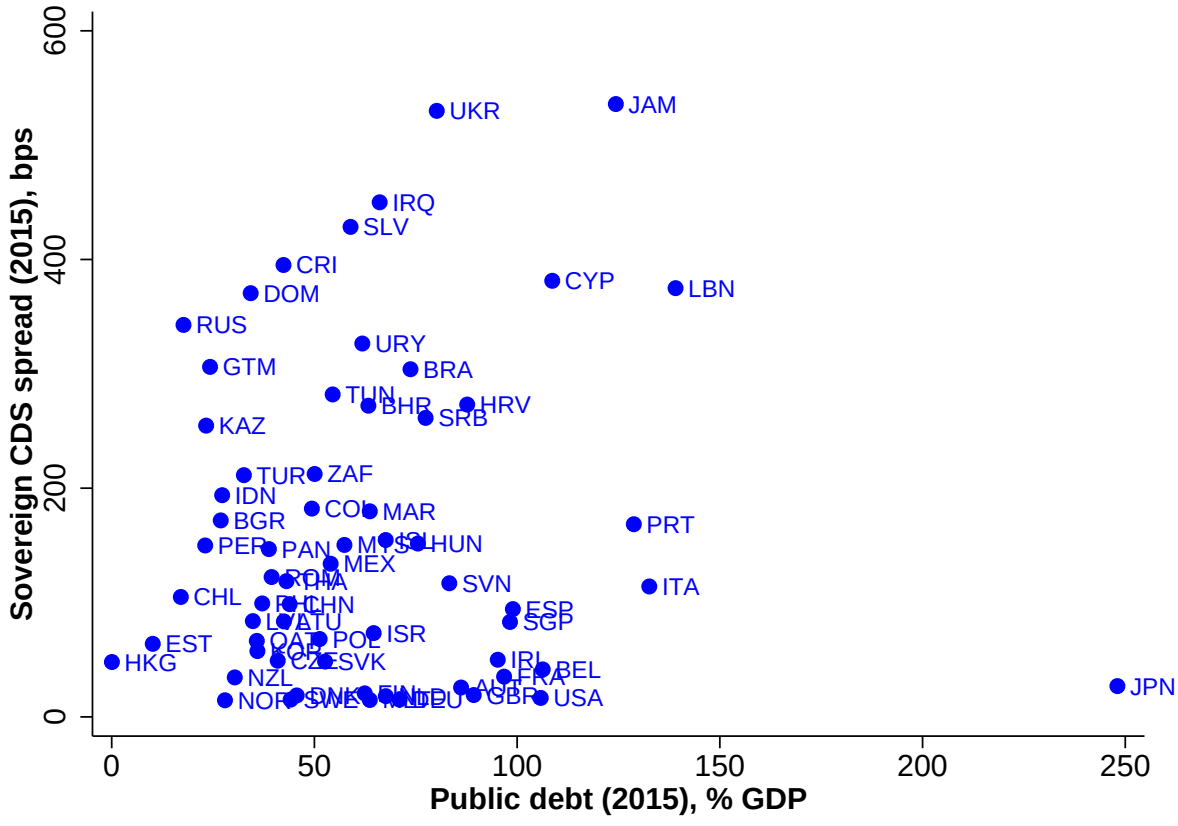
MOST FISCAL RULES TARGET DEBT LEVELS



WHAT IS THE OPTIMAL DEBT LEVEL?

- Blanchard (IMFdirect 2011): "Are **old rules of thumb**, such as trying to keep the debt-to-GDP ratio below 60 percent in advanced countries, still reliable?"
- The Fiscal Monitor (2013): "The **optimal-debt** concept has remained at a **fairly abstract level**... **adjustment needs** scenario has used benchmark **debt ratios of 60 percent of GDP**... **But the appropriate debt target need not be the same for all countries**..."
- Eberhardt and Presbitero (JIE 2015): **impossibility of finding common debt thresholds** across countries for the relationship between debt levels and long-run growth.

DEBT INTOLERANCE



More **debt intolerance** $\Rightarrow$ higher spreads for lower debt (Reinhart et al., 2003).

A COMMON, ROBUST, AND CREDIBLE ANCHOR

1. **Political constraints** lead to **common** fiscal anchors for several governments (e.g. SGP) that may face different levels of **debt intolerance.**

2. For one government, the level of **debt intolerance** changes over time and is difficult to **identify**.
   - What is the debt level consistent with acceptable fiscal risk in Greece? Brazil? Spain?
   - We would like policy advice to be **robust** to this uncertainty.

3. The anchor should be **credible**: governments would not gain from deviating from the fiscal rule.

SPREAD BRAKE VS. DEBT BRAKE

- A spread (debt) brake imposes a **limit on the fiscal balance** when the sovereign spread (debt) is above a **threshold**.

2. Three-period model

ENVIRONMENT

- Government's income in period $t = y_t$. With $t \in \{1, 2, 3\}$.
  - $y_1 = y_2 = 0, y_3 > 0$ and stochastic.
- The government maximizes utility of a representative consumer.
- A bond issued at $t = 1$ promises the payment sequence $\{\delta, 1 - \delta\}$.
- A bond issued at $t = 2$ promises a payment of 1 at $t = 3$.
- Foreign risk-neutral lenders' discount factor = 1.
- Lenders are atomistic and bond market is competitive.
- Cost of defaulting: Lose fraction ϕ of y_3 (no default in first two periods)

Optimal policies

- **Ramsey** policies: sequence of **borrowing** that maximizes the government's **expected utility in period 1**, given the default rule of the period 3 government.

- **Markov** policies: sequence of borrowing chosen **sequentially** by the governments in periods 1 and 2.

(With long-term debt) We need a fiscal rule

Proposition

Suppose $\delta < 1$; i.e., the government issues long-term debt in period 1.

Then, only with a fiscal rule limiting the government's choices in period 2, Markov policies coincide with Ramsey policies.

WHY IS A FISCAL RULE NEEDED?

- The period 2 Ramsey policy satisfies

$$u'\left(c_2(b_1^R, b_2^R)\right)\left[q_2(b_1^R, b_2^R) + b_2^R \frac{\partial q_2(b_1^R, b_2^R)}{\partial b_2}\right] =$$
$$\beta \mathbb{E}\left[u'\left(c_3(b_1^R, b_2^R, y_3)\right)\left[1 - \hat{d}(b_1^R, b_2^R, y_3)\right]\right]$$
$$-\mathbf{u}'\left(\mathbf{c_1}(\mathbf{b_1^R}, \mathbf{b_2^R})\right)\mathbf{b_1^R}\frac{\partial \mathbf{q_1}(\mathbf{b_1^R}, \mathbf{b_2^R})}{\partial \mathbf{b_2}}.$$

- But the period 2 Markov strategy satisfies

$$u'\left(c_2(b_1, b_2^M(b_1))\right)\left[q_2(b_1, b_2^M(b_1)) + b_2^M(b_1)\frac{\partial q_2(b_1, b_2^M(b_1))}{\partial b_2}\right]$$
$$= \beta \mathbb{E}\left[u'\left(c_3(b_1, b_2^M(b_1), y_3)\right)\left[1 - \hat{d}(b_1, b_2^M(b_1), y_3)\right]\right].$$

IDIOSYNCRATIC DEBT BRAKE = IDIOSYNCRATIC SPREAD BRAKE

- Idiosyncratic debt brake imposes a ceiling on the debt level, $(1-\delta)b_1 + b_2 \leq \bar{b}$.
- Idiosyncratic spread brake imposes a ceiling on the spread paid by the government and thus a floor on the sovereign bond price, $q_2(b_1, b_2) \geq \underline{q}$.

Proposition

If the government's choices in period 2 are limited with either a debt brake with threshold $\bar{b}^* = (1-\delta)b_1^R + b_2^R$ or a spread brake with threshold $\underline{q}^* = q_2(b_1^R, b_2^R)$, Markov policies coincide with Ramsey policies.

Optimal "common" fiscal rules

- Consider a set of heterogenous economies indexed by the value of the parameter $\theta \in \{\phi, \sigma_y, \beta\}$.
- $v(x;\theta)$ = expected utility in period 1 of an economy with a fiscal rule with threshold x.
- $h(\theta)$ = density function for θ in the set.
- The **optimal common fiscal rule threshold** X^* maximizes

$$\max_x \int v(x;\theta)h(\theta)d\theta.$$

WHY A "COMMON AND ROBUST" FISCAL RULE?

- X^* would be chosen by a planner that maximizes the expected utility in period 1 of
  1. **a set of different economies** while giving weight $h(\theta)$ to economies with parameter value θ.
  2. **a single economy** when the planner is **uncertain** about the value of the parameter θ and assigns the likelihood $h(\theta)$ to θ.

ASSUMPTION 1

- The function

$$\zeta_q(b) = \frac{b}{\phi} \frac{f\left(\frac{b}{\phi}\right)}{1 - F\left(\frac{b}{\phi}\right)}$$

  is increasing with respect to b and $\lim_{b\to\infty} \zeta_q(b) \geq 1$.

COMMON SPREAD BRAKE $\succ$ COMMON DEBT BRAKE

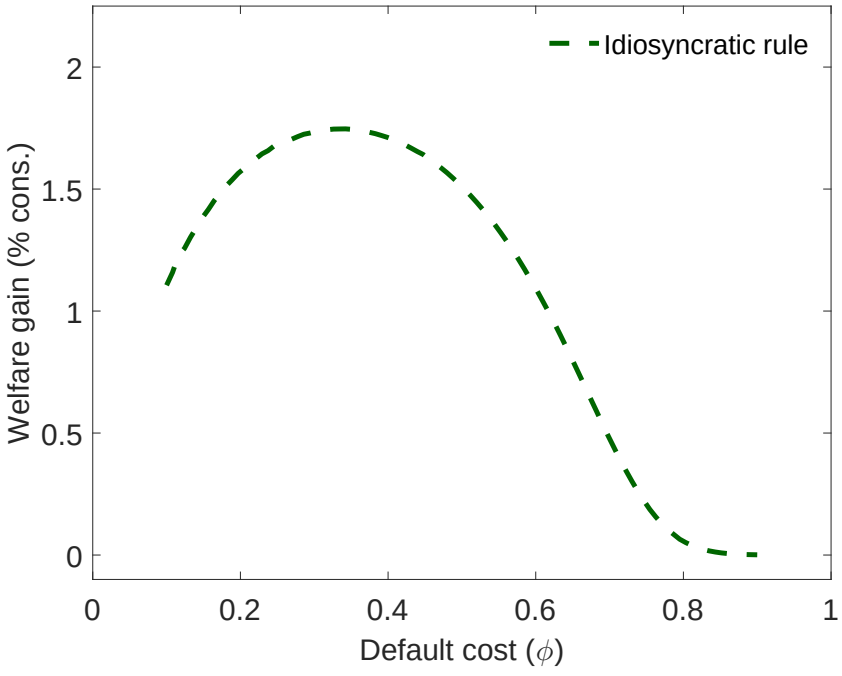
Proposition

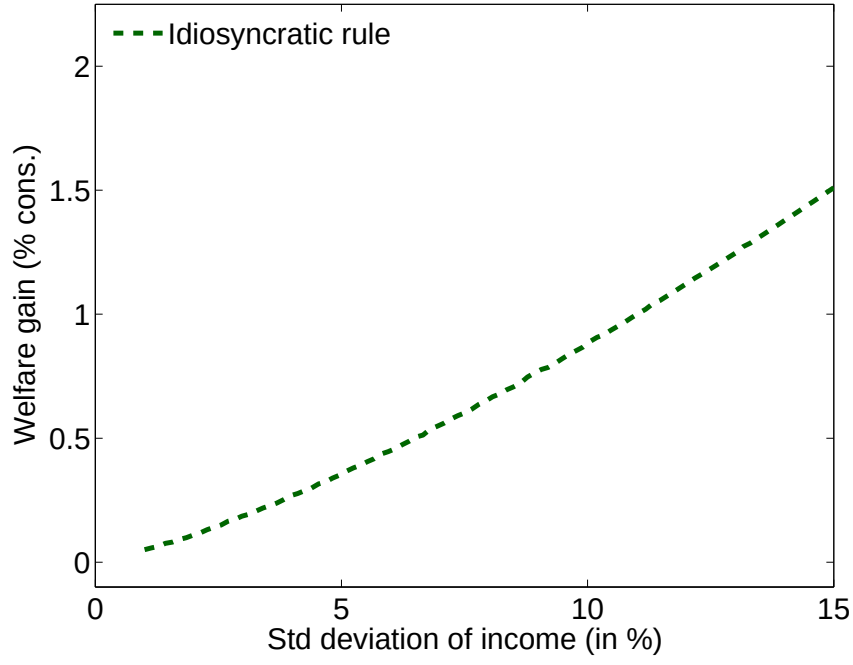
Suppose $\delta = 0$, $u(c) = c$, and Assumption 1 holds. Then, for any economy with cost of defaulting ϕ, the optimal debt brake threshold is $\bar{b}^* = \eta\phi$ and the optimal spread brake threshold is $\underline{q}^* = 1 - F(\eta)$, with $\eta > 0$. Therefore, for any set of economies that differ in the level of debt intolerance (i.e., for economies with different values of ϕ), the optimal common spread-brake threshold is $\underline{Q}^* = 1 - F(\eta)$, and generates larger welfare gains than any common debt-brake threshold $\bar{B}$.

NUMERICAL EXAMPLE

- Assume:
  - $u(c) = -c^{-1}$
  - $\beta = 1$,
  - $log(y_3) \sim N(0, \sigma_y)$,
  - $\delta = 0$.
- If $\sigma_y = 0.1$, debt levels between 25 and 169 percent of average period 3 income, spreads between 1 and 12 percent.

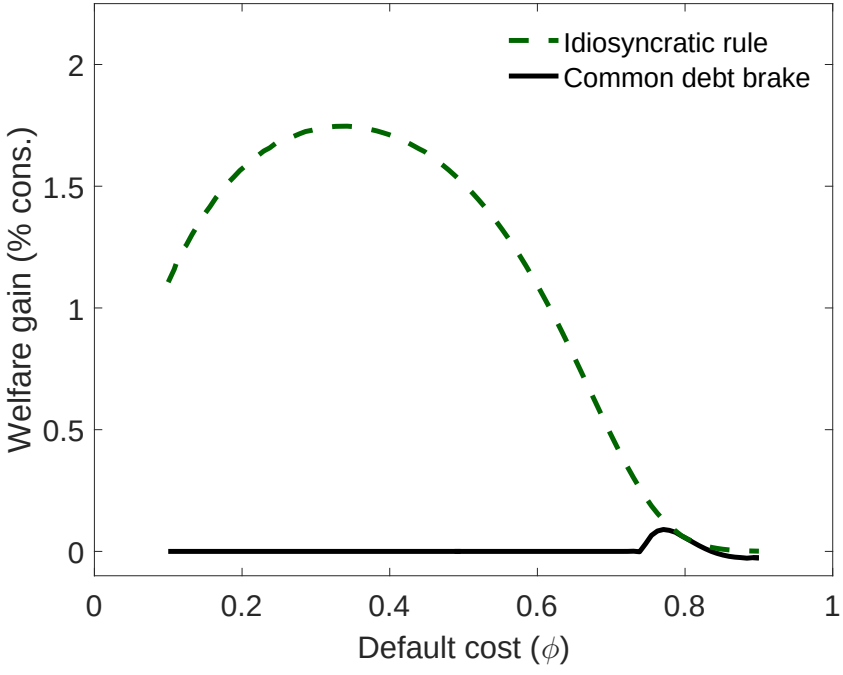
WELFARE GAINS FROM IDIOSYNCRATIC RULE

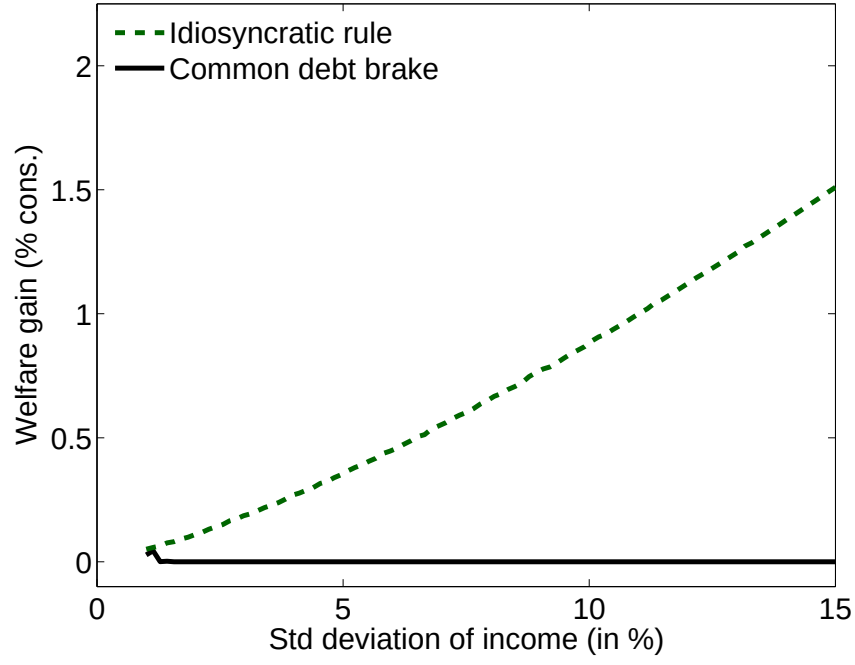




Same welfare gains with either optimal **idiosyncratic** debt brake or optimal **idiosyncratic** spread brake

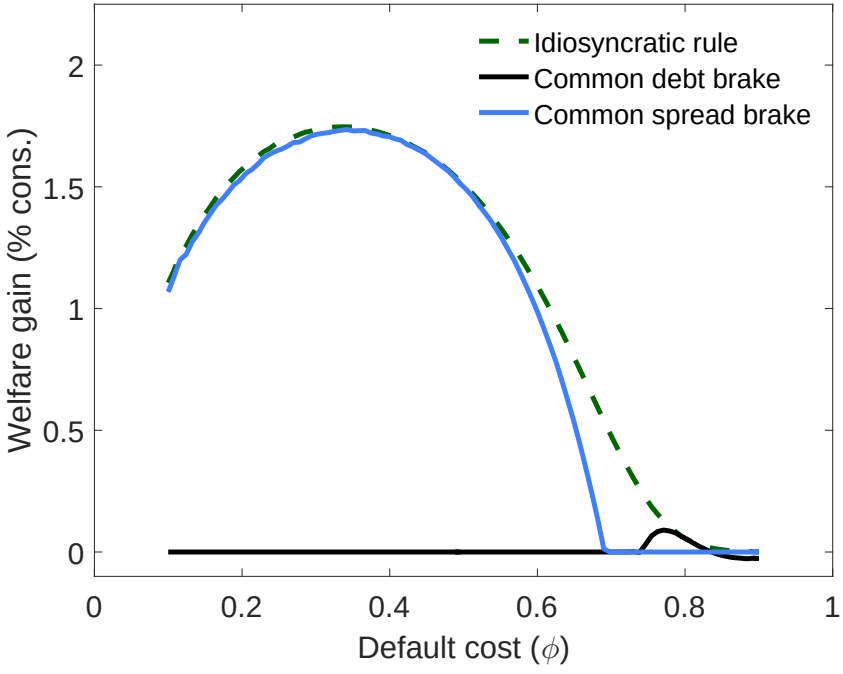
COMMON DEBT BRAKE DOESN'T WORK WELL

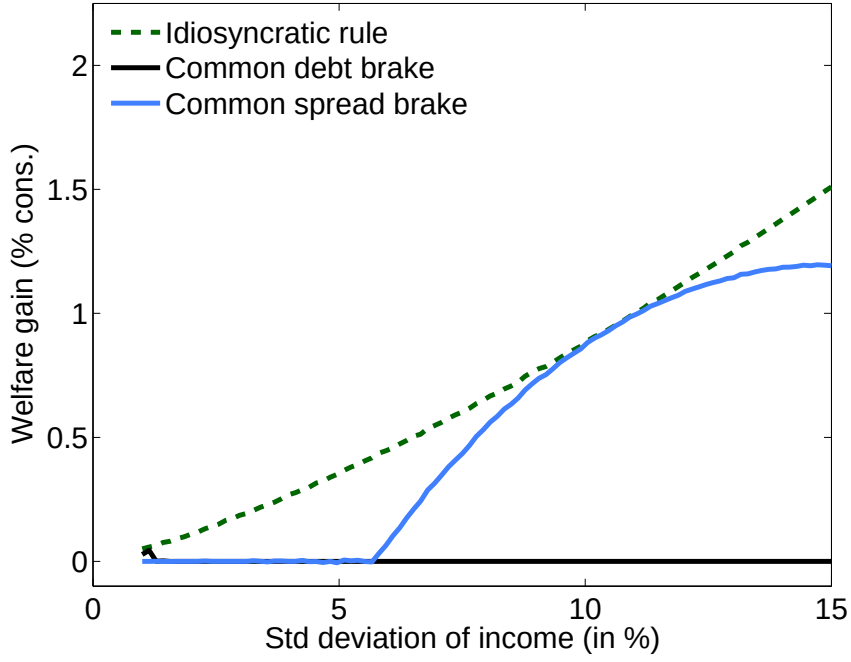




The optimal common debt brake does not impose an excessive constraint in **low-debt-intolerance** economies and thus is not binding in most economies.

COMMON SPREAD BRAKE IS BETTER





A relatively low spread threshold still does not impose an excessive constraint in **low-debt-intolerance** economies but imposes a welfare improving constraint in **high-debt-intolerance** economies.

3. Quantitative model

LITERATURE

- Eaton and Gersovitz (RESTUD 1981), Aguiar and Gopinath (JIE 2006), Arellano (AER 2008), Hatchondo and Martinez (JIE 2009, EQ 2012, IEJ 2013), Hatchondo, Martinez, and Sosa-Padilla (JME 2014, JPE 2016), Hatchondo, Martinez, and Onder (JIE 2017), Hatchondo, Martinez, and Sapriza (EQ 2007, IER 2009, RED 2010), Arellano and Ramanarayanan (JPE 2012), Chatterjee and Eyigungor (AER 2012, AER 2016), Cuadra and Sapriza (JIE 2008), Cuadra, Sanchez, and Sapriza (RED 2010), Boz (JIE 2011), Durdu, Nunes, and Sapriza (JIE 2013).

1. The no-rule environment

EQUILIBRIUM CONCEPT

- Markov Perfect Equilibrium.
  - Each period the government decides taking as given bond prices and future defaulting, spending, taxing, and borrowing strategies.
  - Current optimal choices are consistent with future government strategies.
  - Bond holders make zero expected profits.
- Limit of finite-horizon economy.

TECHNOLOGY

- Linear technology in labor

$$y = e^z l$$

TFP shock z follows a Markov process.

PREFERENCES

- Benevolent government

$$\max \; E_t \left[\sum_{j=0}^{\infty} \beta^j u \left(c_{t+j}, g_{t+j}, l_{t+j} \right) \right]$$

  taking into account private consumption and labor decisions.

- g =public consumption.

IF THE GOVERNMENT PAYS ITS DEBT OBLIGATIONS

- Issues **long-term debt.**
  - Bonds are perpetuities with geometrically decreasing coupon obligations
  - Important for the quantitative performance of the model (Hatchondo and Martinez 2009; Chatterjee and Eyigungor 2012).
- Chooses provision of public good: g
- Chooses labor tax: τ

DEFAULTS

- Two costs of defaulting:
  1. Exclusion from credit market for a stochastic number of periods.
  2. Fall in TFP in every period in which the government is in default.
- With constant probability, the government can exit the default by exchanging α new bonds per bond in default (debt restructuring).
- $1 - \alpha =$ haircut
- Chooses g and labor tax τ while in default.

LENDERS

- Foreign.
- Risk-neutral (later, same results with **shock to the lenders' risk aversion)**
- Opportunity cost of lending: risk-free bonds paying r.

SIMULATIONS MATCH TARGETS

	Data	No-rule benchmark
Mean debt-to-income ratio (in %)	61.8	61.5
Debt duration (years)	6.0	6.0
Annual spread (in %)	2.0	2.0
Mean g/c (in %)	36.5	36.5
$\sigma(g)/\sigma(y)$	0.9	0.9
$\sigma(c)/\sigma(y)$	1.1	1.1

5. Fiscal rules

Debt brake

$$b' \leq \max\{\bar{b}, (1-\delta)b\}$$

- Find the optimal value for $\bar{b}$.

SPREAD BRAKE

Find the optimal value for $\underline{q}$ in the constraint under repayment:

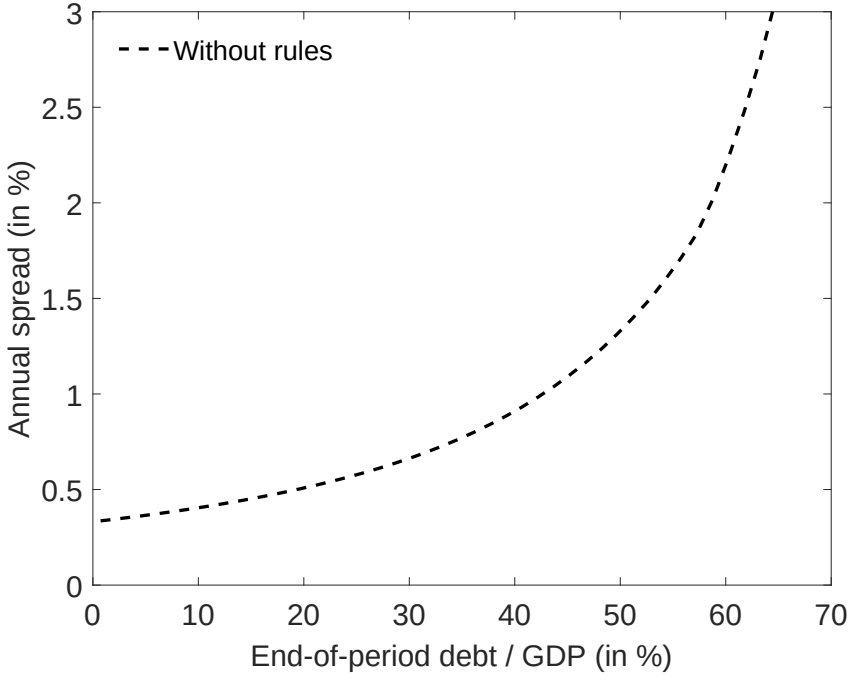
$$\underbrace{q(b', z)}_{\substack{\text{Price at which} \\ \text{bonds are issued}}} \geq \underline{q} \quad \text{if } b' > b.$$

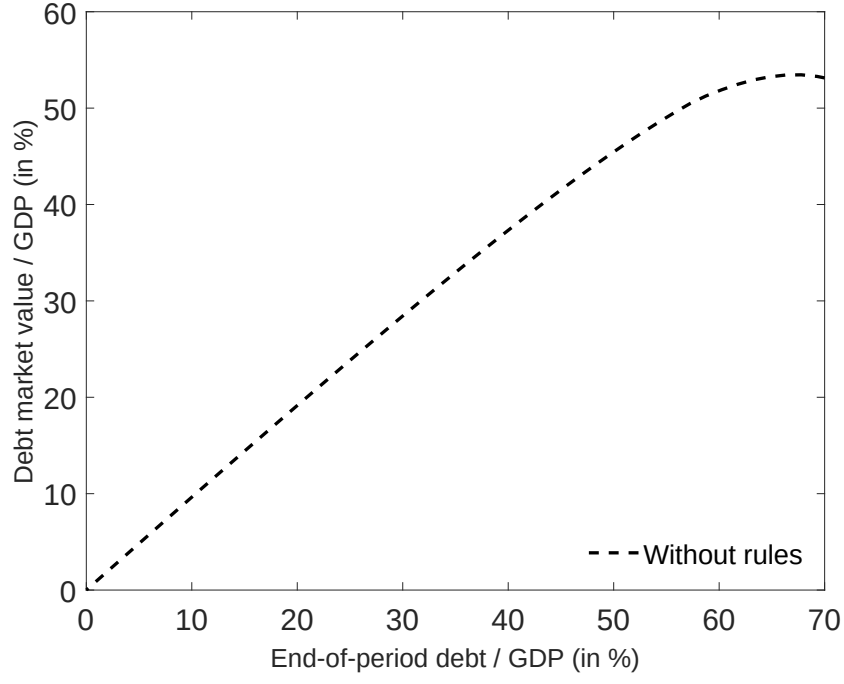
6 Quantitative results

IDIOSYNCRATIC DEBT BRAKE $\simeq$ IDIOSYNCRATIC SPREAD BRAKE

	Without rule	Debt brake (52.5%)	Spread brake (0.45%)
Mean debt-to-income ratio	61.5	54.9	59.4
Annual spread (in %)	2.0	0.5	1.0
Mean g/c (in %)	36.5	37.1	36.9
$\sigma(g)/\sigma(y)$	0.9	0.9	1.0
$\sigma(c)/\sigma(y)$	1.1	1.1	1.1
Defaults per 100 years	2.9	0.8	1.1
Welfare gain (in %)		0.5	0.4

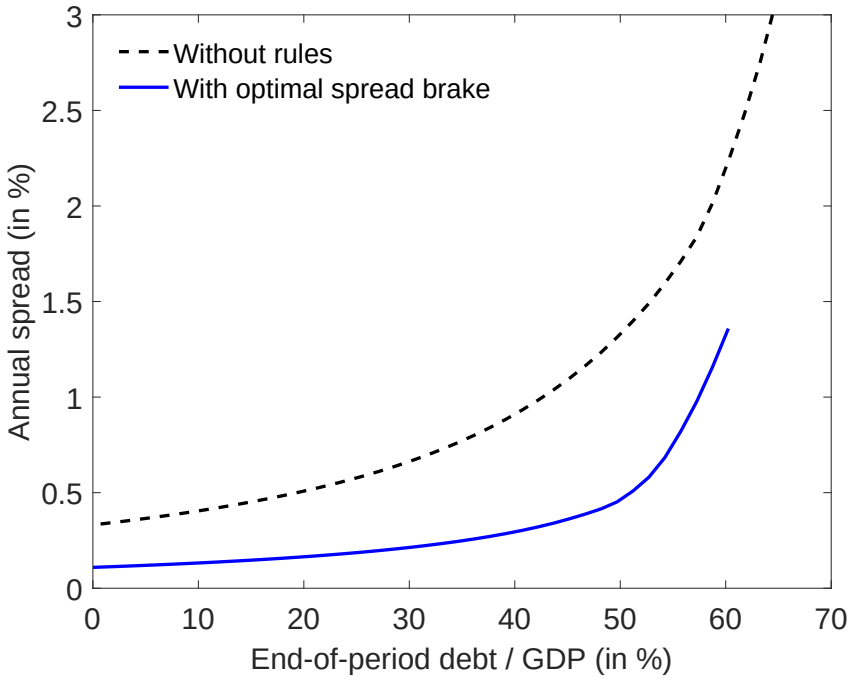
BORROWING WITHOUT A FISCAL ANCHOR

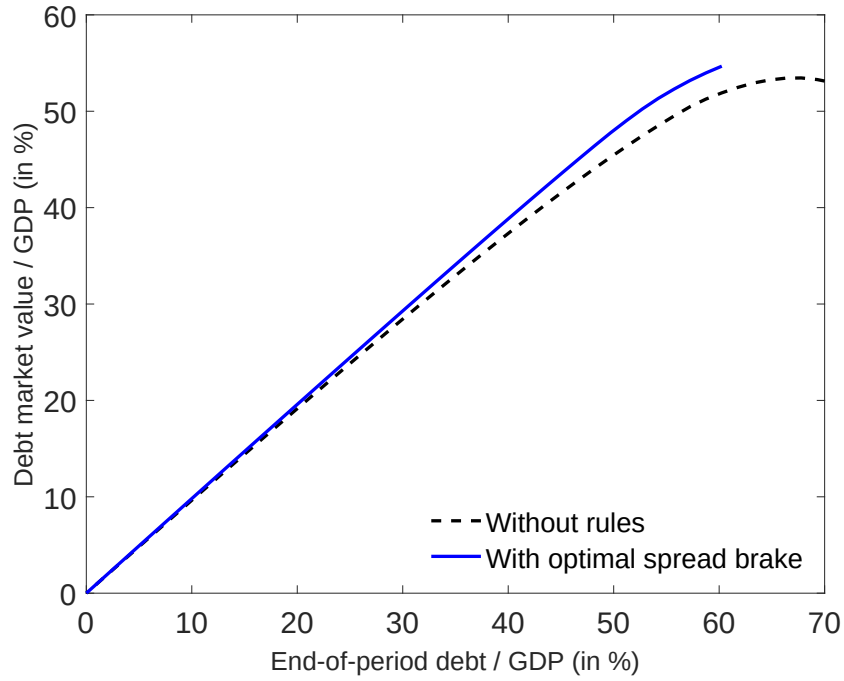




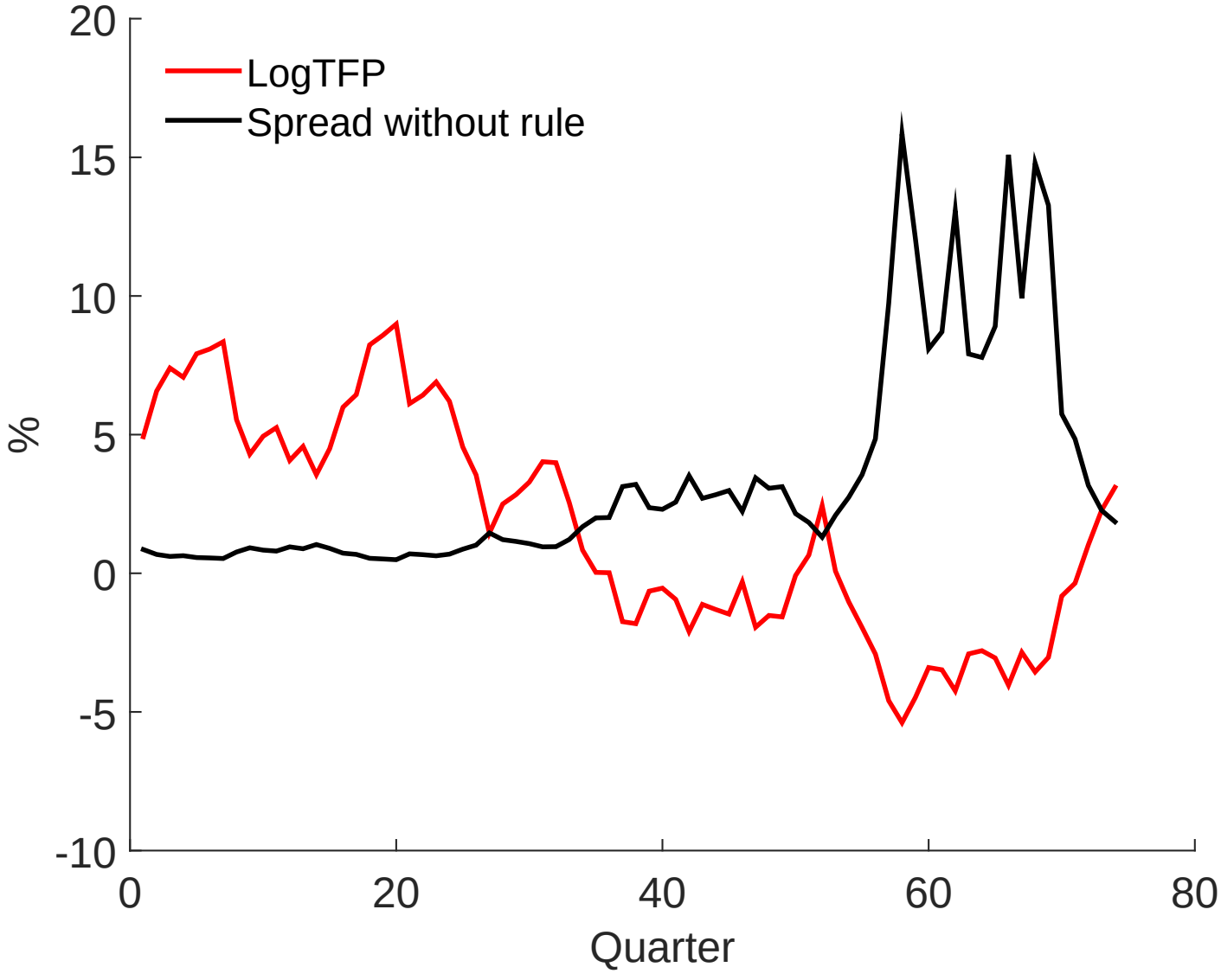
BORROWING WITH A FISCAL ANCHOR

The fiscal **anchor** allow for **less debt** (lower face value) but may allow for **more borrowing** (because of the higher interest rate)

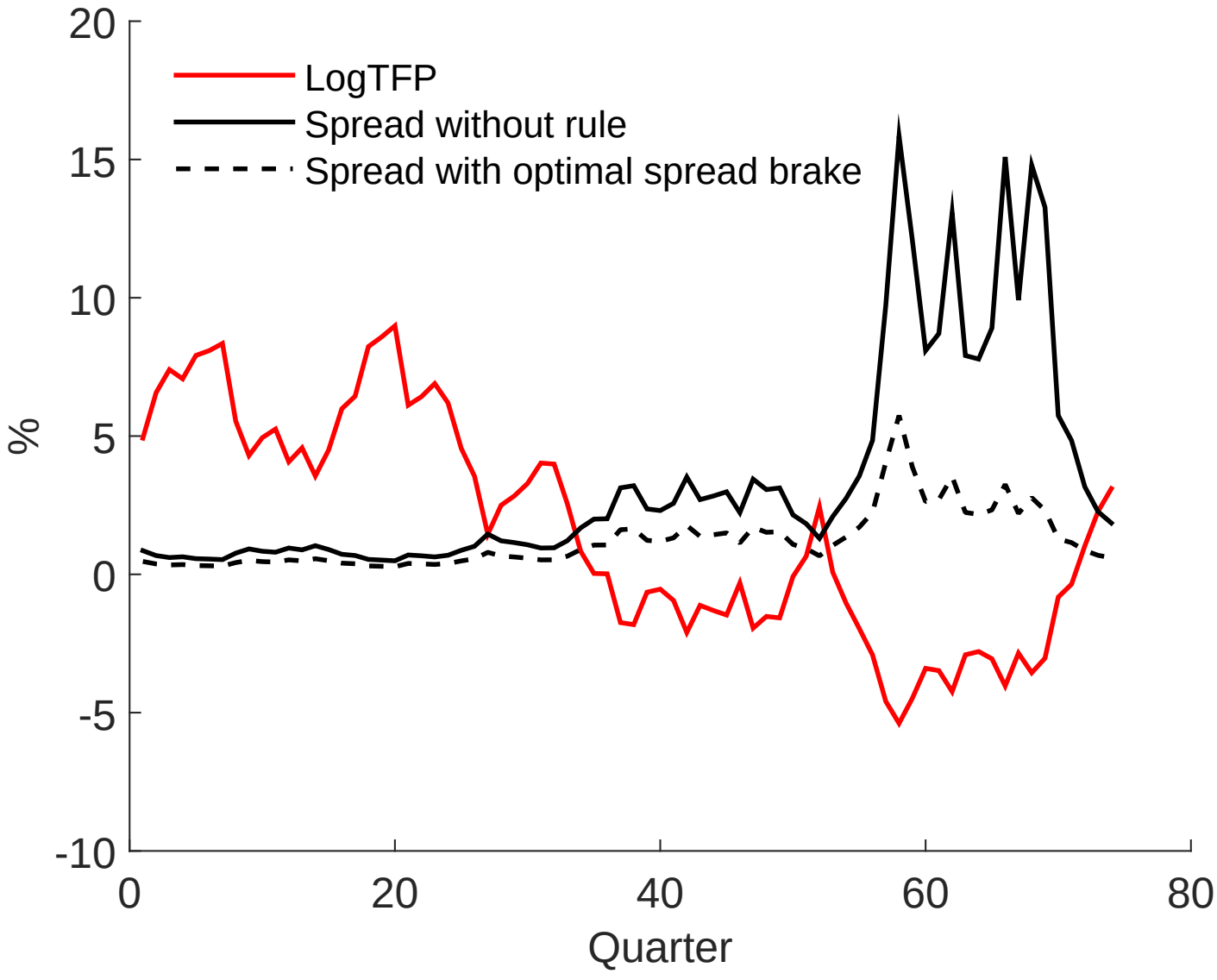




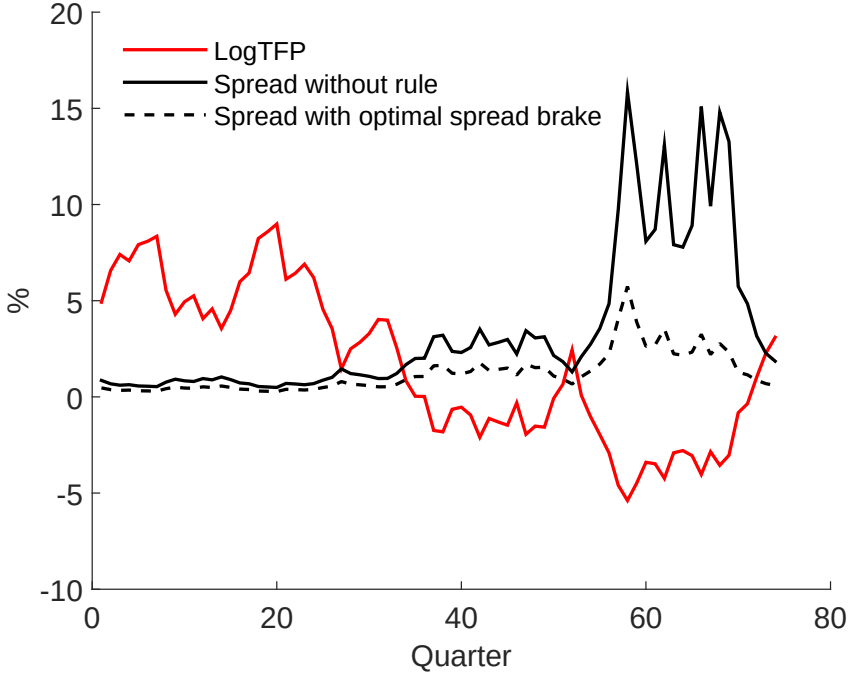
NEGATIVE SHOCKS WITHOUT A FISCAL ANCHOR

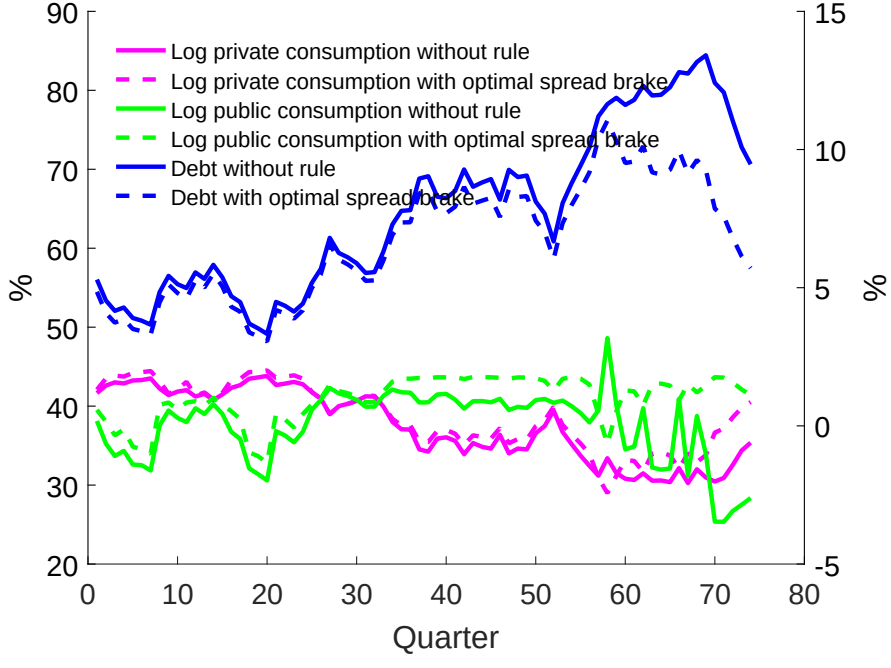


NEGATIVE SHOCK WITH A FISCAL ANCHOR



CONSUMPTION IS NOT MORE VOLATILE WITH THE SPREAD BRAKE

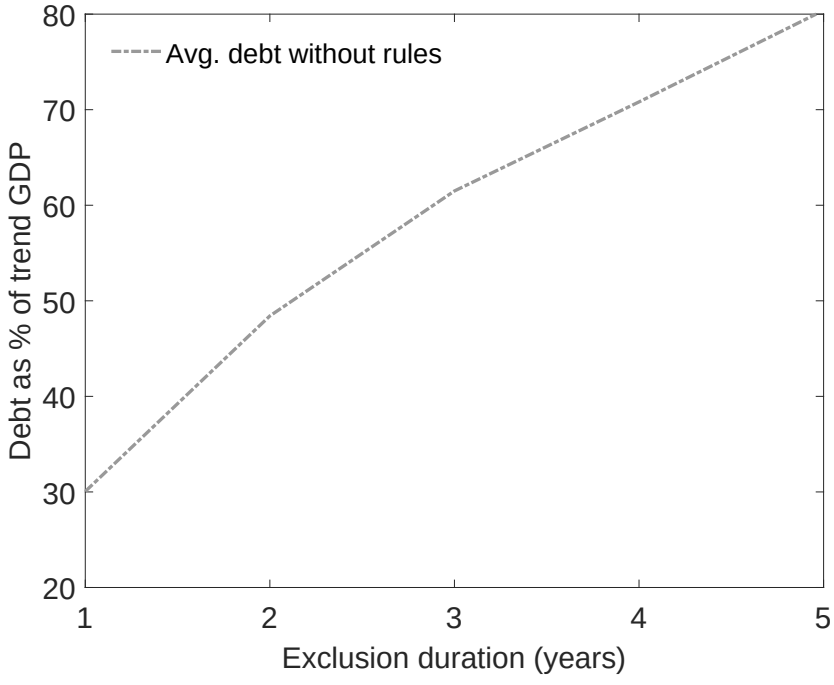


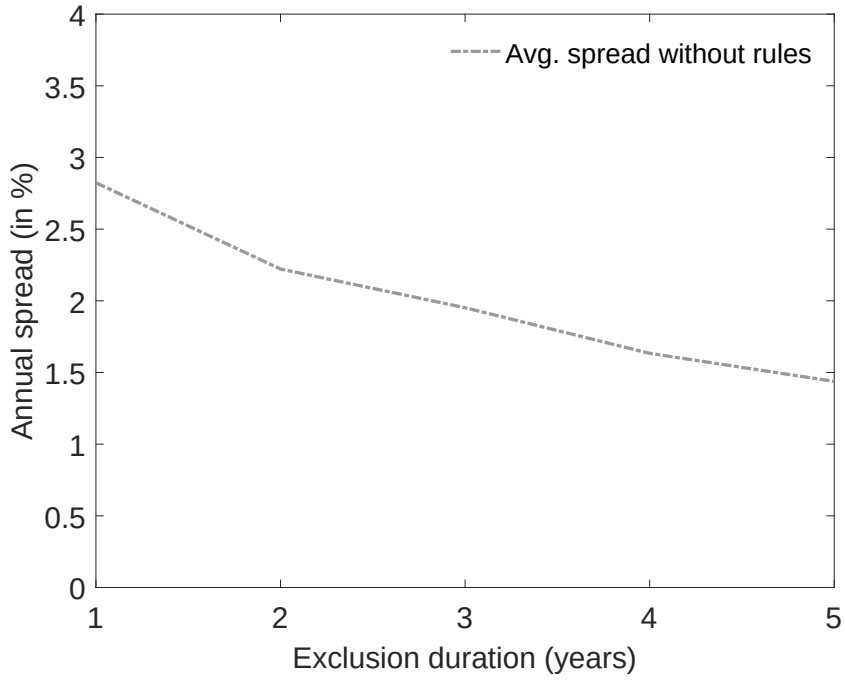


COMMON RULES

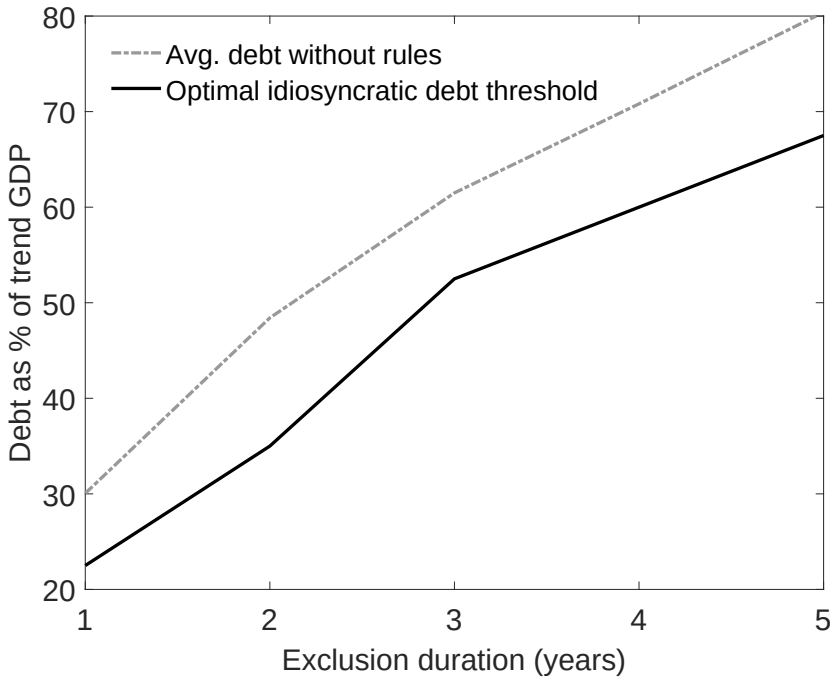
- Longer exclusion $\Rightarrow \uparrow$ cost of defaulting $\Rightarrow$ more debt.
- Higher recovery $\Rightarrow \downarrow$ benefit of defaulting $\Rightarrow$ more debt.
- More impatient borrower $\Rightarrow \uparrow$ benefit of borrowing $\Rightarrow$ more debt.
- We assume exclusions between 1 and 5 years (benchmark = 3), recovery rates between 10% and 60% (benchmark = 35%), and discount factor between 0.96 and 0.985 (benchmark = 0.97).
- Thus, we study economies with average debt levels between 30% and 90%, and average spreads between 0.5% and 5.5%.

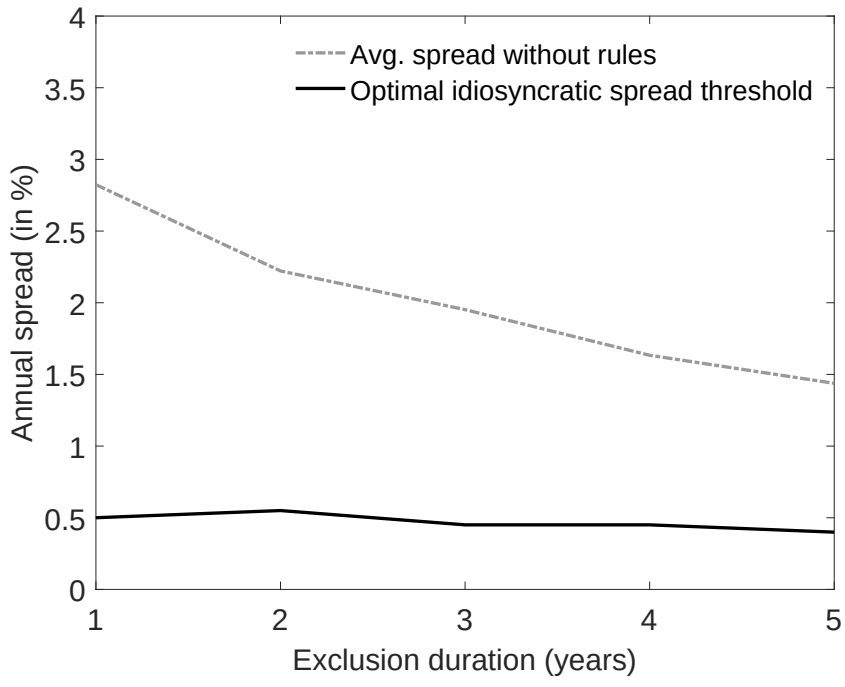
HETEROGENOUS ECONOMIES





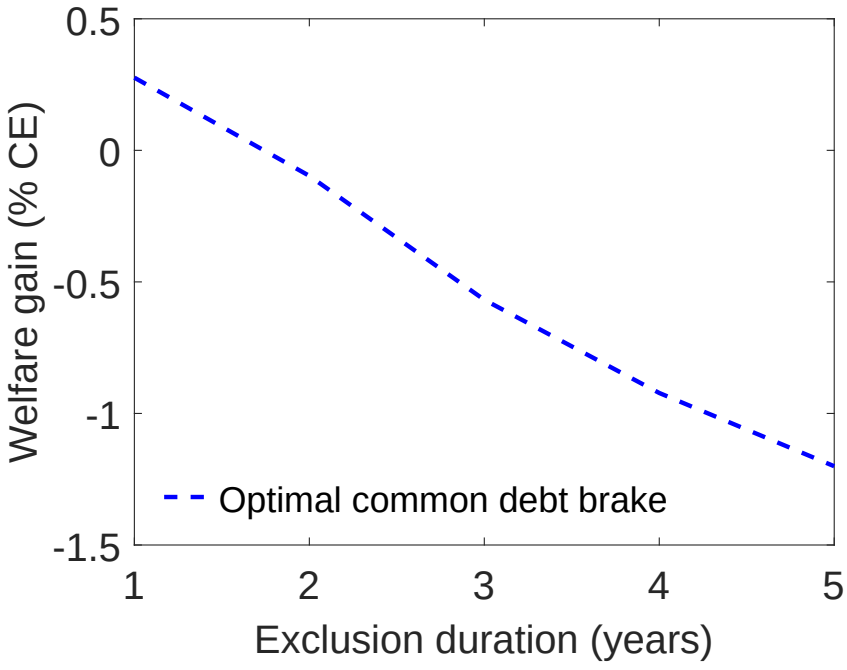
Optimal idiosyncratic thresholds

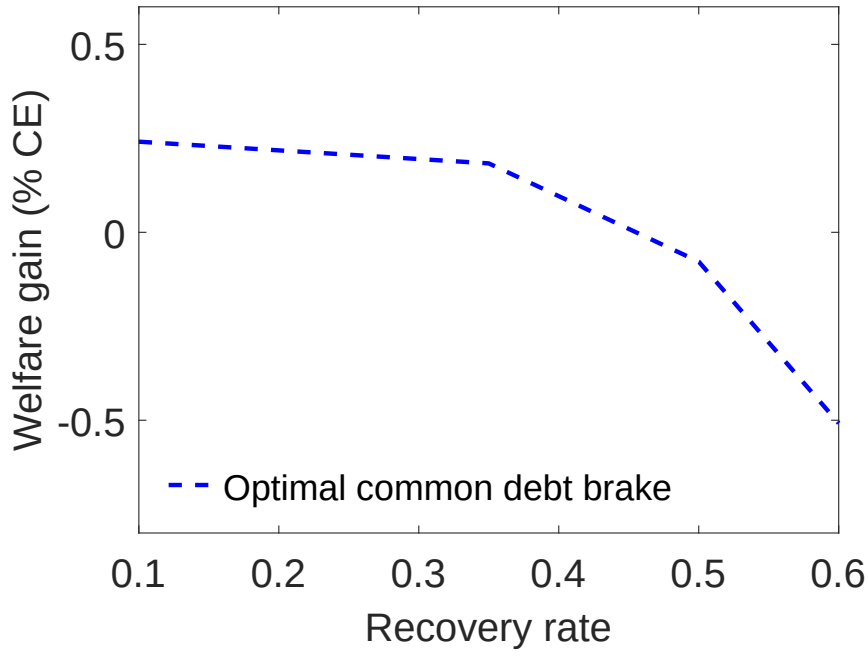




The optimal **idiosyncratic debt threshold** changes almost one to one with the average debt level in the no-rule economy.

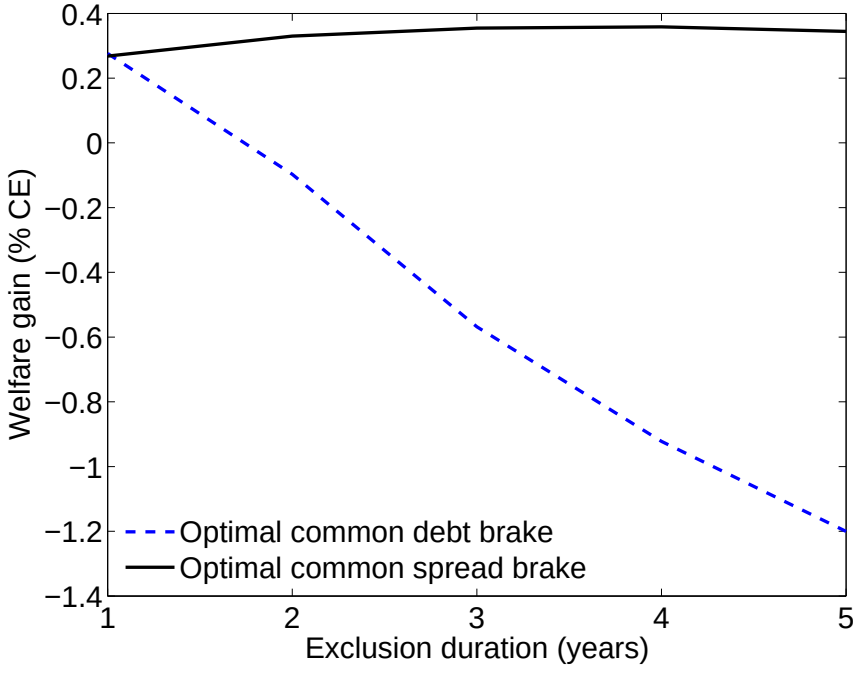
RAWLSIAN DEBT BRAKE GENERATES WELFARE LOSSES

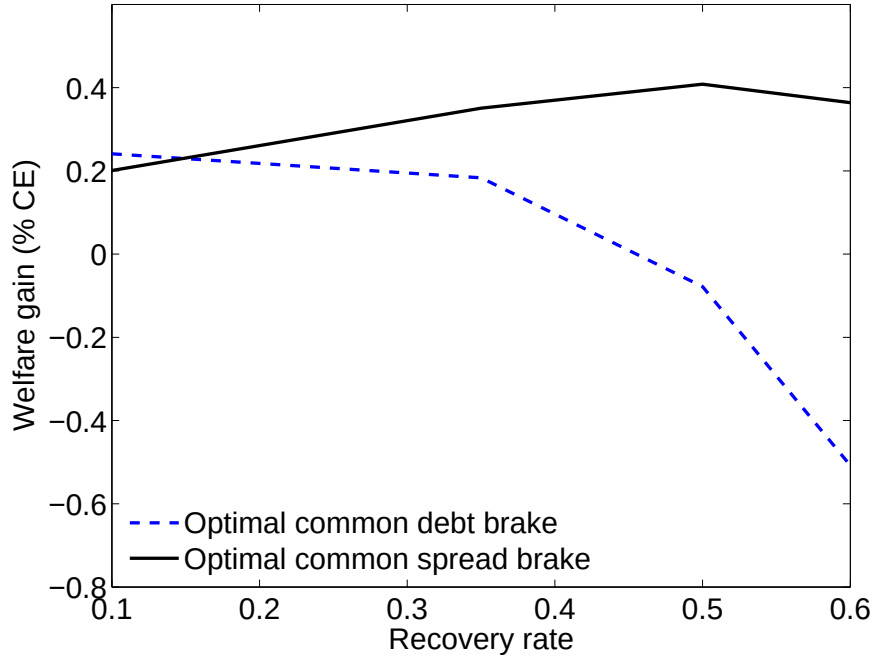




To be binding in **high-debt-intolerance** economies, the optimal common Rawlsian debt brake imposes an excessive constraint in **low-debt-intolerance** economies.

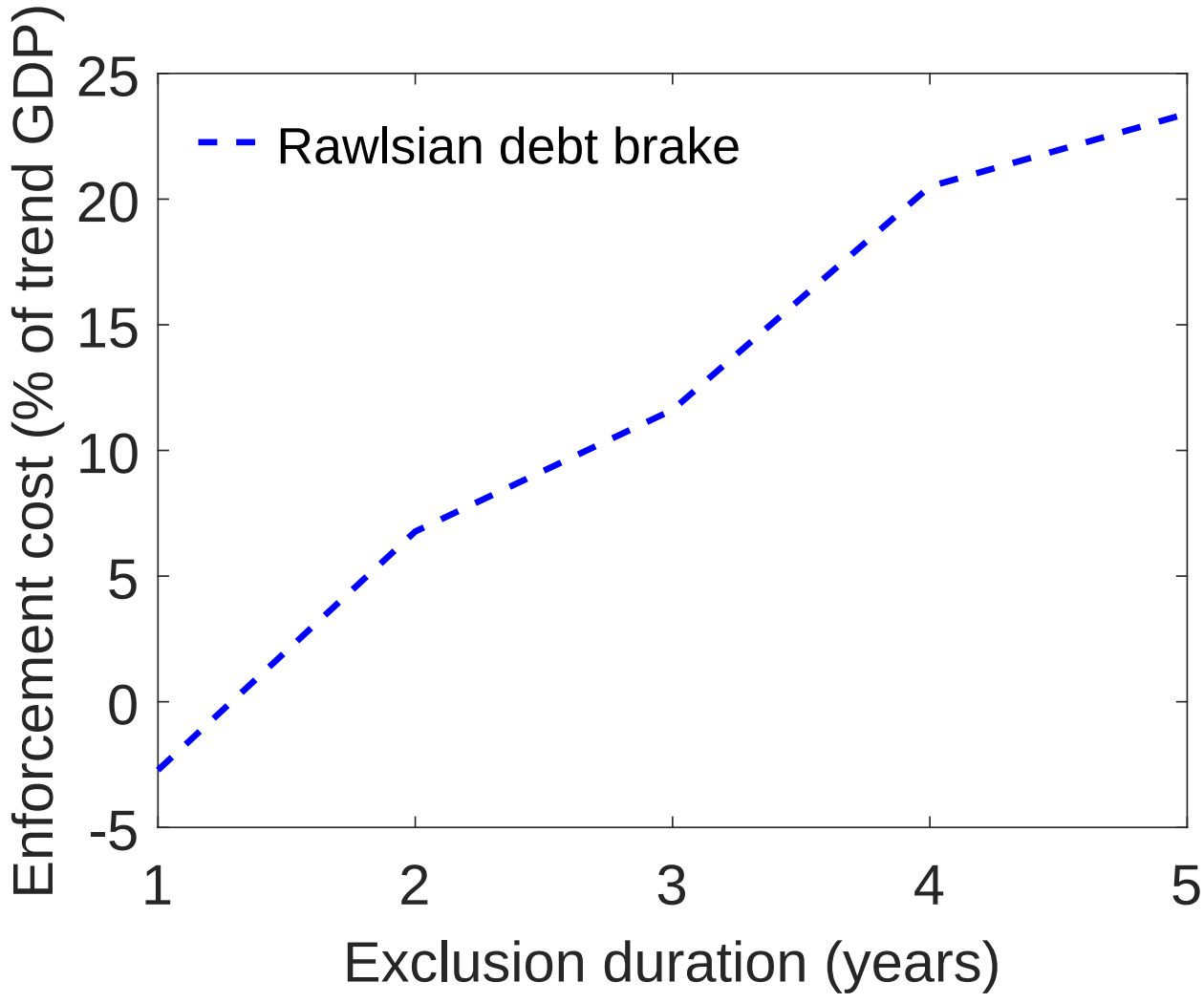
RAWLSIAN SPREAD BRAKE $\succ$ RAWLSIAN DEBT BRAKE



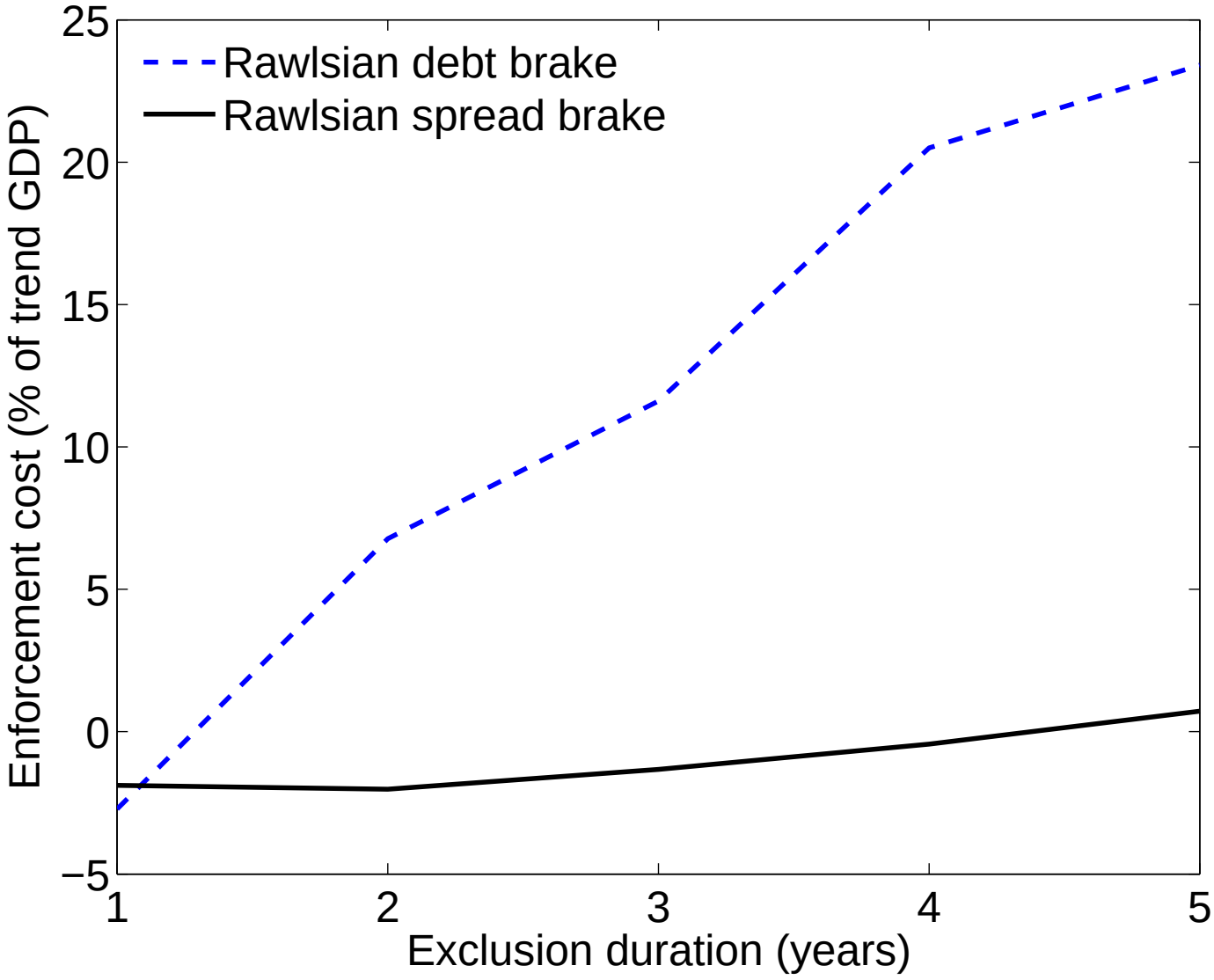


The optimal common Rawlsian spread brake is binding in **high-debt-intolerance** economies without imposing an excessive constraint in **low-debt-intolerance** economies.

PENALTY NEEDED TO ENFORCE THE RAWLSIAN DEBT BRAKE



PENALTY NEEDED TO ENFORCE THE RAWLSIAN SPREAD BRAKE



7. Conclusions and extensions

CONCLUSIONS

- Maybe sovereign spreads should play a more prominent role in **anchoring discussions of fiscal policy**
  - Economies that suffer less **debt intolerance** should be allowed to issue more debt.
- It may be **much easier to enforce** a spread brake than to enforce a debt brake.
- Also
  - a market-determined fiscal anchor could be less susceptible to **creative accounting**
  - more **comprehensive** measure of fiscal risks (e.g., debt maturity, currency composition, implicit or contingent liabilities)

NEED FOR FUTURE WORK?

- What should the spread-brake **threshold** be? Should it be **reduced gradually** (mimicking disinflation periods)?
- Which **interest rates** should fiscal rules use?
- The average spread over **which period** should be used to trigger the spread brake?
- How should a spread brake be **complemented with other numerical targets?**
- How fast should the **fiscal adjustment** triggered by the brake be?
- Would the spread limit help with other **shocks** (bailout probability, multiple equilibria, political shocks, debt shocks)?