Policy Rules and Large Crises in Emerging Countries

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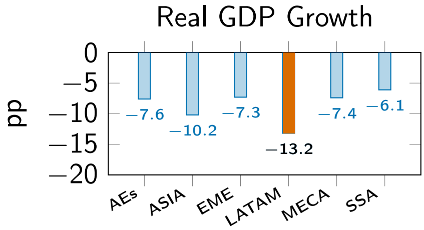
Policy Rules and Large Crises in Emerging Countries

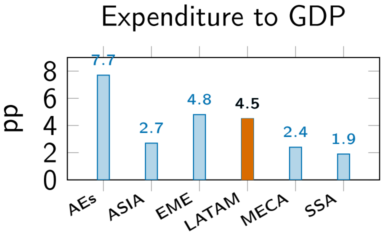
Emerging economies are adopting policy rules to strengthen macroeconomic stability:

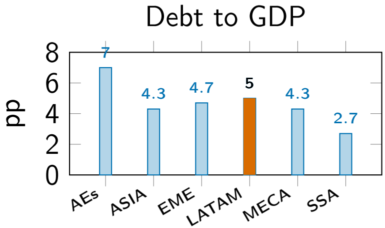
- Fiscal rules: debt ceilings, balanced budgets.
- Monetary rules: inflation targeting, money supply limits.

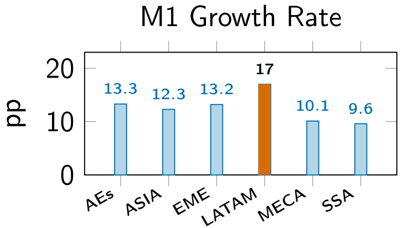
Should rules be suspended during crises for flexibility or maintained for credibility?

COVID-19: Macro Effects and Policy Response









Impact on 2020. Groups follow IMF WEO classification: AEs=Advanced Economies, ASIA=Emerging and Developing Asia, EME=Emerging and Developing Europe, LATAM=Latin America, MECA=Emerging and Developing Middle East and Central Asia, SSA=Sub-Saharan Africa.

Suspension of Fiscal Rules

Country group	With rules in 2019	With suspension 2020	2021
Advanced	31	3	3
Emerging	43	10	11
Low-income	31	9	10

Widespread suspension of fiscal rules, particularly among emerging and low-income countries

Davoodi, Hamid, Paul Elger, Alexandra Fotiou, Daniel Garcia-Macia, Andresa Lagerborg, Raphael Lam, and Sharanya Pillai. 2022. "Fiscal Rules Dataset: 1985-2021", International Monetary Fund, Washington, D.C.

What We Do

▷ Related lit.

Analyze policy rules and flexibility during crises using a sovereign default model.

In Normal Times:

- Rules improve welfare by reducing policy inconsistencies.

In Crises:

- Evaluate suspending or abandoning rules under COVID-19-type shocks.

Outline

Model

Calibration

Policy Rules

Large Crises

Model

Framework: Tradable-Nontradable Model

- Small open economy model with tradable and non-tradable goods.
- Incorporate: production, fiscal policy, monetary policy and sovereign default.
- **Goods:**
  1. Non-tradable (c^N, y^N): produced and consumed domestically
  2. Public good g: produced from non-tradable output
  3. Imported good c^T: consumed domestically
  4. Exported good Y^T: produced domestically

The Firm's Problem: Profit Maximization

A representative firm maximizes profits:

$$\max_{y^N, y^T, h} \; p^N y^N + e p^T (1-\phi) y^T - wh$$

$$\text{subject to} \quad A(I) F(y^N, y^T) - h \leq 0$$

- Production:
  - $A(I)F(y^N, y^T)$ determines the hours required to produce (y^N, y^T).
  - (Inverse of) productivity $A(I)$
  - $I = \{P, D\}$ indicates the government's credit standing (pay or default).
- Trade frictions ϕ

The Problem of the Household

$$V(m, B, I) = \max_{c^N, c^T, m', h} \left[u(c^N, c^T) + v(1-h) + \vartheta(g) + \beta \mathbb{E}\left[V(m', B', I') \mid B, I \right] \right]$$

subject to

$$p^N c^N + e(1+\phi)c^T + m'(1+\mu) \leq (1-\tau)wh + m + p^N \gamma$$
$$p^N c^N \leq \theta m$$

Velocity of money θ

Government:

- g: government spending
- μ: money growth rates distorts saving decisions m'
- τ: Labor income tax rate
- γ: Lump-sum transfers, received in units of non-tradable goods.

Government

- Government Debt: Long-term, defaultable, and denominated in foreign currency.
- Debt Pricing: International, risk-neutral lenders price the debt.
- Expenditure: Public goods g, and exogenous transfers γ.
- Revenue Sources: τ taxes on labor, μ seigniorage, and B' borrowing.

Government Budget Constraint:

$$\boxed{\underbrace{p^N(g+\gamma)}_{\text{Expenditure}} + \underbrace{e\delta B}_{\text{Debt repayments}} = \underbrace{\tau wh}_{\text{Tax revenue}} + \underbrace{\mu}_{\text{Seigniorage}} + \underbrace{eQ(B')[B'-(1-\delta)B]}_{\text{Net borrowing}}}$$

Balance of Payments

Balance of Payments: Expressed in **foreign currency**

$$\underbrace{(1-\phi)p^T y^T - (1+\phi)c^T}_{\text{Net exports}} = \underbrace{\delta B}_{\text{Debt repayments}} - \underbrace{Q(B')[B' - (1-\delta)B]}_{\text{Net borrowing}}$$

Economic Intuition:

- **Net exports:** Revenue from tradable goods production (y^T) minus imports (c^T).
- **Debt repayments:** Repaying a fraction (δ) of outstanding debt.
- **Net borrowing:** New borrowing (B') priced at $Q(B')$ considering default risk.

Repayment vs Default

Default Consequences: Temporary exclusion from credit markets and lower productivity.

Government chooses between repayment (P) and default (D):

$$\hat{\mathcal{V}}(B, \varepsilon) = \max\{V^P(B) + \varepsilon, V^D\}$$

where ε is an i.i.d. shock drawn from a logistic distribution with mean zero and variance ζ.

Probability of Repayment and Debt Price

Repayment Probability:

$$\mathcal{P}(B) = \Pr[V^P(B) - V^D \geq -\varepsilon] = \frac{\exp\left(\frac{V^P(B)}{\zeta}\right)}{\exp\left(\frac{V^P(B)}{\zeta}\right) + \exp\left(\frac{V^D}{\zeta}\right)}$$

Continuation Value:

$$\mathcal{V}(B) = \zeta \log\left[\exp\left(\frac{V^P(B)}{\zeta}\right) + \exp\left(\frac{V^D}{\zeta}\right)\right]$$

Debt Pricing

$$Q(B') = \frac{1}{1+r}\left[\mathcal{P}(B')\left(\delta + (1-\delta)Q(\mathcal{B}(B'))\right)\right]$$

Government optimization: Repayment

$$V^P(B) \equiv \max_{B', c^N, c^T, y^T, \mu, \tau, g} \; u(c^N, c^T) + v(1-h) + \vartheta(g) + \beta \mathcal{V}(B')$$

subject to

1. government budget constraint
2. balance of payment constraint
3. households and firms making optimal decisions
4. equilibrium conditions: $c^N + g = y^N, \;\; A(I)F(y^N, y^T) = h$
5. constraints imposed by rules (if they apply):
   - Monetary policy: $\mu = \mu^*$
   - Fiscal policy: $B' \leq B^*$

Government optimization: Default

$$V^D \equiv \max_{c^N, c^T, y^T, \mu, \tau, g} u(c^N, c^T) + v(1-h) + \vartheta(g) + \beta \mathbb{E}[\underbrace{\pi}_{\text{re-entry prob}} \mathcal{V}(0) + (1-\pi) V^D]$$

subject to

1. government budget constraint
2. balance of payment constraint
3. households and firms making optimal decisions
4. equilibrium conditions: $c^N + g = y^N, \; A^D(I) F(y^N, y^T) = h$
5. Rules do not apply in default

Calibration

Quantitative analysis

▷ Calibration

Calibration:

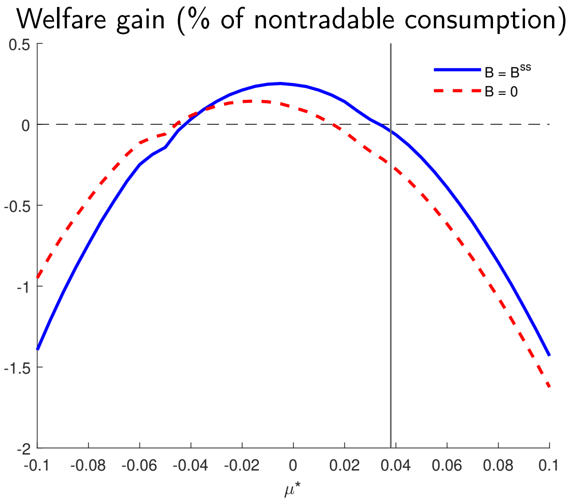
- Seven Latin American countries (1980–2018).
- EKMS (2024) studies the case with stochastic term-of-trade and TFP.
- Calibrate model in *normal times.*
- Crisis: COVID-19 $\{\text{TFP}, \gamma, \phi, \theta\ , \omega_2\ \}$.

Roadmap:

1. Derive optimal monetary and fiscal rules in normal times.
2. Use COVID-19 to simulate a large, unexpected crisis.
3. Evaluate welfare gains: Maintain, suspend, or abandon rules.

Policy Rules

Monetary policy rule: $\mu = \mu^* = -0.5\%$

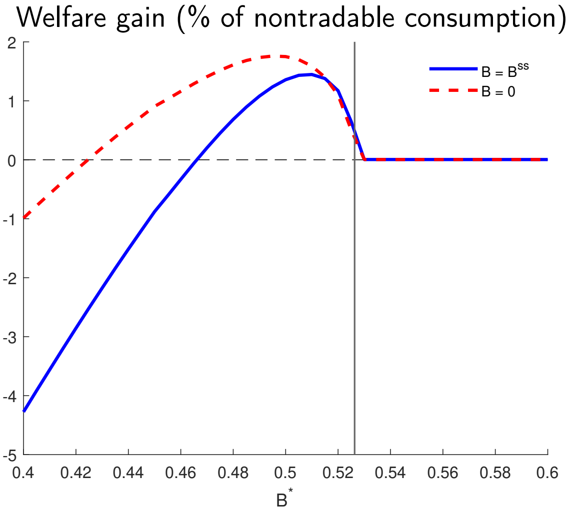


Vertical lines represent the policy outcome in a no-rules case.

Gains because of time-consistency problem in μ

No gains when $\sigma = 1$

Fiscal policy rule: $B' \leq B^* = 0.51$

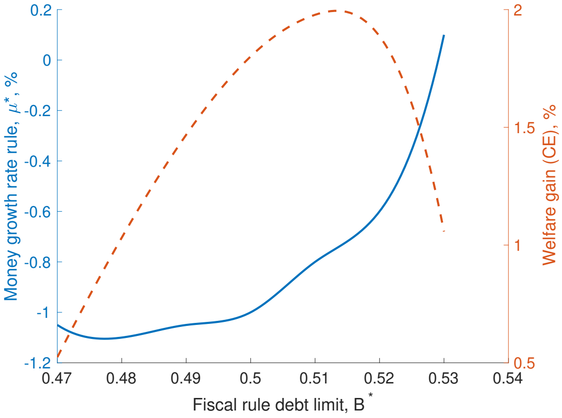


Vertical lines represent the policy outcome in a no-rules case.

Gains because of over-borrowing due to debt dilution

No gains with short-term debt

Fiscal and Monetary Rules: $\mu = \mu^* = -0.81\%, B \leq B^* = 0.51$



Optimal money growth rate target μ^* as a function of debt limit B^*.

Complementarity between fiscal and monetary rules

Optimal money growth target increases as the debt limit increases

Long-run implications of policy rules

	Discretion	Money growth $\mu^* = -0.50\%$	Debt ceiling $B^* = 0.51$	Both $\mu^* = -0.80\%$ $B^* = 0.51$
Debt / GDP	0.365	0.363	0.351	0.347
Inflation	0.038	-0.005	0.036	-0.008
Tax rate	0.240	0.269	0.238	0.268
Expenditure / GDP	0.250	0.251	0.250	0.251
Real GDP	1.000	0.993	1.000	0.992
Employment	0.587	0.586	0.587	0.586
Exports / GDP	0.209	0.200	0.207	0.197
Default probability	0.020	0.021	0.010	0.010
Welfare gains, %	—	0.250	1.450	1.978

Substitution between policy instruments

Rules more useful when combined

Large Crises

Large Crises: Modeling a COVID-19 shock

Optimal monetary and fiscal rules:

1. Imposed prior to shock
2. Suspended during crisis
3. Reimposed afterwards

Unexpected shocks

Shock	**Target**
Productivity, ω_0	Δ Real GDP -9.5 %
Transfers γ	Δ Expenditure / GDP 4.1 pp
Trade costs ϕ	Δ Imports -15.4 %
Liquidity θ	Δ Inflation -0.2 pp
Cost of default ω_2	Δ Credit spreads 96.2 bps

COVID-19 shock: Good fit for most non-targeted moments

	Data	Model
Δ GDP USD, %	-18.6	-21.9
Δ Employment, pp	-7.3	-2.9
Δ Exports, %	-13.2	-13.9
Δ Debt / GDP, pp	5.2	12.7
Δ Tax rate, pp	-0.8	-9.9
Δ Money growth rate, pp	28.9	15.8
Δ Depreciation, pp	8.2	13.0
Δ Inflation in 2021, pp	6.3	18.0
Welfare gain of shock, %		-13.1

High cost, equivalent to a one-period drop in non-tradable consumption of 13.1%.

Gains from flexibility during large crises

- Fiscal and monetary rules are in place before the crisis.
- What happens when the shock hits? Three cases:
  - Maintain rules
  - Suspended for the duration of the crisis (benchmark)
  - Abandon: Lack commitment to reinstate rules suspended during a crisis.

Maintaining, suspending, or abandoning both rules

	Both rules Maintained	Both rules Suspended	Both rules Abandoned
Δ Real GDP, %	-12.13	-9.49	-9.54
Δ Debt / GDP, %	26.95	36.64	36.88
Δ Money growth rate, pp	0.00	15.81	16.31
Δ Tax rate, pp	4.73	-9.87	-9.60
Δ Primary deficit / GDP, pp	-0.41	13.92	13.59
Δ Credit spreads, bps	94.58	96.28	218.57
Δ Inflation, pp	-1.21	-0.19	0.52
Δ Inflation 2021, pp	1.23	18.01	18.24
Welfare gains of shocks, %	-13.85	-13.13	-15.10
Welfare gains of flexibility, %	—	0.83	-1.42

Larger fiscal adjustment if maintaining rules

Abandoning rules generates welfare losses

Monetary rule

	Both rules Maintained	Monetary Suspended	Monetary Abandoned
Δ Real GDP, %	-12.13	-9.30	-9.41
Δ Debt / GDP, %	26.95	30.90	31.26
Δ Money growth rate, pp	0.00	17.94	17.90
Δ Tax rate, pp	4.73	-9.16	-9.06
Δ Primary deficit / GDP, pp	-0.41	12.94	12.85
Δ Credit spreads, bps	94.58	74.80	95.66
Δ Inflation, pp	-1.21	1.72	1.99
Δ Inflation 2021, pp	1.23	15.95	16.99
Welfare gains of shocks, %	-13.85	-13.35	-13.87
Welfare gains of flexibility, %	–	0.57	-0.02

Note: Fiscal rule maintained in all cases.

Rule forces substitution between μ and τ

Abandoning rule generates small welfare losses

Fiscal rule

	Both rules Maintained	Fiscal Suspended	Fiscal Abandoned
Δ Real GDP, %	-12.13	-11.91	-11.92
Δ Debt / GDP, %	26.95	33.28	33.42
Δ Money growth rate, pp	0.00	0.00	0.00
Δ Tax rate, pp	4.73	2.40	2.90
Δ Primary deficit / GDP, pp	-0.41	2.18	1.61
Δ Credit spreads, bps	94.58	117.94	242.09
Δ Inflation, pp	-1.21	-2.99	-2.70
Δ Inflation 2021, pp	1.23	5.14	3.78
Welfare gains of shocks, %	-13.85	-13.51	-15.20
Welfare gains of flexibility, %	—	0.39	-1.54

Note: Monetary rule maintained in all cases.

Rule reduces borrowing

Suspending and abandoning rule implies ↑ spreads

Unpacking the gains from flexibility during large crises

Shocks				Both rules are		Monetary rule is		Fiscal rule is	
TFP	γ	ϕ	θ	Suspended	Abandoned	Suspended	Abandoned	Suspended	Abandoned
$\surd$	$\surd$	$\surd$	$\surd$	0.83	-1.42	0.57	-0.02	0.39	-1.54
$\surd$	$\surd$	$\surd$	$\times$	0.39	-1.72	0.19	-0.35	0.25	-1.58
$\surd$	$\surd$	$\times$	$\surd$	0.49	-1.74	0.40	-0.20	0.17	-1.75
$\surd$	$\times$	$\surd$	$\surd$	0.56	-1.67	0.32	-0.26	0.33	-1.59
$\times$	$\surd$	$\surd$	$\surd$	0.66	-1.54	0.46	-0.12	0.31	-1.58

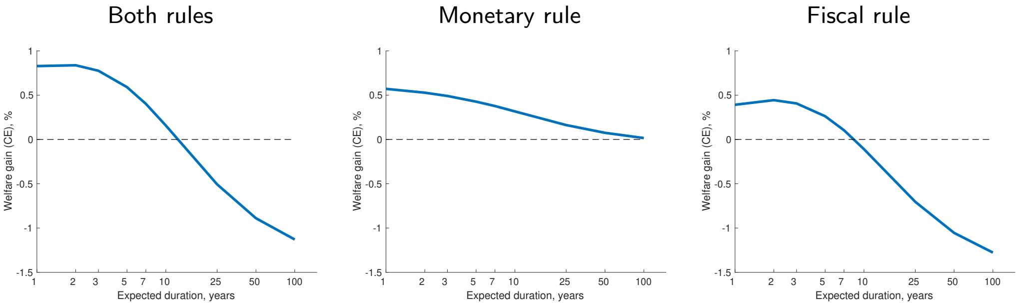
Suspend rules

- Suspending a rule is always beneficial (unanticipated crisis and lasts one period)
- Benefits of suspension diminish when the shock to money demand, θ, is absent

Abandon rules

- Abandoning trades off short-run gains for long-run costs.
- The value of abandoning is always detrimental for welfare.

What if rules remain suspended after crisis ends?



- Positive gains when both rules are expected to be suspended for up to 14 years
- Flat for a number of years after the crisis ends
- Reimposing rules can be safely delayed

Rules vs. flexibility when the crisis is expected to last for two years

	Both rules are			Monetary rule is		Fiscal rule is	
	Suspended	Maintained	Abandoned	Suspended	Abandoned	Suspended	Abandoned
Δ Real GDP, %	-8.57	-11.35	-8.61	-8.57	-8.62	-11.35	-11.44
Δ Debt / GDP, %	27.01	21.90	26.30	27.01	26.79	21.90	21.35
Δ Tax rate, pp	-9.15	6.12	-8.87	-9.15	-9.04	6.12	6.63
Δ Primary deficit / GDP, pp	12.64	-2.12	12.29	12.64	12.51	-2.12	-2.68
Δ Money growth rate, pp	19.84	0.00	20.44	19.84	20.01	0.00	0.00
Δ Credit spreads, bps	497.58	647.62	752.54	497.57	562.59	647.48	916.19
Δ Default probability, pp	13.62	17.20	18.78	13.61	15.21	17.19	22.09
Δ Inflation, pp	1.80	-1.94	2.63	1.80	2.13	-1.94	-1.42
Δ Inflation 2021, pp	16.80	1.11	17.33	16.80	17.65	1.11	0.33
Welfare gains of shocks, %	-22.53	-23.08	-24.29	-22.53	-23.00	-23.08	-24.60
Welfare gains of flexibility, %	0.66	–	-1.46	0.66	0.10	0.00	-1.84

- Suspending only the fiscal rule does not yield any welfare gains
- Large surge in credit spreads → fiscal rule not binding

Monetary and fiscal rules in emerging countries

In normal times:

- rules mitigate time-consistency problems in debt choice
- debt limit particularly beneficial as the debt-dilution problem is severe
- monetary and fiscal rules are complementary

During times of crisis:

- flexibility might be warranted to implement a better policy response
- **Caution:** prolonged suspension of rules beyond crisis may lead to welfare losses

Appendix

Related Literature

▷ back

- Sovereign Default
  Eaton and Gersovitz (1981); Aguiar and Gopinath (2006); Arellano (2008); **Hatchondo and Martinez (2009)**; Chatterjee and Eyigungor (2012).

- Sovereign Default + Fiscal Policy
  Cuadra, Sánchez, and Sapriza (2010); Bianchi, Ottonello, and Presno (2023).

- Sovereign Default + Monetary Policy
  Na, Schmitt-Grohé, Uribe, and Yue (2018); Arellano, Bai, and Mihalache (2020); Bianchi and Sosa-Padilla (2023); **Espino, Kozlowski, Martin, and Sánchez (2024)**.

- Sovereign Default + Policy Rules
  Bianchi and Mondragon (2021); Hatchondo, Roch, and Martinez (2022).

Functional forms

▷ back

Preferences:

$$u(c^N, c^T) = \alpha^N \frac{\left(c^N\right)^{1-\sigma}}{1-\sigma} + \alpha^T \frac{\left(c^T\right)^{1-\sigma}}{1-\sigma}, \quad v(\ell) = \alpha^H \frac{\ell^{1-\varphi}}{1-\varphi}.$$

Labor requirement for production:

$$F(y^N, y^T) = \left[\left(y^N\right)^\rho + \left(y^T\right)^\rho\right]^{1/\rho}$$

Cost of default:

$$A(P) = \omega_0{}^{-1}, \qquad A(D) = (\omega_0 - \omega_1)^{-1}$$

Cost of default in crisis:

$$A(D) = (\omega_0 - \max\{\omega_1 + \omega_2 \times gap(\omega_0, \gamma, \theta, \phi), 0\})^{-1}$$

where *gap* is the deviation from the steady state of the GDP in dollars.

Exogenous Parameters

▷ back

Parameter	Description	Value	Basis
r	risk-free rate	0.03	Long-run average
φ	curvature of leisure	1.50	Frisch elasticity
α^T	preference share for c^T	1.00	Normalization
θ	velocity of circulation	1.00	Normalization
ϕ	trade cost	0.00	Normalization
p^T	price of exports	1.00	Normalization
π	re-entry probability	0.17	Exclusion duration
δ	fraction of maturing coupons	0.20	Debt maturity
σ	curvature of $u(c^N, c^T)$	0.50	EKMS
ρ	elasticity of substitution in $F(y^N, y^T)$	1.50	EKMS

Parameters calibrated internally and matched statistics

▷ back

Parameter	Value	Statistic	Target
β	0.8563	Inflation, %	3.800
γ	0.1082	Transfers/GDP	0.117
α^H	0.9366	Employment/Population	0.587
α^G	0.4397	Gov. Consumption/GDP	0.133
α^N	2.7880	Exports/GDP	0.209
ω_0	1.4575	Real GDP	1.000
ω_1	0.1034	Debt/GDP	0.365
ζ	0.0663	Default, %	2.000

COVID-19 Impact on Real GDP Growth in 2020

To calibrate the shock, we target the impact of COVID-19 on some macro variables.
The impact of COVID-19 is the difference between the data for 2020 and the WEO forecast for 2020 made in October 2019.

Country	Actual GDP (%)	WEO Forecast (%)	Impact (%)
Argentina	-9.9	-1.3	-8.6
Brazil	-4.1	2.0	-6.1
Chile	-5.8	3.0	-8.9
Colombia	-6.8	3.6	-10.4
Mexico	-8.3	1.3	-9.6
Peru	-11.0	3.6	-14.6
Uruguay	-5.9	2.3	-8.2
Average	-7.4	2.1	-9.5

Welfare gains

Value in the repayment and default states, given compensation Δ:

$$V^P(B,\Delta) = u\left(\left(1+\Delta\right)c^N, c^T\right) + v\left(1-h\right) + \vartheta(g) + \beta\mathcal{V}\left(B'\right)$$

$$V^D(\Delta) = u\left(\left(1+\Delta\right)c^N, c^T\right) + v\left(1-h\right) + \vartheta(g) + \beta\delta\mathcal{V}\left(0\right) + \beta\left(1-\delta\right)V^D$$

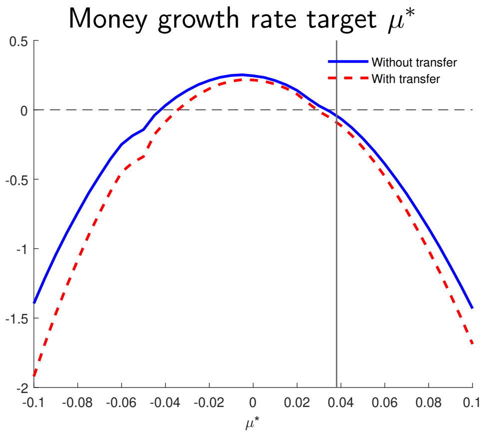
Ex ante value (before the extreme value shock is realized) is given by

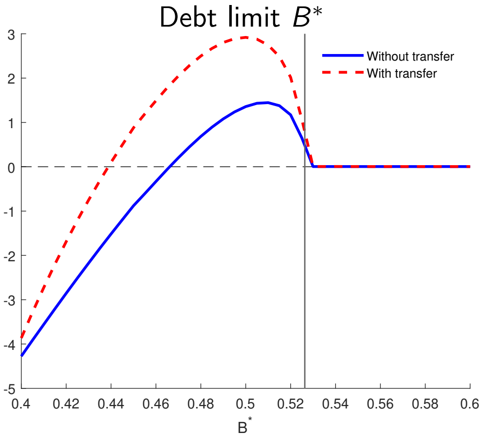
$$\mathcal{V}(B,\Delta) = \zeta \log\left[exp\left(\frac{V^P(B,\Delta)}{\zeta}\right) + exp\left(\frac{V^D(\Delta)}{\zeta}\right)\right]$$

Let $\mathcal{V}^R(B)$ be the corresponding value function under policy rule $R = \{\mu^*, B^*\}$. For a given debt level B, the welfare measure Δ solves:

$$\mathcal{V}(B,\Delta) = \mathcal{V}^R(B)$$

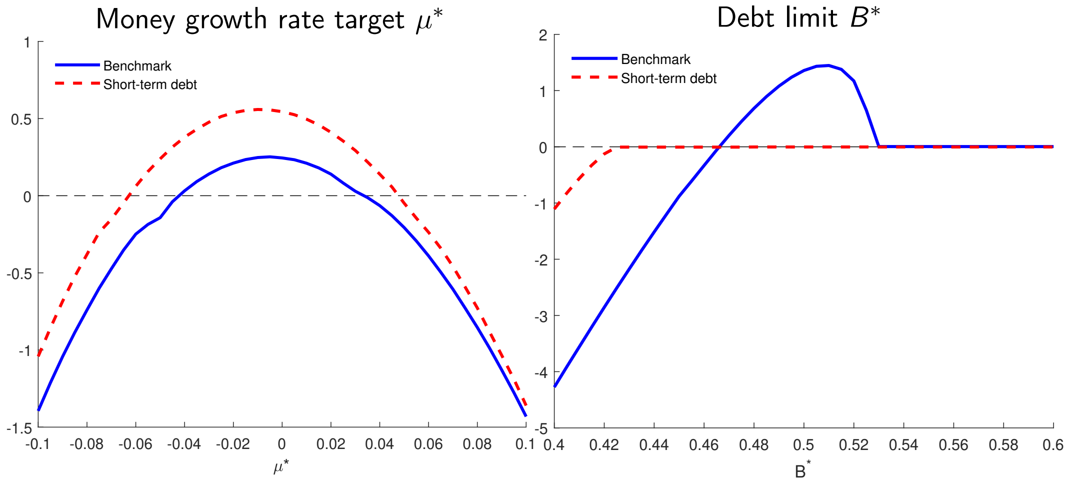
Welfare implications with indifferent lenders





Note: Debt is at the steady state value, $B = B^{ss}$.

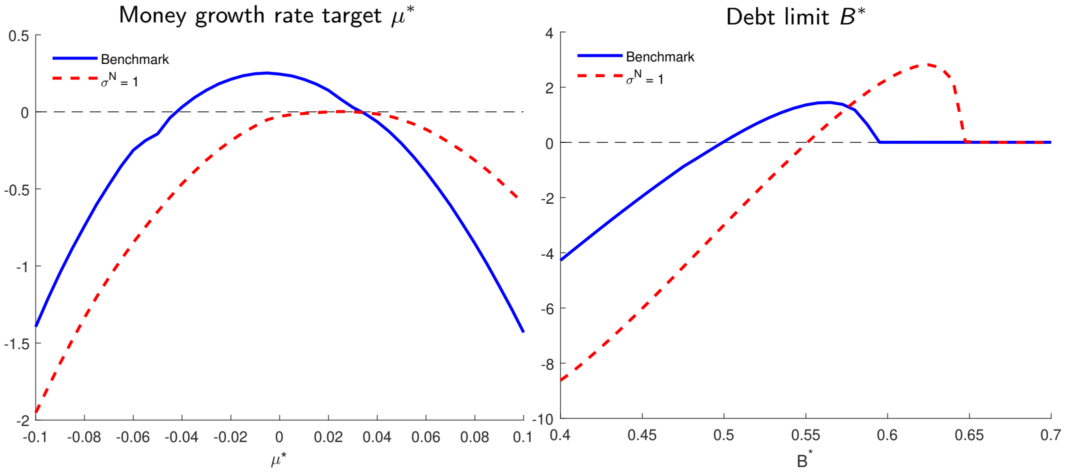
Short-term debt



Note: Debt is at the steady state value, $B = B^{ss}$.

Money demand

With $\sigma^N = 1$, the intertemporal distortion in debt choice, which stems from a time-consistency problem due to the demand for money, disappears.



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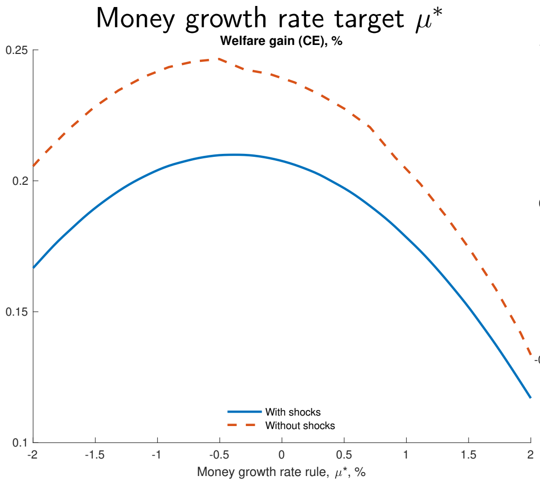
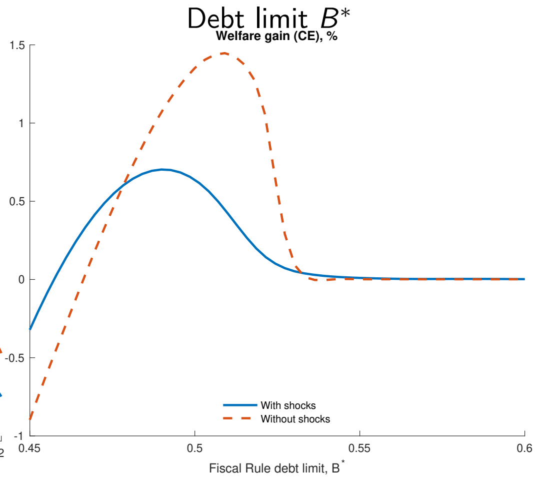
Expected terms of trade shocks





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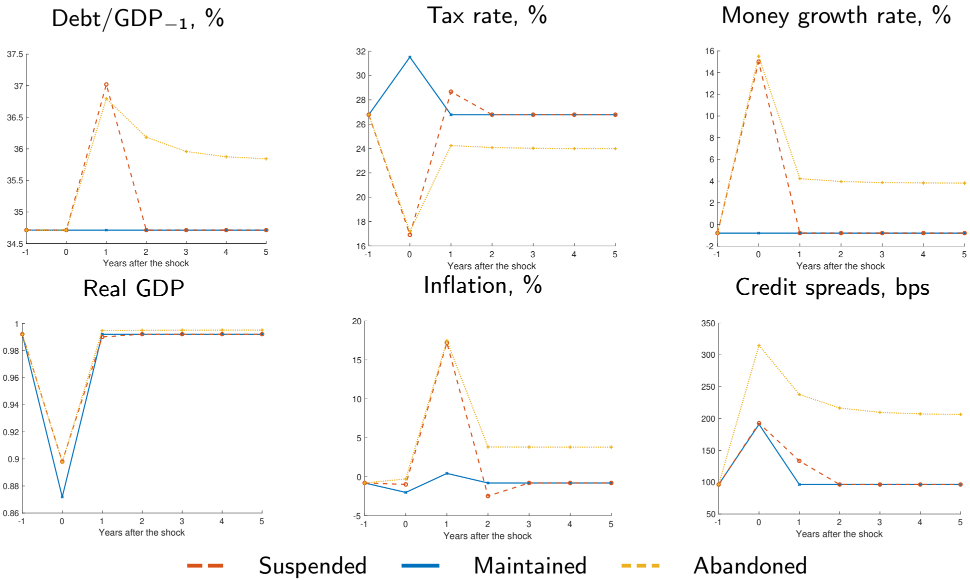
Dynamics of a large crisis



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