Policy Rules and Large Crises in Emerging Countries

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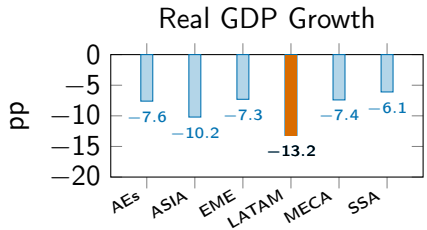
Policy Rules and Large Crises in Emerging Countries

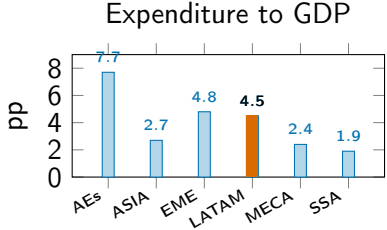
Emerging economies are adopting policy rules to strengthen macroeconomic stability:

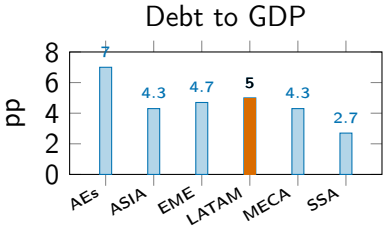
- Fiscal rules: debt ceilings, balanced budgets.
- Monetary rules: inflation targeting, money supply limits.

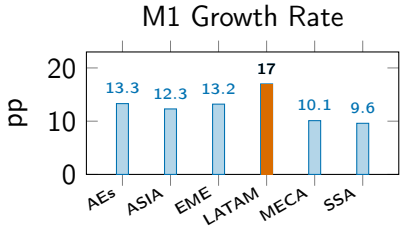
Should rules be suspended during crises for flexibility or maintained for credibility?

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.

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

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

- θ: velocity of money
- 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 Budget Constraint:

- 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:

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

expressed in **local currency**

Balance of Payments

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

expressed in **foreign currency**

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, Default, & Debt Pricing

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.

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: $B' \leq B^*$

$\Rightarrow$ Rules do not apply in default

Calibration

Quantitative analysis

Calibration:

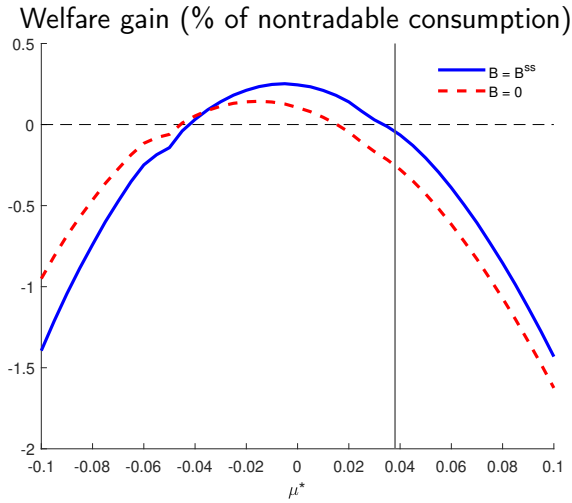
- Seven Latin American countries (1980–2018).
- EKMS (2024) studies the case with stochastic term-of-trade and TFP.
- Calibrate model in *normal times*.
- Crisis: unexpected shocks as in the COVID-19 episode $\{\text{TFP}, \gamma, \phi, \theta, \omega_2\}$.

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: $\mu = \mu^* = -0.5\%$

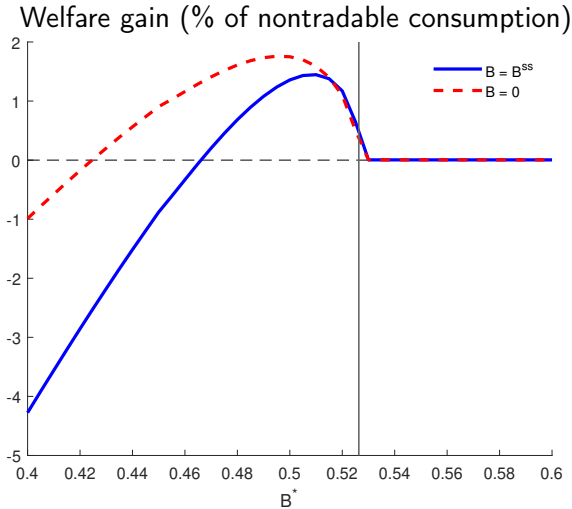


Vertical lines represent the policy outcome in a no-rules case.

Gains because of time-consistency problem in μ

No gains when $\sigma = 1$

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



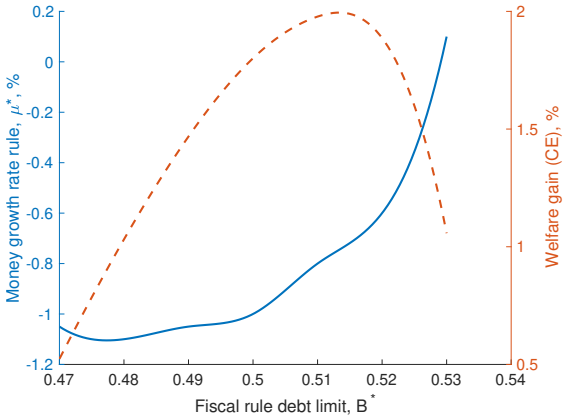
Vertical lines represent the policy outcome in a no-rules case.

Gains because of over-borrowing due to debt dilution

No gains with short-term debt

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

▷ Long-run implications



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

Large Crises

Large Crises: Modeling a COVID-19 shock

▷ Non-targeted moments

Model the COVID-19 as a combination of unexpected shocks.

Optimal monetary and fiscal rules:

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

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

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

▷ Monetary rule ▷ Fiscal rule

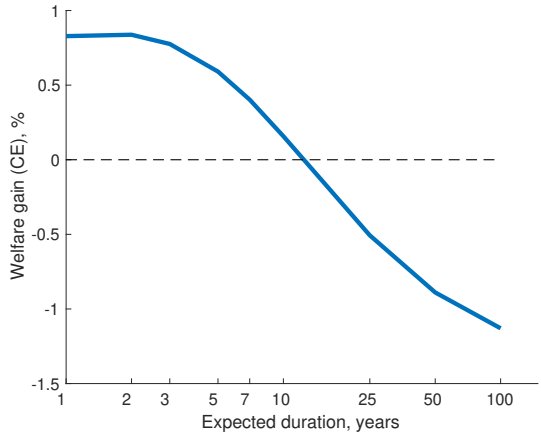
	Both rules Maintained	Both rules Suspended	Both rules Abandoned
Δ Real GDP, %	-12.13	-9.49	-9.54
Δ Debt / GDP, %	26.95	36.64	36.88
Δ Money growth rate, pp	0.00	15.81	16.31
Δ Tax rate, pp	4.73	-9.87	-9.60
Δ Primary deficit / GDP, pp	-0.41	13.92	13.59
Δ Credit spreads, bps	94.58	96.28	218.57
Δ Inflation, 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

What if rules remain suspended after crisis ends?

▷ monetary & fiscal



- 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

Robustness & Extensions

Normal times

1. Welfare implications with indifferent lenders ▷ go
2. Short-term debt ▷ go
3. Money demand with $\sigma^N = 1$ ▷ go
4. Rules with expected terms of trade shocks ▷ go

Crisis

1. Dynamics of a large crisis ▷ go
2. Rules vs. flexibility when the crisis is expected to last for two years ▷ go
3. Unpacking the gains from flexibility during large crises ▷ go

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

Long-run implications of policy rules

▷ back

	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

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:

$$V^P(B,\Delta) = u\left((1+\Delta)c^N, c^T\right) + v(1-h) + \vartheta(g) + \beta\mathcal{V}\left(B'\right)$$
$$V^D(\Delta) = u\left((1+\Delta)c^N, c^T\right) + v(1-h) + \vartheta(g) + \beta\delta\mathcal{V}(0) + \beta(1-\delta)V^D$$

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

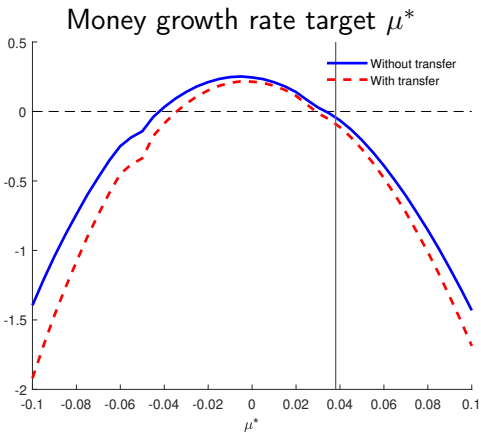
$$\mathcal{V}(B,\Delta) = \zeta \log\left[exp\left(\frac{V^P(B,\Delta)}{\zeta}\right) + exp\left(\frac{V^D(\Delta)}{\zeta}\right)\right]$$

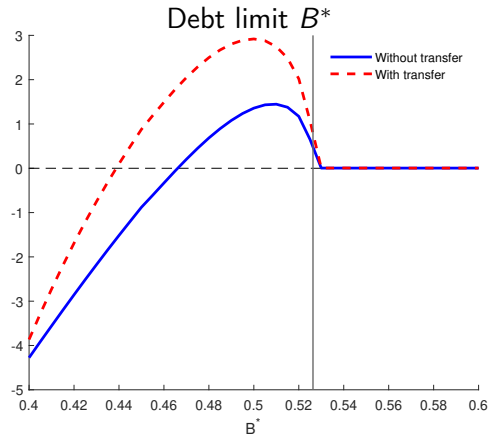
Let $\mathcal{V}^R(B)$ be the corresponding value function under policy rule $R = \{\mu^*, B^*\}$. For a given debt level B, the welfare measure Δ solves:

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

Welfare implications with indifferent lenders

▷ back

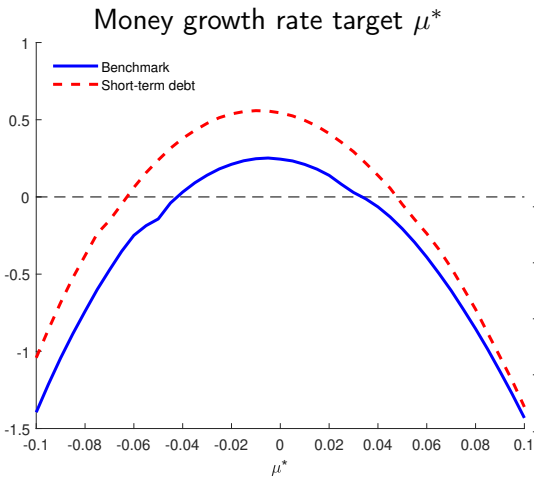


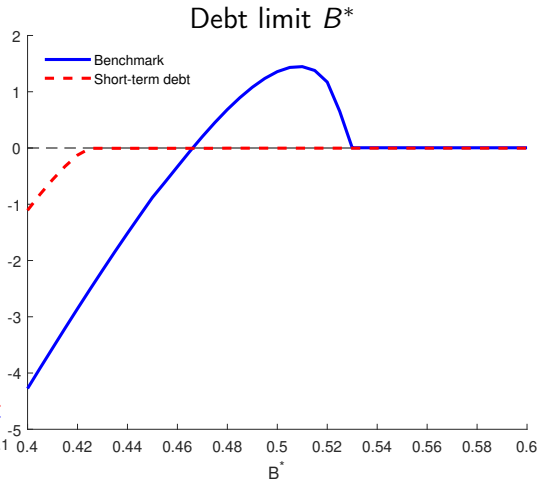


Note: Debt is at the steady state value, $B = B^{ss}$.

Short-term debt

▷ back



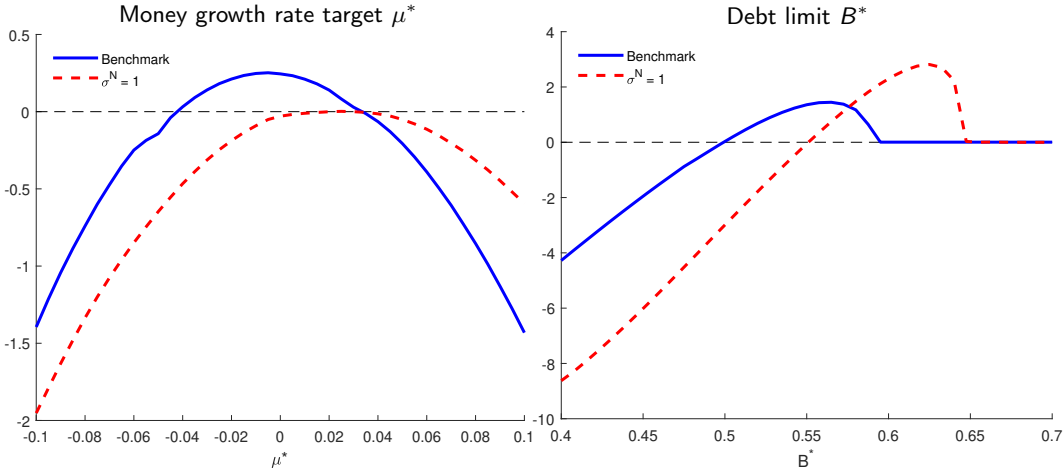


Note: Debt is at the steady state value, $B = B^{ss}$.

Money demand

▷ back

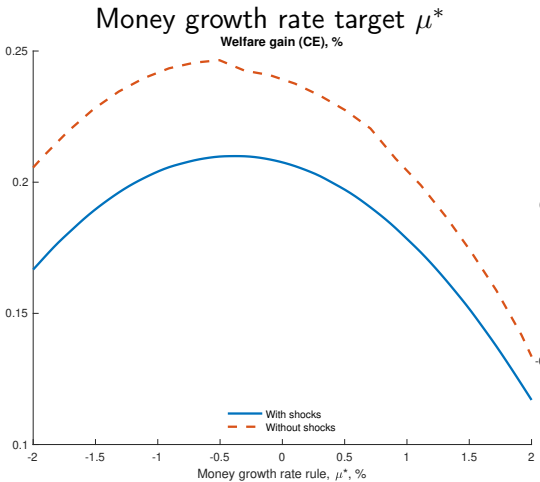
With $\sigma^N = 1$, the intertemporal distortion in debt choice, which stems from a time-consistency problem due to the demand for money, disappears.

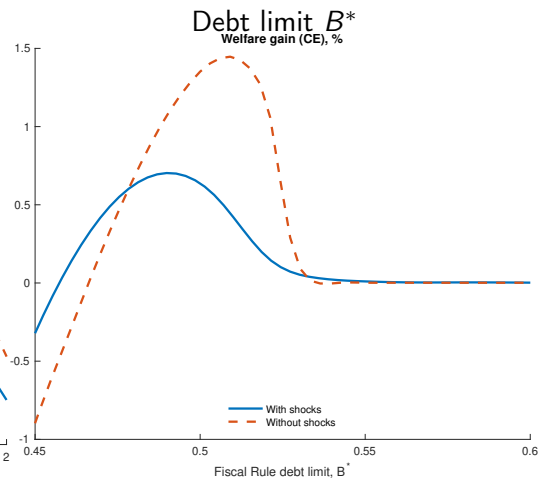


Note: Debt is at the steady state value, $B = B^{ss}$.

Expected terms of trade shocks

▷ back





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

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

▷ back

	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%.

Monetary rule

▷ back

	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

▷ back

	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.

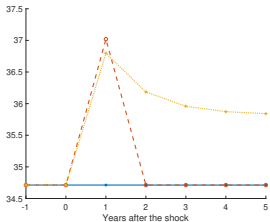
Rule reduces borrowing

Suspending and abandoning rule implies ↑ spreads

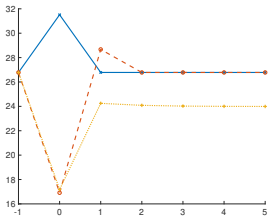
Dynamics of a large crisis

▷ back

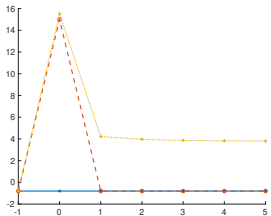
Debt/GDP$_{-1}$, %



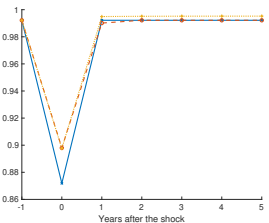
Tax rate, %



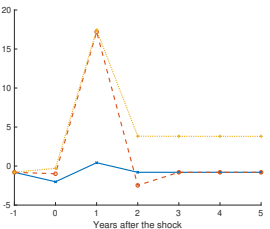
Money growth rate, %



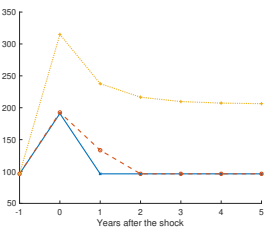
Real GDP



Inflation, %



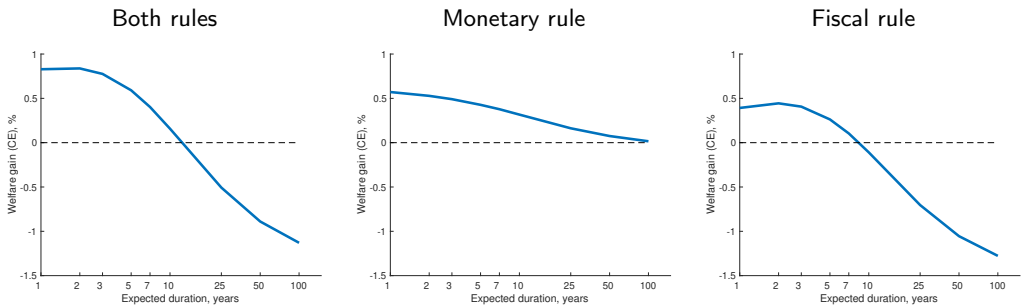
Credit spreads, bps



Suspended Maintained Abandoned

What if rules remain suspended after crisis ends?

▷ back



- 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

▷ back

	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

Unpacking the gains from flexibility during large crises

▷ back

Shocks				Both rules are		Monetary rule is		Fiscal rule is	
TFP	γ	ϕ	θ	Suspended	Abandoned	Suspended	Abandoned	Suspended	Abandoned
√	√	√	√	0.83	-1.42	0.57	-0.02	0.39	-1.54
√	√	√	×	0.39	-1.72	0.19	-0.35	0.25	-1.58
√	√	×	√	0.49	-1.74	0.40	-0.20	0.17	-1.75
√	×	√	√	0.56	-1.67	0.32	-0.26	0.33	-1.59
×	√	√	√	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.

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