

# When is Debt Odious?

## A Theory of Repression and Growth Traps

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# Research question

- Is (external) government borrowing ever good for the economy?
- Debt is often considered good:
  - Better risk sharing, intertemporal consumption smoothing, etc.
- Debt could be odious if government is bad:
  - An idea in the legal literature that citizens must not be responsible for legacy debt issued by past corrupt (truly bad) governments
  - Buchheit, Gulati, Thompson (2006), Jayachandran and Kremer (2006)
- Empirical literature has so far struggled to find positive relation between foreign borrowing and growth for developing countries
  - Aizenman, Pinto and Radziwil (2004), Prasad et al. (2006)

[► Related literature](#)

# Towards a theory of sovereign debt

- We propose a theory of sovereign debt with a government that is purely myopic and wasteful (in general, self-interested)
  - This is a strong assumption about the nature of government but not unrealistic even for developed countries
- How does access to (external) debt affect the decisions of such a government?
  - We compare long-run outcomes with and without debt
- Does an odious government necessarily imply odious debt?
- When does the government repress the economy vs. adopt growth-friendly policies?

# Summary of results

- Key result: odious government need not imply odious debt
  - Debt can in fact lengthen the effective horizon of a myopic government
  - However, for poor economies that save little, debt is indeed odious
    - \* The government's ability to borrow internationally makes the citizens worse off in the long run
- Our model helps explain persistently slow growth in developing economies and the lack of growth-debt relationship in data
- It offers implications for restructuring of developing country debt in response to large shocks such as COVID-19
- Issues we examine increasingly germane for (some) developed economies too, given the fiscal trajectories

[▶ Detailed summary](#)

# Model

- Time is discrete, and the horizon is infinite
- Small open economy, world interest rate at  $r$
- Households feature an overlapping generations structure
- Governments are only incumbent for one period
  - Equivalently, they only care about their current term
- Households can invest in foreign or domestic government debt, at  $r$ 
  - Assumption: mild “home bias”

# Household objective

- Household inherits  $e_i$  from its parents, and maximizes utility over consumption  $c_i$  and the bequest  $e_{i+1}$ :

$$U = \ln c_i + \rho \ln e_{i+1}$$

- $\rho$  captures the household's savings preference
- Household has two ways to invest its endowment:
  - Financial savings  $s_i$  which returns  $(1 + r)s_i$  at the end of period
  - Real investment  $k_i$  which returns  $f(k_i)$  at the end of period
  - We assume certain regularity conditions on  $f(k)$  ► Regularity conditions

# Government objective

- Being myopic, the government maximizes its one-period spending only
- Government's budget if it decides not to default:

$$\text{spending}_i = D_i - D_{i-1}(1 + r) + \text{tax revenues}_i$$

- Government can decide to default; if it does, it incurs a default cost and cannot borrow for the remainder of the period
  - Large reputational costs and/or sanctions not necessary for the model
  - Defaulting countries able to tap bond markets next period at low costs
- As strategic defaults are possible, the debt capacity  $D_i$  is limited by the willingness and the ability of the next period government to repay

# Cost of default

- The deadweight cost of default is modeled as

$$\text{default cost}_i = C + zD_{i-1}^{Dom}(1 + r)$$

where  $D_{i-1}^{Dom} = s_{i-1}$  is the domestic holdings of its debt

- $C > 0$  is a fixed cost of default, e.g., cost of default on foreign debt
- $z > 1$  is to capture the additional deadweight cost of default, on top of a direct loss of face value
  - Collateral damage to payment systems, inter-bank markets, etc.



# Taxation/repression

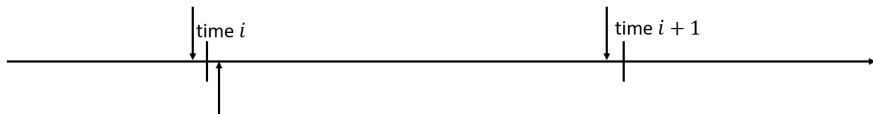
- Government  $i$  taxes the real sector at distortionary tax rate  $t_i$

$$\tau_i := \text{tax revenue}_i = t_i f(k_i)$$

- Assumption: financial savings – or equivalently in our model, purchases of government debt – are not taxed
  - Intuitively, financial assets are harder to tax, e.g., they are easily converted to concealable assets like gold
  - Can also represent financial repression
    - \* Subsidizing domestic savings in government debt with tax preferences
    - \* Minimum level of government bond holdings for banks
    - \* Effectively is a tax on real investment

# Model timeline

- Previous government issues debt  $D_{i-1}$
- Domestic holdings of legacy debt  $(1+r)s_{i-1}$
- Household endowment  $e_i$
- Government collects taxes  $t_i f(k_i)$
- If it hasn't defaulted, government issues  $D_i$  and repays legacy debt  $(1+r)D_{i-1}$ , spending the remainder
- Domestic holdings of legacy debt  $(1+r)s_i$
- Household endowment  $e_{i+1}$



- Newly incumbent government announces default decision, which is a function of  $D_{i-1}$ ,  $(1+r)s_{i-1}$ , and  $e_i$
- Government announces tax rate  $t_i$
- Household decides on savings  $s_i$  and investment  $k_i$

# Household choices

- In reaction to tax rate  $t_i$ , household makes the following choices:

$$k_i = f'^{-1}\left(\frac{1+r}{1-t_i}\right)$$

$$e_{i+1} = \frac{\rho}{1+\rho} [(1+r)(e_i - k_i) + (1-t_i)f(k_i)]$$

$$c_i = \frac{1}{\rho(1+r)} e_{i+1}$$

$$s_i = \frac{\rho}{1+\rho} (e_i - k_i) - \frac{1}{(1+\rho)(1+r)} (1-t_i)f(k_i)$$

- In autarky, government chooses  $t^{**} := \operatorname{argmax}_t \tau(t)$ ;  $\tau^{**} := \tau(t^{**})$

# Government choices - I

- Let  $S_{i+1} := D_{i+1} + \tau_{i+1}$  denote the maximum resource that the next period government can raise, in case it does not default
- The next period government needs to have the **ability to pay**:

$$D_i(1+r) \leq S_{i+1}$$

- The next period government needs to have the **willingness to pay**:

$$\underbrace{S_{i+1} - D_i(1+r)}_{\text{net spending on no default}} \geq \underbrace{\tau^{**}}_{\text{revenues in autarky}} - \underbrace{(C + z s_i(1+r))}_{\text{deadweight cost of default}}$$

$$\Rightarrow D_i(1+r) \leq S_{i+1} + z s_i(1+r) + C - \tau^{**}$$

# Government choices - II

- Both constraints must be met:

$$D_i(1+r) \leq S_{i+1} - \max\{0, \tau^{**} - C - z s_i(1+r)\}$$

- The double-edged sword nature of debt:
  - $D_i \propto s_i \propto t_i$ , incentivizing the government to repress the real sector
  - $D_i \propto S_{i+1} \propto e_{i+1} \propto -t_i$ , incentivizing the government to boost growth
- The government trades off both incentives and the tax-revenue impact
- The deterministic model implies no default in equilibrium
- Recursive formulation (Bellman equation) for  $S(e)$  and the policy tax rate  $t(e)$ , with the state variable  $e$  ▶ Analytical formulation

# Model solution

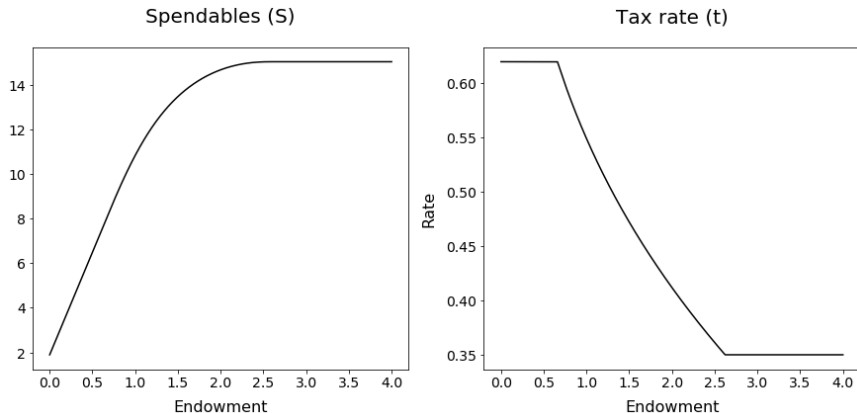


Figure: Parameters:  $f = 3k^{.65}$ ,  $r = 10\%$ ,  $z = 4$ ,  $\rho = 2.3$  and  $C = 1.0$ .

► Savings and investment

# Model properties

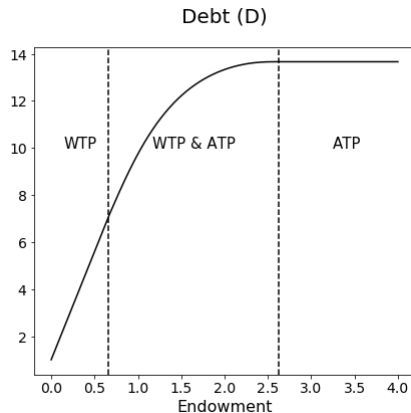
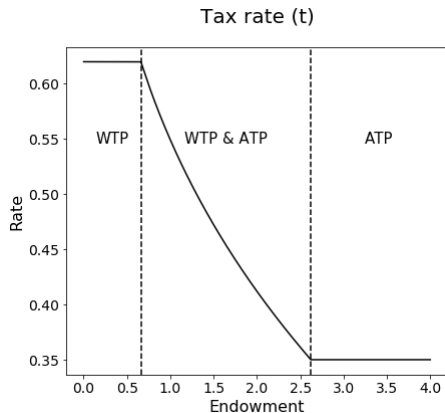


Figure: Parameters:  $f = 3k^{.65}$ ,  $r = 10\%$ ,  $z = 4$ ,  $\rho = 2.3$  and  $C = 1.0$ .

# Multiple steady states

- Endowments  $\{e_i\}_{i=0}^{\infty}$  evolve in time according to  $e_{i+1} = e_+(e_i, t(e_i))$
- We formally characterize convergence to, and nature of, steady states

► Proposition 3.2

- Three possible steady states:
  - $e^W$  (WTP),  $e^A$  (ATP), and  $e^S$  (WTP & ATP)
- Importantly, this creates a possibility for **multiple steady states**
- When this is the case, the limit of an endowment path depends on the initial endowment, creating a **growth trap** from low endowments



# Intuition for growth trap

- Access to debt worsens the steady state relative to the benchmark
- Government of an economy with low endowment has a strong incentive to repress the real economy, suppressing growth
- As a result of repression, the economy cannot accumulate enough wealth, which just leads to persistent repression

# Growth trap

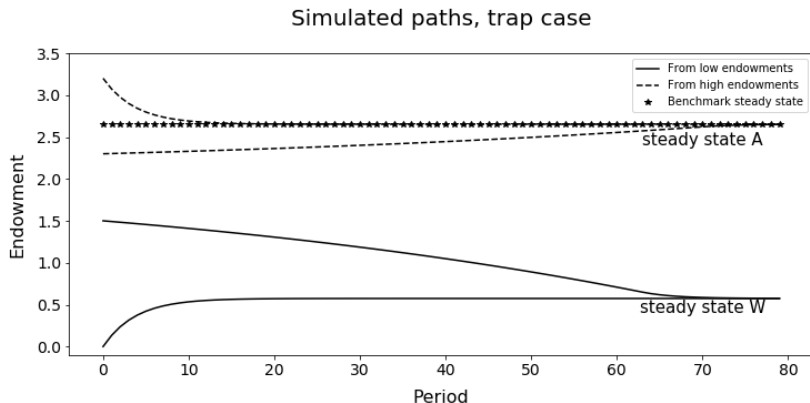


Figure: Parameters:  $f = 3k^{.65}$ ,  $r = 10\%$ ,  $z = 4$ ,  $\rho = 2.3$  and  $C = 1.0$ .

# Intuition for growth boost

- Access to debt improves the steady state relative to the benchmark
- Debt lengthens the horizon of myopic governments
- Growth-enhancing taxation becomes a persistent feature

▶ Numerical example

# Growth boost

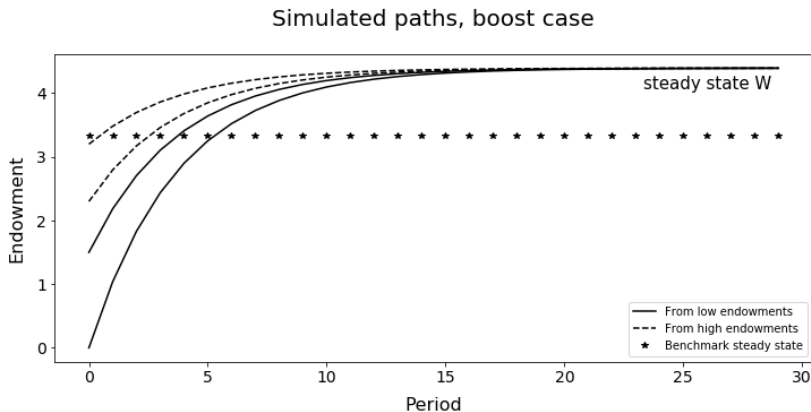


Figure: Parameters:  $f = 3k^{.65}$ ,  $r = 1\%$ ,  $z = 1.1$ ,  $\rho = 3.1$  and  $C = 1.0$ .

# Savings preference $\rho$ and growth trap

## Proposition 3.3

*Growth trap exists only if  $\rho < \frac{1}{t^{**}}$*

*In other words, when private agents have sufficiently high (low) propensity to save, sovereign debt in the presence of government myopia can be beneficial (detrimental) to growth.* [► Details](#)

- Intuition:

- With low savings rate, endowments do not grow quickly
- This weakens the horizon-lengthening feature of debt
- The incentive to repress and channel savings to debt dominates

Higher (lower) default costs  $z \rightarrow$  ATP (WTP) binds

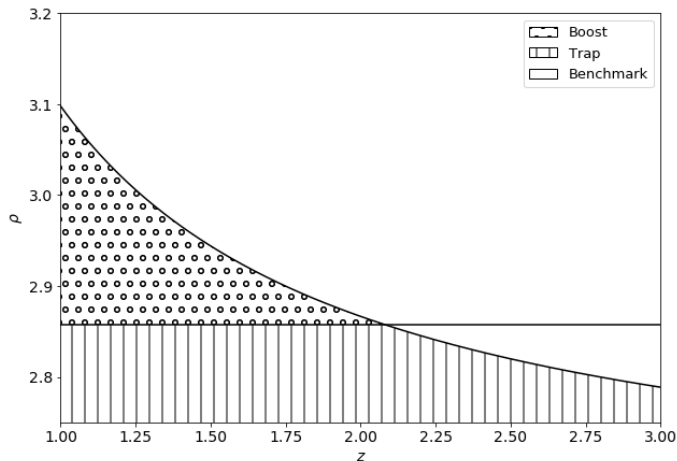


Figure: Parameters:  $f = 3k^{.65}$ ,  $r = 1\%$ , and  $C = 1.0$ . [Intuition for  \$z\$](#)

## To summarize....

- Odious (myopic, wasteful) government need not imply odious debt
- Sovereign debt with an odious government is a double-edged sword
  - On the one hand, debt can encourage the myopic government to “repress” the real economy in order to channel savings to bonds
  - On the other hand, debt acts as the only horizon-lengthening device that incentives myopic governments to encourage economic growth
- Both effects are more pronounced for poor economies
- Repression effect dominates for economies that save little
  - Different experience with external borrowing of high-saving Asian economies and low-saving Latin American economies

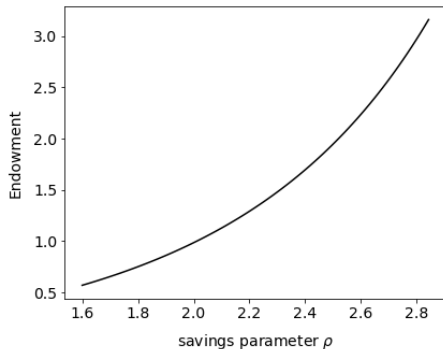
# Allocation puzzle - I

- Odious debt discussion relates to **extensive** margin of access to debt
  - What happens when a country gains access to foreign borrowing?
- Some studies have explored the **intensive** margin: How developing country growth is correlated with the level of foreign borrowing
  - Aizenman, Pinto and Radziwil (2004), Prasad et al. (2006), Gourinchas and Jeanne (2013)
- Surprisingly, they find that the correlation is weak or even negative
- Our model suggests an **endogenous** selection of countries that borrow more from abroad:
  - Low savings rate (low  $\rho$ ) is associated with low growth
  - Low savings rate is associated with more repression and greater reliance on foreign debt



# Allocation puzzle - II

(a) Steady state endowment (low  $z$ )



(b) Normalized foreign debt (low  $z$ )

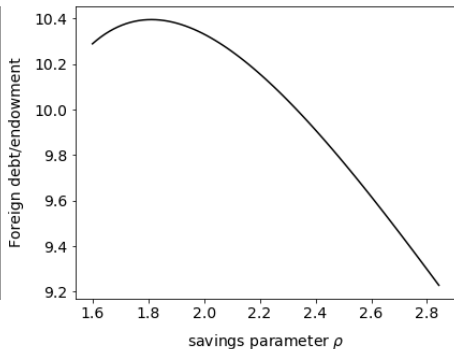


Figure: Parameters:  $f = 3k^{.65}$ ,  $r = 5\%$ , and  $C = 1.0$ .  $z = 1.1$ . [► High  \$z\$](#)

# Policy instruments for escaping the trap - I

- Consider an economy trapped in steady state W, though higher steady state A also exists
- What policy instruments can get the economy out of the trap?
- Since the repression incentive comes from debt, a **debt ceiling** can curb the repression that results in a growth trap
- The threshold debt ceiling that removes the trap is just below the amount of debt taken at the trap steady state
  - The debt ceiling dislodges the country from the WTP steady state
  - The ensuing dynamics take it to the ATP region
  - However, such a debt ceiling will trigger an immediate default

## Policy instruments for escaping the trap - II

- **Debt relief** alone in our model just allows the government to increase spending by the amount of the relief
- This is not too far from reality:
  - Historically, 36 countries received significant official debt relief under the Highly Indebted Poor Country (HIPC) Initiative and Multilateral Debt Relief Initiative (MDRI) in the early 2000s
  - Out of the 36, 15 were either back in debt distress or had a high risk of debt distress by 2019; another 13 had a moderate risk of debt distress
- However, debt relief, combined with an effective debt ceiling, can prevent default while guiding the economy out of a growth trap

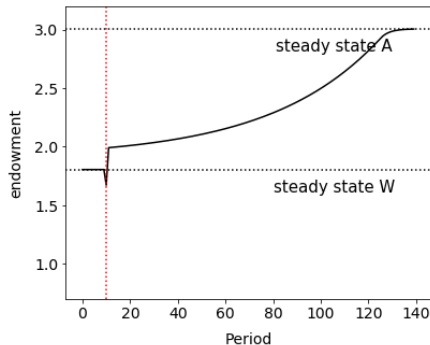
▶ Numerical example

# Unanticipated small shocks to steady state - I

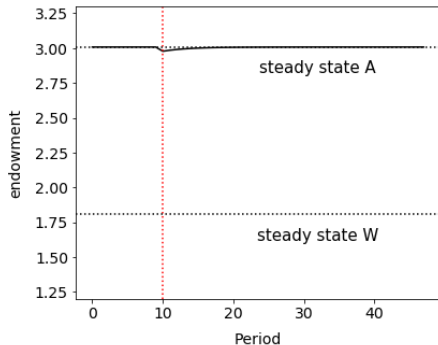
- A small negative endowment shock causes an economy in steady state W to default; in contrast, it does not for one in steady state A
  - All economies borrow to the hilt, but rich ones are “safe havens”
    - \* They are only constrained by the ability to pay, which is the discounted sum of tax revenues that does not (locally) depend on endowment
  - Debt capacity increases with endowment only in the WTP region
- While it causes default, the absence of repression by this period government (in debt autarky) creates a growth boost next period
- This offsets the initial shock and the resulting cost of default; sometimes, it is large enough to move the economy to steady state A

# Unanticipated small shocks to steady state - II

(a) Endowment path, from W, small shock



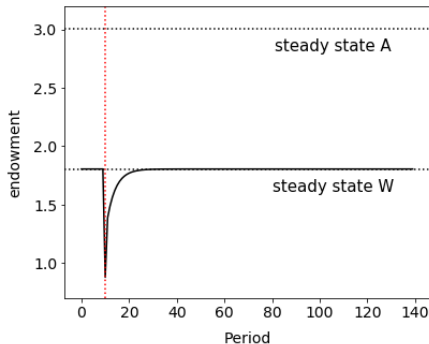
(b) Endowment path, from A, small shock



**Figure:** Parameters:  $f = 3k^{-65}$ ,  $r = 4\%$ ,  $z = 4.24$ ,  $\rho = 2.72$  and  $C = 1.0$ . Shock amount: 1% of original endowment

# Unanticipated large shocks to steady state W

(a) Endowment path, from W, large shock



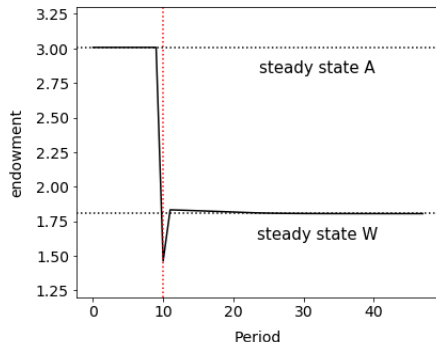
**Figure:** Parameters:  $f = 3k^{.65}$ ,  $r = 4\%$ ,  $z = 4.24$ ,  $\rho = 2.72$  and  $C = 1.0$ . Shock amount: 40% of original endowment

# Targeted relief in response to the COVID pandemic

- There are calls today for debt relief for certain developing countries to help them spend on necessary healthcare and fiscal support measures
  - Some countries likely to have myopic self-centered governments
- Myopic self-centered governments have little interest in spending that has benefits outside of their horizon
  - Continued access to debt can ensure that their horizon is lengthened
- Hence, an efficient mechanism could be “targeted relief”:
  - Debt relief to avoid a default cost
  - Continued access to debt markets
  - Monitored utilization of proceeds from debt issuance

# Unanticipated large shocks to steady state A

(b) Endowment path, from A, large shock



**Figure:** Parameters:  $f = 3k^{.65}$ ,  $r = 4\%$ ,  $z = 4.24$ ,  $\rho = 2.72$  and  $C = 1.0$ . Shock amount: 40% of original endowment



# Implications of COVID for developed countries

- While poor economies can hardly do much worse, rich ones can plunge into lower equilibrium
- How will developed economies finance high public indebtedness in the post-COVID era? [▶ Economist article](#)
  - Akin to developing economies?
  - Repression?
  - Vulnerable to default from small shocks?
  - Might there be growth traps?

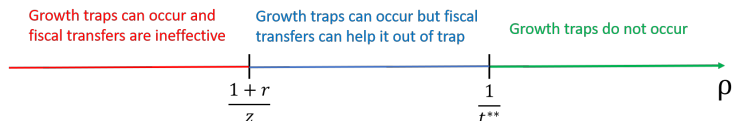
# Extensions

# Productive government

- In return for investment  $I$ , it creates  $g(I)$  in the next period
- Because the government is myopic, the only reason for the government to invest is through increased debt capacity
- In the willingness-to-pay region (low endowments), the government does not invest even in a productive technology [▶ Numerical example](#)
  - Can explain why developing countries do not invest in public goods even if beneficial, while richer countries do
- Growth trap persists as long as there is myopia

# Fiscal transfer

- One primary reason for growth trap is low household endowment
- Suppose the government can commit to a one-time fiscal transfer to boost household endowment [► Formal results](#)
- The government is still myopic and wasteful, and therefore it will undertake the transfer only if it increases its net spendings



- Note: even for high- $\rho$  cases, the government still has to overcome the time-inconsistency problem [► Illustration](#)

# Appendix

# Summary of results - I

- We show that odious governments need not imply odious debt
- Sovereign debt with an odious government is a double-edged sword
  - On the one hand, debt can encourage the myopic government to “repress” the real economy in order to channel savings to bonds
  - On the other hand, debt acts as the only horizon-lengthening device that it incentivizes myopic governments to encourage economic growth
- Both effects are more pronounced for poor economies
- Repression effect dominates for economies that save little
  - Debt of myopic governments in such economies is indeed odious

# Summary of results - II

- Key dynamic: What is the government's incentive to repay debt?
- We assume that the deadweight cost of default is increasing in the amount of government debt **held domestically**
- The myopic government's trade-off is between default costs and the current debt repayment (instead of the present value of debt)
  - Long-horizon government would default; myopia sustains debt capacity
- Poor-economy governments constrained by willingness to repay
  - This creates an incentive to repress real investments
  - Borrowing capacity is boosted by encouraging domestic debt holdings

## Summary of results - III

- The repressive effect of debt can lead to a “growth trap”:
  - Government of an economy with low endowment has a strong incentive to repress the real economy, suppressing growth
  - As a result of repression, the economy cannot accumulate enough wealth, which just leads to persistent repression
- When the horizon-lengthening effect dominates, the economy may ultimately achieve a higher than benchmark growth
- Extensions:
  - Policies: Debt ceiling, Debt relief
  - Alternative assumptions: Productive government, Fiscal transfers

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# Related literature

- Benefits of sovereign debt: Kletzer and Wright (2000)
- Sovereign debt and default: Eaton and Gersovitz (1981), Bulow and Rogoff (1989), Fernandez and Rosenthal (1990), Eaton and Fernandez (1995), Cole and Kehoe (1998), Guembel and Sussman (2009), Reinhart and Rogoff (2010), Amador (2012), Tomz (2012), Acharya and Rajan (2013)
- Cost of sovereign default and domestic holdings: Basu (2009), Bolton and Jeanne (2011), Gennaioli, Martin and Rossi (2014)
- Financial repression: Roubini and Sala-i Martin (1992), Reinhart, Kirkegarrrd and Sbrancia (2011), Reinhart (2012), Reinhart and Sbrancia (2015), Chari, DAVIS and Kehoe (2020)

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# Regularity conditions

## Definition 3.2

We assume that the derived functions  $k(t) := f'^{-1}(\frac{1+r}{1-t})$  and  $\pi(t) := (1-t)f(k(t)) - (1+r)k(t)$  satisfy the following conditions:

- A.  $k(t)$  is decreasing and convex in  $t$ .
- B.  $\frac{k'(t)}{\pi'(t)}$  is decreasing in  $t$ , and  $\frac{\tau'(t)}{\pi'(t)}$  is strictly increasing in  $t$ .

- Note:  $f(k) = Ak^\gamma$  always satisfies both conditions

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# Recursive formulation - I

- $S_i$  allows for a recursion:

$$S_i = D_i + \tau_i = \frac{1}{1+r} [S_{i+1} - \max\{0, \tau^{**} - C - z s_i(1+r)\}] + \tau_i$$

- Natural set of state variables:  $(e_i, D_{i-1}, D_{i-1}^{Dom})$
- However, once the government decides not to default,  $D_{i-1}$  and  $D_{i-1}^{Dom}$  are irrelevant
- Moreover, given the absence of uncertainty, no government on the equilibrium path will default
- This allows us to recursively formulate the problem using  $S$  – the spendables function – with the only state variable being  $e$

# Recursive formulation - II

## Lemma 2.1

*Given the set of state variables  $(e, D_{-1}, s_{-1})$ , the government's problem can be summarized with the Bellman equation  $S(e)$  and the policy tax rate  $t(e)$ :*

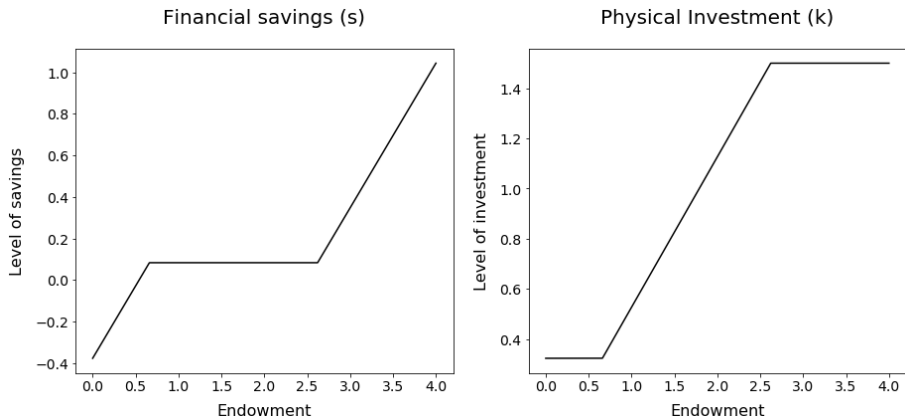
$$\begin{aligned}
 S(e) = \max_t \quad & \left[ \frac{1}{1+r} [S(e') - \max\{0, \tau^{**} - C - zs(1+r)\}] + \tau(t) \right] \\
 \text{s.t.} \quad & e' = \kappa_1 [(1+r)(e - k(t)) + (1-t)f(k(t))], \\
 & s = \kappa_1 (e - k(t)) - \kappa_0 (1-t)f(k(t)), \text{ and} \\
 & k(t) = f'^{-1} \left( \frac{1+r}{1-t} \right).
 \end{aligned}$$

*The government will default if and only if*

$$S(e) - (1+r)D_{-1} < \max\{0, \tau^{**} - C - zs_{-1}(1+r)\}$$

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# Model solution



**Figure:** Parameters:  $f = 3k^{.65}$ ,  $r = 10\%$ ,  $z = 4$ ,  $\rho = 2.3$  and  $C = 1.0$ .

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# Model solution - boost case

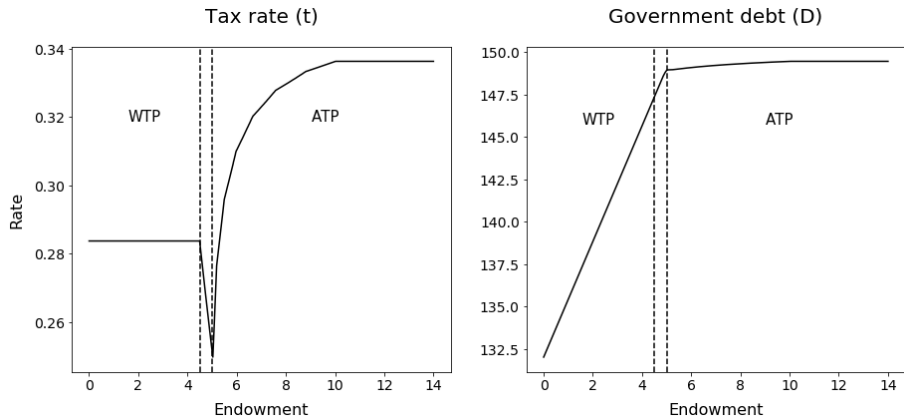


Figure: Parameters:  $f = 3k^{.65}$ ,  $r = 1\%$ ,  $z = 1.1$ ,  $\rho = 3.1$  and  $C = 1.0$ .

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# Model solution - boost case (S)

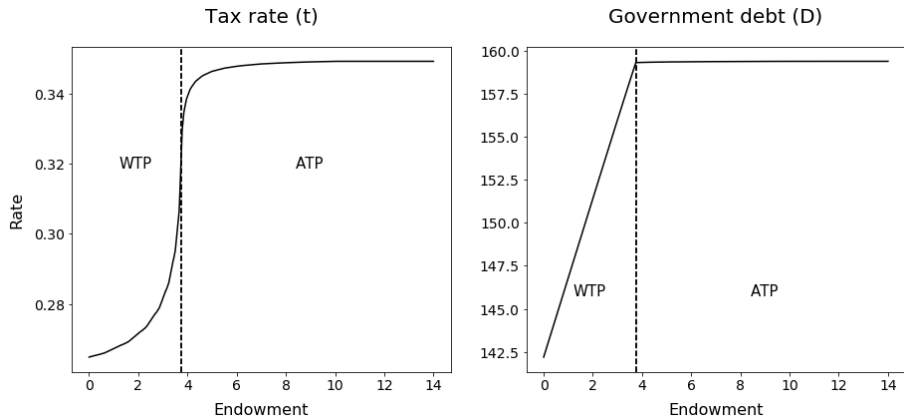


Figure: Parameters:  $f = 3k^{.65}$ ,  $r = 1\%$ ,  $z = 1.5$ ,  $\rho = 3.1$  and  $C = 1.0$ .

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# How model cases are spanned

## Proposition 3.2

- (**Trap**) For a strictly positive measure of model parameters,  $\exists \bar{e}$  such that  $\forall e_0 > \bar{e}$ ,  $e_\infty(e_0) = e_\infty^{**}$ , and for  $\forall e_0 \leq \bar{e}$ ,  $e_\infty(e_0) < e_\infty^{**}$ .
  - (**Boost**) For another strictly positive measure of model parameters,  $e_\infty(e_0)$  is independent of  $e_0$  and  $e_\infty(e_0) > e_\infty^{**}$ .
  - (**Benchmark**) In the remaining cases,  $e_\infty(e_0) = e_\infty^{**}$  regardless of  $e_0$ .
- 
- We identify two critical parameters in determining these cases:
    - Household propensity to save ( $\rho$ )
    - Financial sector sophistication ( $z$ )

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# The role of savings parameter ( $\rho$ ) - I

- For illustrative purposes, consider a first order linear approximation of  $S(e)$ :  $S(e) \approx \alpha + \beta e$
- Suppose that only the willingness-to-pay constraint binds, so that locally the Bellman equation is:

$$S(e) = \frac{1}{1+r} \left[ S(e') - (\tau^{**} - C - zs(1+r)) \right] + \tau(t)$$

- Plugging in the approximation and collecting terms only dependent on  $e$ , we have

$$\begin{aligned} \beta e &= \frac{1}{1+r} \beta \frac{\rho}{1+\rho} (1+r)e + z \frac{\rho}{1+\rho} e \\ \Rightarrow \beta &= \rho z \end{aligned}$$

# The role of savings parameter ( $\rho$ ) - II

- Now consider the first-order derivative of the Bellman equation:

$$\frac{1}{1+r} \frac{de'}{dt} \frac{dS}{de} + z \frac{ds}{dt} + \tau'(t)$$

- The first term ( $< 0$ ) is the incentive to boost growth, whereas the second term ( $> 0$ ) is the incentive to repress
- Recall that:

$$e' = \frac{\rho}{1+\rho} [(1+r)(e - k(t)) + (1-t)f(k(t))]$$

$$s = \frac{\rho}{1+\rho} (e - k(t)) - \frac{1}{(1+r)(1+\rho)} (1-t)f(k(t))$$

# The role of savings parameter ( $\rho$ ) - III

- The first two terms evaluate to

$$\underbrace{\frac{dS}{de} \frac{\rho}{1+r} \frac{d}{dt} [(1-t)f(k(t)) - (1+r)k(t)]}_{=\rho z}$$

Incentive to lower taxes to boost growth to increase next-period spendable

$$- \underbrace{z \left[ \rho k'(t) + \frac{1}{1+r} \frac{d}{dt} (1-t)f(k(t)) \right]}$$

Incentive to repress investment with higher taxes to increase next-period willingness-to-pay

- The first term, incentive to boost, is proportional to  $\rho^2$ , whereas the second term, incentive to repress, is proportional to  $\rho$

# The role of savings parameter ( $\rho$ ) - IV

- This is because the savings parameter  $\rho$  influences both
  - The marginal sensitivity of the future endowment to current tax rate ( $\frac{de_+}{dt}$ ), and
  - The marginal sensitivity of next period government's repayment capacity to endowment ( $\frac{dS}{de}$ )
- For high enough  $\rho$ , the first term dominates and the myopic government chooses an even lower tax rate than benchmark. For low  $\rho$ , the second term dominates and the opposite occurs
- Roughly speaking, when  $\rho > \frac{1}{t^{**}}$ , the government access to debt is good for the economy, and when  $\rho < \frac{1}{t^{**}}$ , it is bad for the economy

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# Financial sector sophistication $z$ and growth boosts

- Growth boosts occur only for less financially sophisticated economies (low  $z$ )
- In order for growth boost to persist in a steady state, the willingness to pay constraint needs to bind for sufficiently long
- Recall that
  - $\tau^{**} - C - zs(1 + r) > 0 \Rightarrow$  willingness to pay constraint is binding
  - $\tau^{**} - C - zs(1 + r) < 0 \Rightarrow$  ability to pay constraint is binding
- At high  $z$ , the willingness to pay constraint gets relaxed quickly, and therefore boost steady state vanishes

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# Allocation puzzle - high $z$

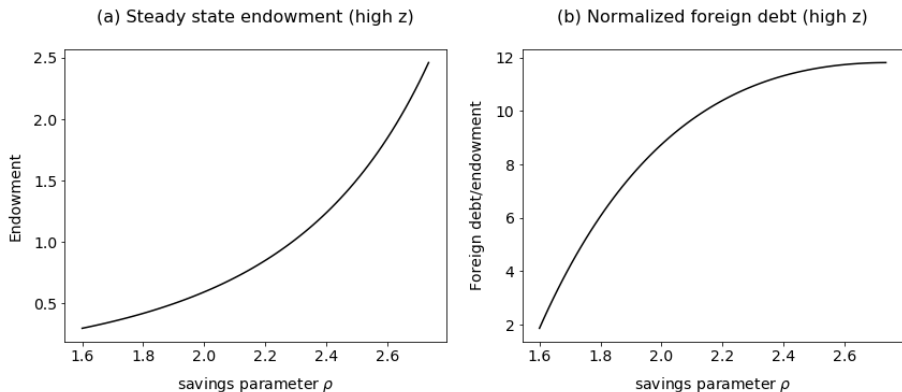
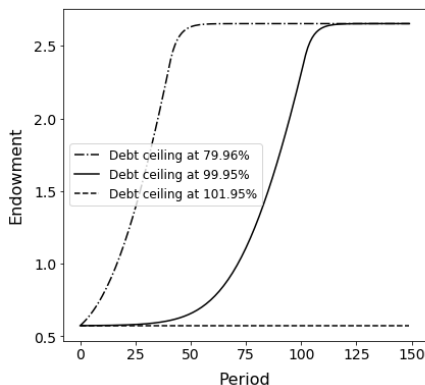


Figure: Parameters:  $f = 3k^{.65}$ ,  $r = 5\%$ , and  $C = 1.0$ .  $z = 2$ . [Back to slide](#)

# Debt Ceiling + Debt Relief

Endowment path from low steady state



Simulated tax rate path

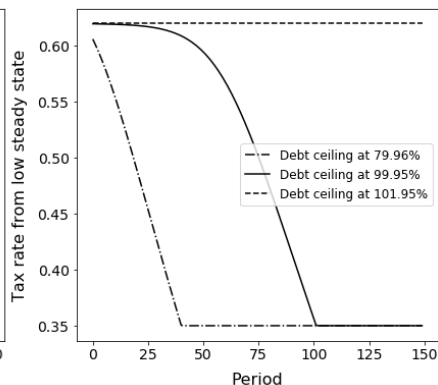


Figure: Parameters:  $f = 3k^{.65}$ ,  $r = 10\%$ ,  $z = 4$ ,  $\rho = 2.3$  and  $C = 1.0$ .

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# Productive government

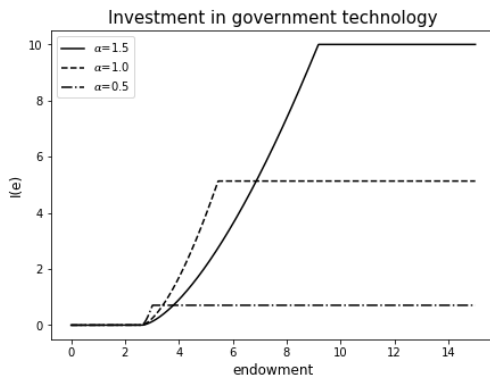


Figure:  $g(\cdot) = \alpha \times f(\cdot)$ . Parameters:  $f = 3k^{.65}$ ,  $r = 10\%$ ,  $z = 4$ ,  $\rho = 2.3$  and  $C = 1.0$ . [Back to slide](#)



# Fiscal transfer: Timing

- Previous government issues debt  $D_{i-1}$
- Domestic holdings of legacy debt  $(1+r)s_{i-1}$
- Household endowment  $e_i$

time  $i$

time  $i+1$

- Government collects taxes  $t_i f(k_i)$
- If it hasn't defaulted, government issues  $D_i$  and repays legacy debt  $(1+r)D_{i-1}$ , spending the remainder.
- Domestic holdings of legacy debt  $(1+r)s_i$
- Household endowment  $e_{i+1}$

- Newly incumbent government announces default decision, which is a function of  $D_{i-1}$ ,  $(1+r)s_{i-1}$ , and  $e_i$ .
- Government announces tax rate  $t_i$
- Household decides on savings  $s_i$  and investment  $k_i$

# Fiscal transfer: Formal set-up - I

- Note that the government  $i$  is transferring to  $e_{i+1}$ , instead of  $e_i$
- Leaving out all independent terms, the government's objective function is

$$\text{spending} = \frac{1}{1+r} S(e^{low} + \Delta e) - \Delta e, \quad \Delta e > 0$$

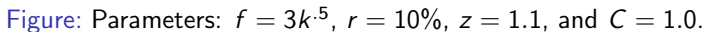
- This implies that in order for a positive transfer to be in government's incentive, the following must hold:

$$\frac{1}{1+r} \frac{dS}{de} \Big|_{e^{low}} - 1 > 0 \Rightarrow \frac{\rho z}{1+r} > 1 \Rightarrow \rho > \frac{1+r}{z} \quad (\because \frac{dS}{de} = \rho z)$$

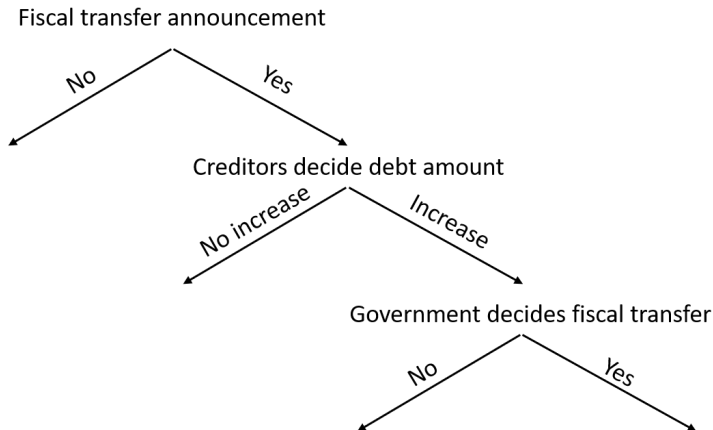
## Fiscal transfer: Formal set-up - II

### Proposition 5.7

*Suppose the model parameters admit a trap equilibrium. There is a non-zero fiscal transfer to the households that increases the government's spending if and only if  $\rho > \frac{1+r}{z}$ .*



# Fiscal transfer “game”

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# Developed economy debt - II

