Imperfect Financial Markets and the Cyclicality of Social Spending

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Overview

- Financial markets & fiscal policy over the business cycle
  - Government expenditure
  - Taxes
  - External debt with endogenous risk
  - Inequality
- Why is this interesting?
  - Countercyclical fiscal policies in advanced economies
  - Procyclical fiscal policies in emerging markets
  - Cross-country differences driven by *social transfers*

Research Question

Can sovereign risk explain the observed cross-country differences in cyclicality of fiscal policy (and its components)?

Contribution

Empirical:

- Cyclicality of fiscal expenditure depends on sovereign risk
- And is most pronounced for social transfers

Theoretical:

- Optimal fiscal policy in endogenous default model
- Framework with two types of expenditure: transfers and public good
- Trade off: taxes (distortionary) vs borrowing (risky)
  - Low risk: countercyclical spending
  - High risk: **optimally** procyclical fiscal spending
  - Cyclicality switch only for transfers
- Role of inequality and risk on optimal default, taxes and spending

Plan

- Literature
- Stylized facts
- Model
- Results from calibrated exercise

Literature

Empirical Literature: Fiscal Policy differences

Gavin & Perotti (1997), Kaminsky, Reinhart & Végh (2005), Végh & Vuletin (2012), **Michaud & Rothert (JIE 2018)**

Default Risk and Fiscal Policy

Eaton & Gersovitz (1981), **Cuadra, Sanchez & Sapriza (RED 2010)**

Political Economy and Fiscal Policy

Andreasen, Sandleris and van der Ghote (2019), Talvi & Végh (2005), Ilzetzki (2011)

Redistribution with Uniform Transfers

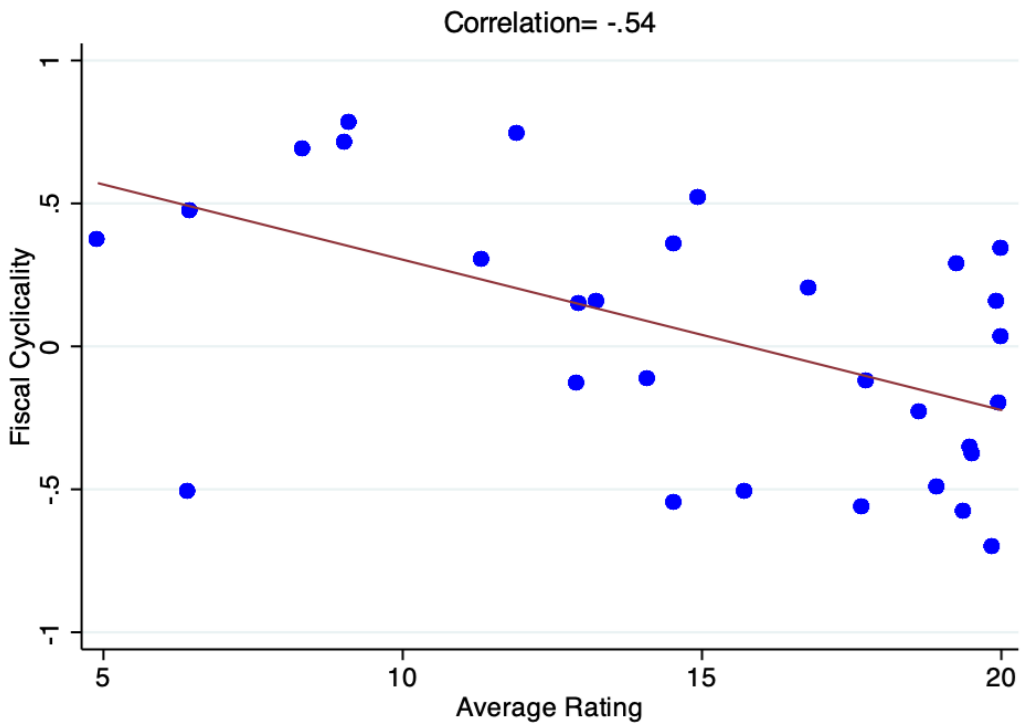
Alonso-Ortiz & Rogerson (2010), Bhandari, Evans, Golosov & Sargent (2013)

Stylized facts

Data

- Fiscal expenditure from Michaud & Rothert (2018)
  - Harmonized GFS (IMF)
  - 30 countries between 1990-2015
  - Total expenditure = transfers + goods & services + employment exp. + interest + other
  - Normalized GDP (2005 = 1)
  - Cyclicality: remove linear-quadratic trend and correlate with GDP
- Sovereign debt ratings from S&P, Fitch and Moody's
  - Encode on 0 to 20 scale
  - Time average (of yearly average) for each country
- Plot cyclicality against sovereign risk

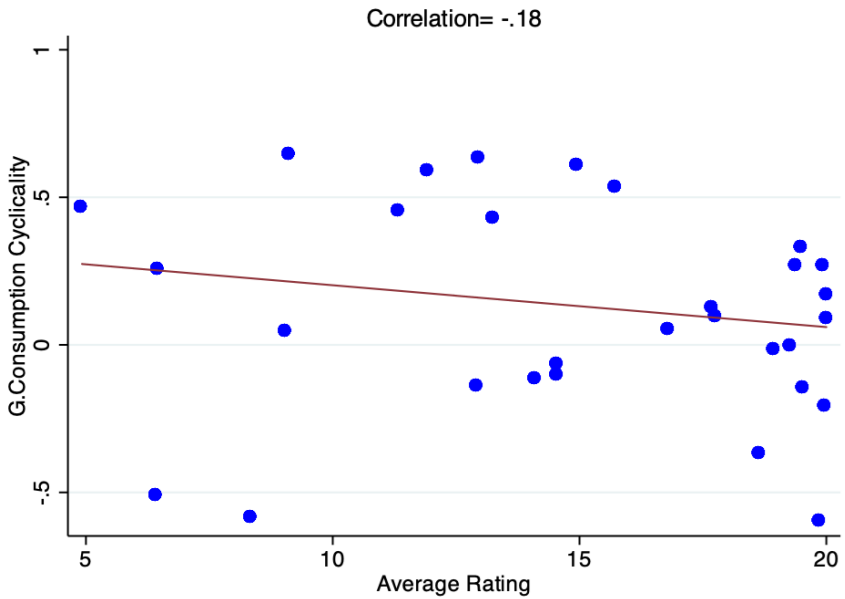
Fiscal Expenditure

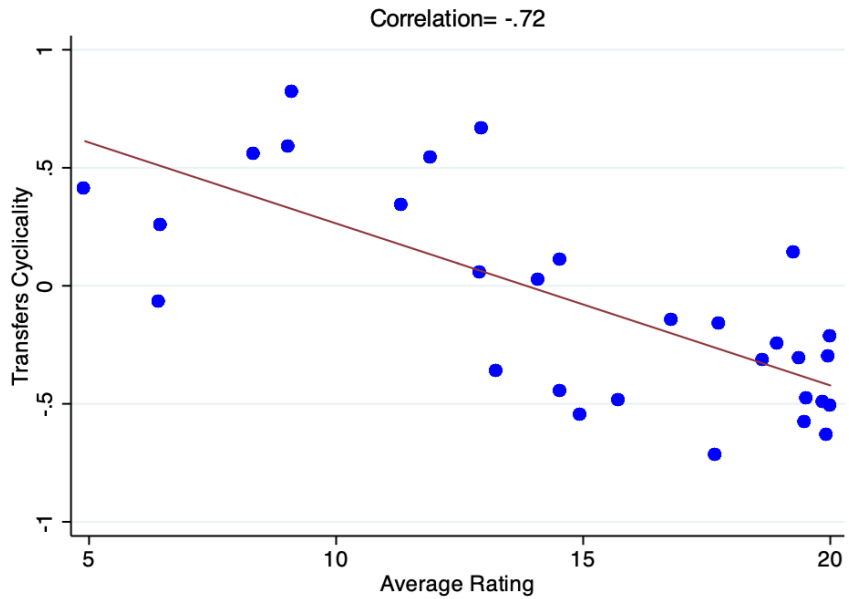


On average 40% of GDP, standard deviation 11p.p.

Expenditure Components

Government consumption (left) and transfers (right)





Jointly cover on average 50% of total fiscal expenditures

More Data

Debt and Interest Rates

- **External debt** in EM: on average more than 50% of total government is external (Paczos & Shakhnov, 2016)
- **Interest rates** are countercyclical, drive current account and excess volatility: Neumeyer & Perri (2005)

Model

Environment: Households

- Time is discrete, $t = 0, 1, 2, \ldots$
- Households differ in labor productivity: $e^i \in [0, 1]$
- Constant population of size 1, share σ^i have e^i.
- Aggregate, persistent TFP shock A_t

$$\max_{c_t^i, h_t^i} \mathbb{E} \sum_{t=0}^{\infty} \beta^t [\kappa u(c_t^i, h_t^i) + (1 - \kappa)\nu(g_t^P)],$$

$$\text{s.t.:} \quad (1 + \tau_t)c_t^i = A_t e^i h_t^i + g_t^T. \tag{1}$$

- Total output: $Y_t = A_t \sum_i \sigma^i e^i h_t^i$

Environment: Government (I)

State of economy is $S = (A, b)$. Every period government decides whether to default:

$$V^0(S) = \max_{d \in \{0,1\}} \left(dV^d(S) + (1-d)V^{nd}(S) \right), \tag{2}$$

where after repayment it solves:

$$V^{nd}(S) = \max_{\{\tau, g^T, g^P, b'\}} [\kappa \sum_i \sigma^i u(c^{*i}, h^{*i}) + (1-\kappa)\nu(g^P)] + \beta \mathbb{E}[V^0(S')|S] \tag{3}$$

where c^{*i}, h^{*i} solve HHs problem:

$$-\frac{u_n(c^{i*}, h^{i*})}{u_c(c^{i*}, h^{i*})} = \frac{Ae^i}{(1+\tau)}, \qquad \forall\, i. \tag{4}$$

$$(1+\tau)c^i = Ae^i h^i + g^T, \qquad \forall i. \tag{5}$$

subject to gov't budget constraint:

$$g^P + g^T + qb' = \tau C^* + b, \quad \text{where } C^* = \sum^i \sigma^i c^{*i}. \tag{6}$$

and risk-neutral pricing of debt by foreign investors:

$$q(b', A) = \frac{\mathbb{E}(1 - d(b', A))}{1+r}. \tag{7}$$

Environment: Government (II)

After default gov't solves:

$$V^d(S) = \max_{\{\tau_d, g_d^T g_d^G\}} [\kappa \sum_i \sigma^i u(c^{*i}, h^{*i}) + (1-\kappa)\nu(g_d^P)] + \beta \mathbb{E}[\mu V^0(S') + (1-\mu)V^d(S')|S], \tag{8}$$

where μ is probability of returning to markets, subject to HHs constrains (4)-(5) and gov't budget constraint:

$$g_d^P + g_d^T = \tau_d C^*. \tag{9}$$

After default economy incurs asymmetric proportional productivity loss:

$$A^d = g(A) = \begin{cases} A & \text{if } A < \theta \mathbb{E}[A] \\ \theta \mathbb{E}[A] & A \geq \theta \mathbb{E}[A]. \end{cases} \tag{10}$$

Optimality Conditions

- Risk sharing condition:

$$\kappa \sum_i \sigma^i u_c^i(c_t^i, h_t^i) = (1-\kappa) v'(G_t^P) = \text{MU of resources} \tag{11}$$

- Distribution of tax distortion:

$$\underbrace{\sum_i \left[\kappa u_c^i(c_t^i, h_t^i) - (1-\kappa) v'(G_t^P)\right] \sigma^i c_t^i}_{\text{weighted sum of rs wedges}} = \underbrace{(1-\kappa) v'(G_t^P) w_t \sum_i \sigma^i \epsilon^i h_t^i \xi_{h,\tau}}_{\text{weighted sum of output wedges}} \tag{12}$$

$$\xi_{h,\tau} = \frac{\partial h}{\partial \tau} \frac{\tau}{h} = -\frac{1}{\phi} \frac{\tau}{1-\tau} \tag{13}$$

Equilibrium

A stochastic dynamic recursive equilibrium in this economy is a set of households decisions $\{c^i(S), h^i(S), c^i_d(S), h^i_d(S)\}$ government default policy $d(S)$, government policies $\{g^T(S), g^P(S), b'(S), \tau(S), g^T_d(S), g^P_d(S), \tau_d(S)\}$, and a bond price policy function $q(S)$ such that:

(a) Given bond prices and government policies, the household decisions solve the households' maximization problem.

(b) Given bond prices and household decisions, the government policies solve the government's maximization problem.

(c) Lenders' beliefs are consistent with default probabilities and the resulting bond prices satisfy the zero profit condition.

Calibration

Calibration to Mexican economy

Parameter	Value	Target/Source
	Set Parameters	
r	1 %	3 month T-Bill
γ	2	Arellano (2008), CSS (2010)
ψ	0.5	CSS (2010), GHH (1988)
μ	0.16	Literature
β	0.94	Literature
	Calibration	
χ	0.80	Average Hours worked
κ	0.80	Share of social spending
ρ_A	0.8355	Persistence GDP Mexico
σ_ϵ	0.0062	Std GDP Mexico
θ	0.9907	Debt service/GDP ratio
e^i	[0.393,1]	Gini / Earnings Quintiles

TFP follows AR(1) process:

$$\log(A_t) = \rho \log(A_{t-1}) + \epsilon_t, \quad \epsilon_t \sim N(0, \sigma_\epsilon) \tag{14}$$

Preferences are as in GHH (1988)

$$u(c, h) = \frac{\left[c - \chi \frac{h^{1+\psi}}{1+\psi}\right]^{1-\gamma}}{1-\gamma} \tag{15}$$

Results

Results

Results in 3 steps:

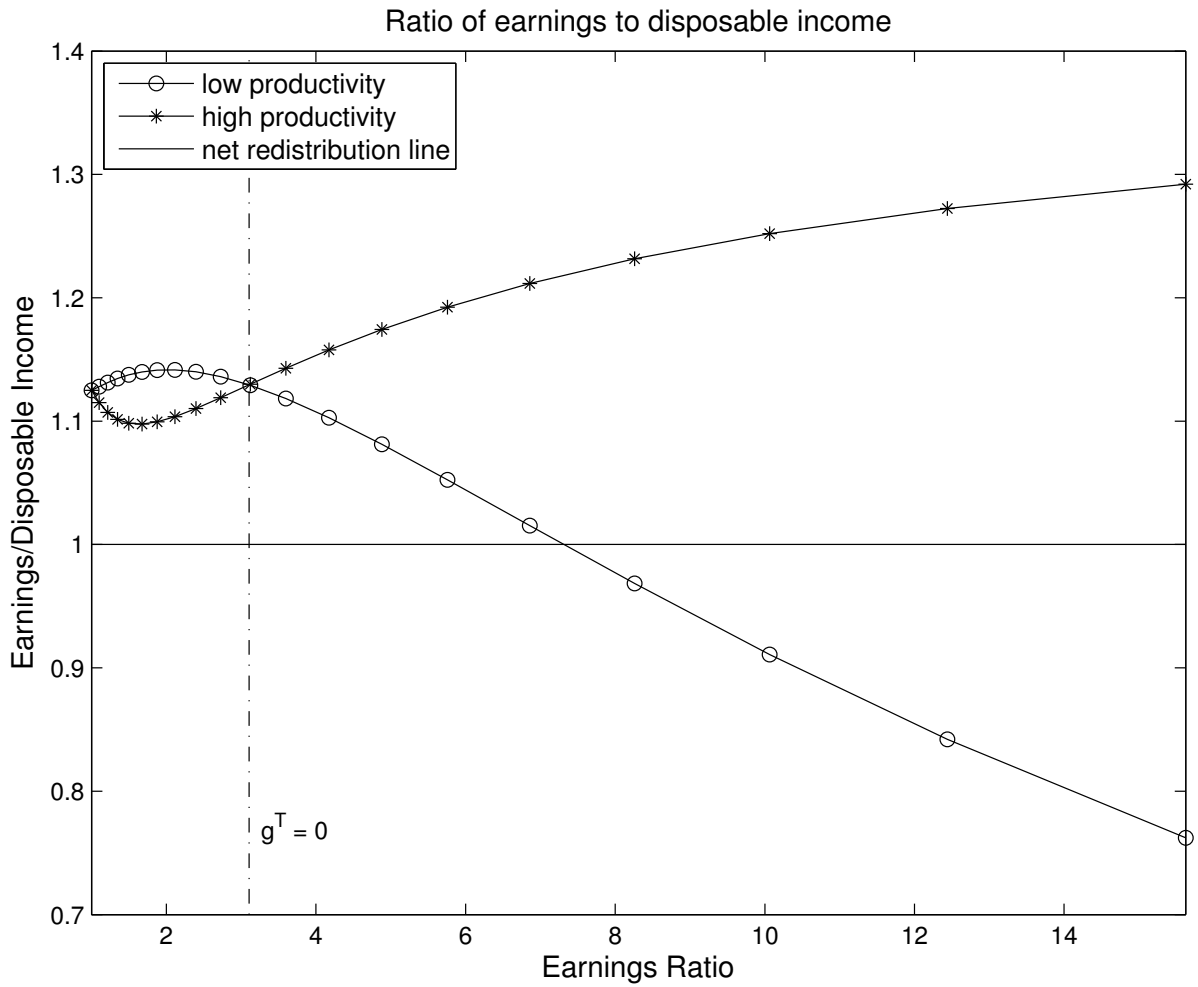
1. Static redistribution

2. Two dynamic polar cases: complete markets and autarky

3. Incomplete markets
   - Policy functions
   - Simulations with two counterfactuals:
     - Lower inequality (distribution features from Canada)
     - No default in equilibrium (no differences in discount factor)

Static Redistribution

Figure: Redistribution with constant marginal tax rates and uniform transfers: Ratio of disposable income and earnings.



Two Polar Cases

Regime 1: Autarky

- No access to external credit markets
- Closed economy, cannot smooth income

Regime 2: Complete Markets

- Access to full set of (country-specific) state-contingent assets
- Rest of the world is neutral
- Full insurance against idiosyncratic productivity shocks. (λ constant)

Complete Markets vs Autarky

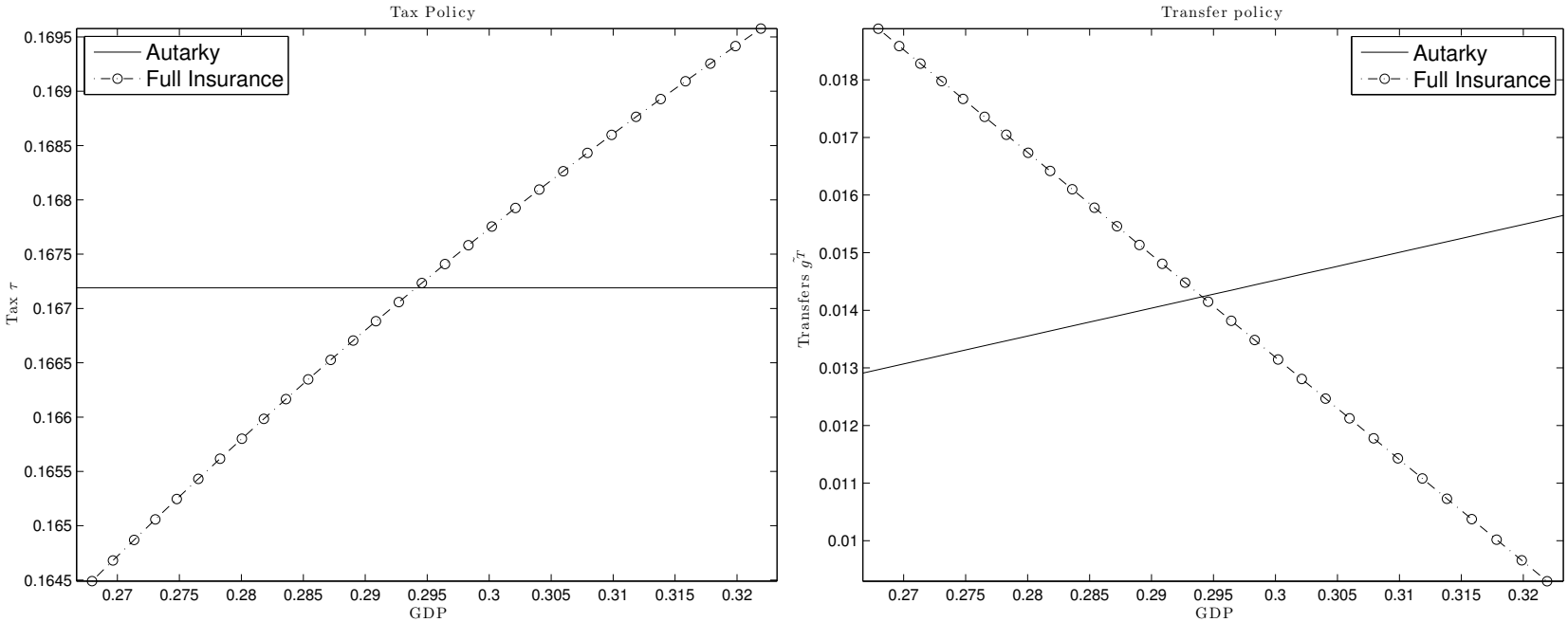


Figure: Optimal taxes (left) and transfers (right) as a function of GDP in complete markets and autarky

Incomplete Markets

Results: Policy Functions (I)

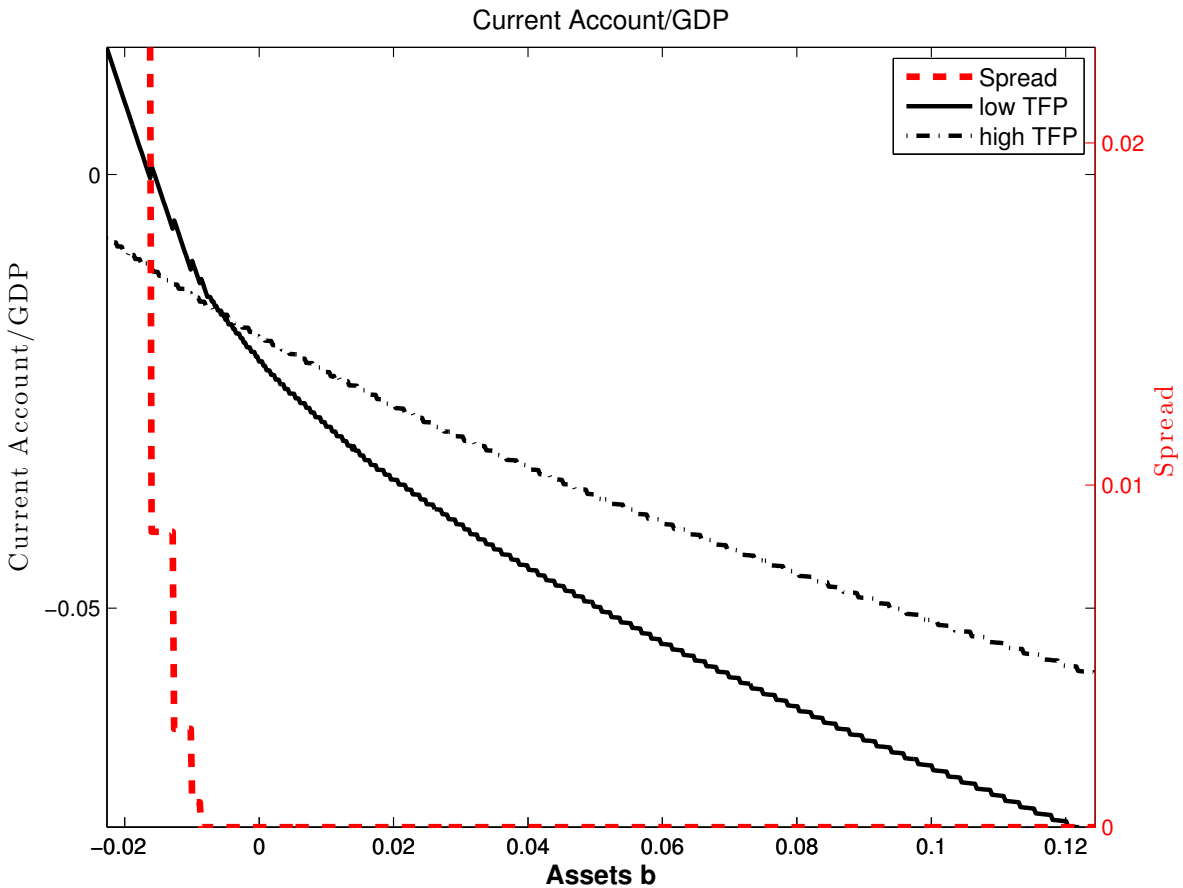


Figure: Bond policy function (high and low productivity) and spread

Results: Policy Functions (II)

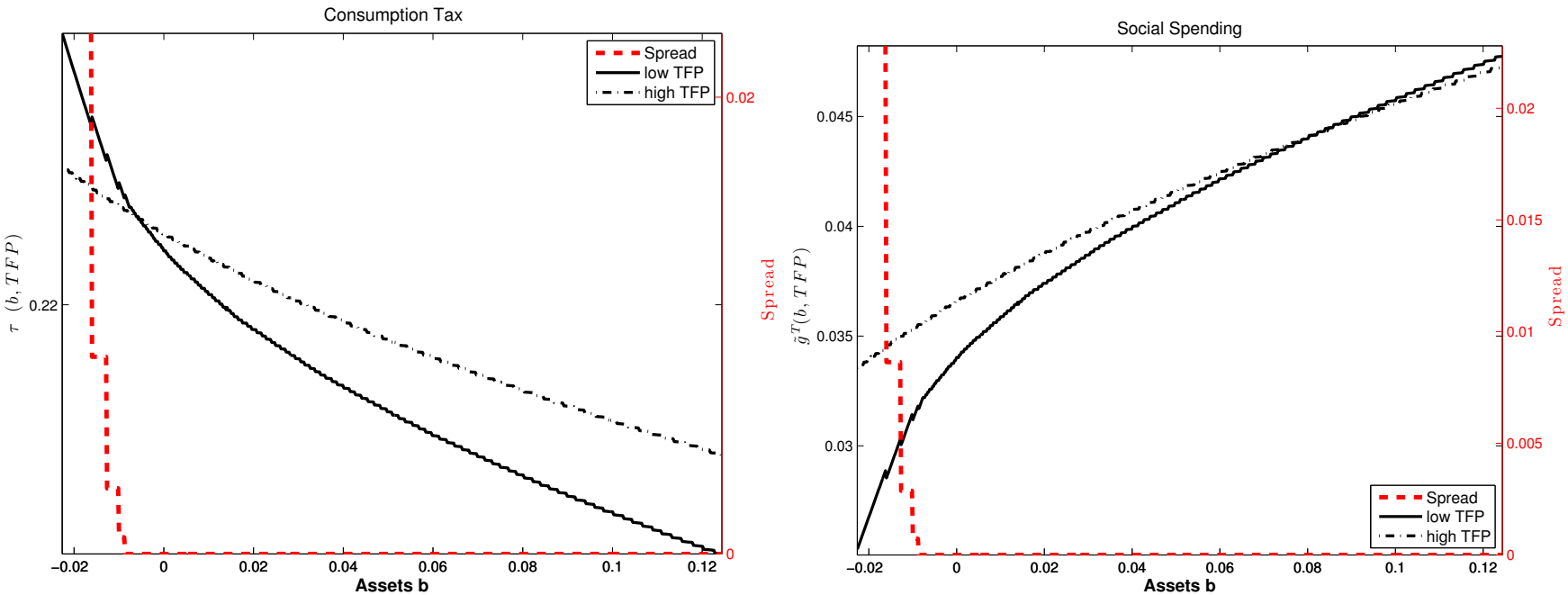


Figure: Tax policy (left) and transfer policy (right) functions, high and low productivity

$\rightarrow$ tax becomes procyclical when spread is positive, transfers way before.

Results: Spending Composition

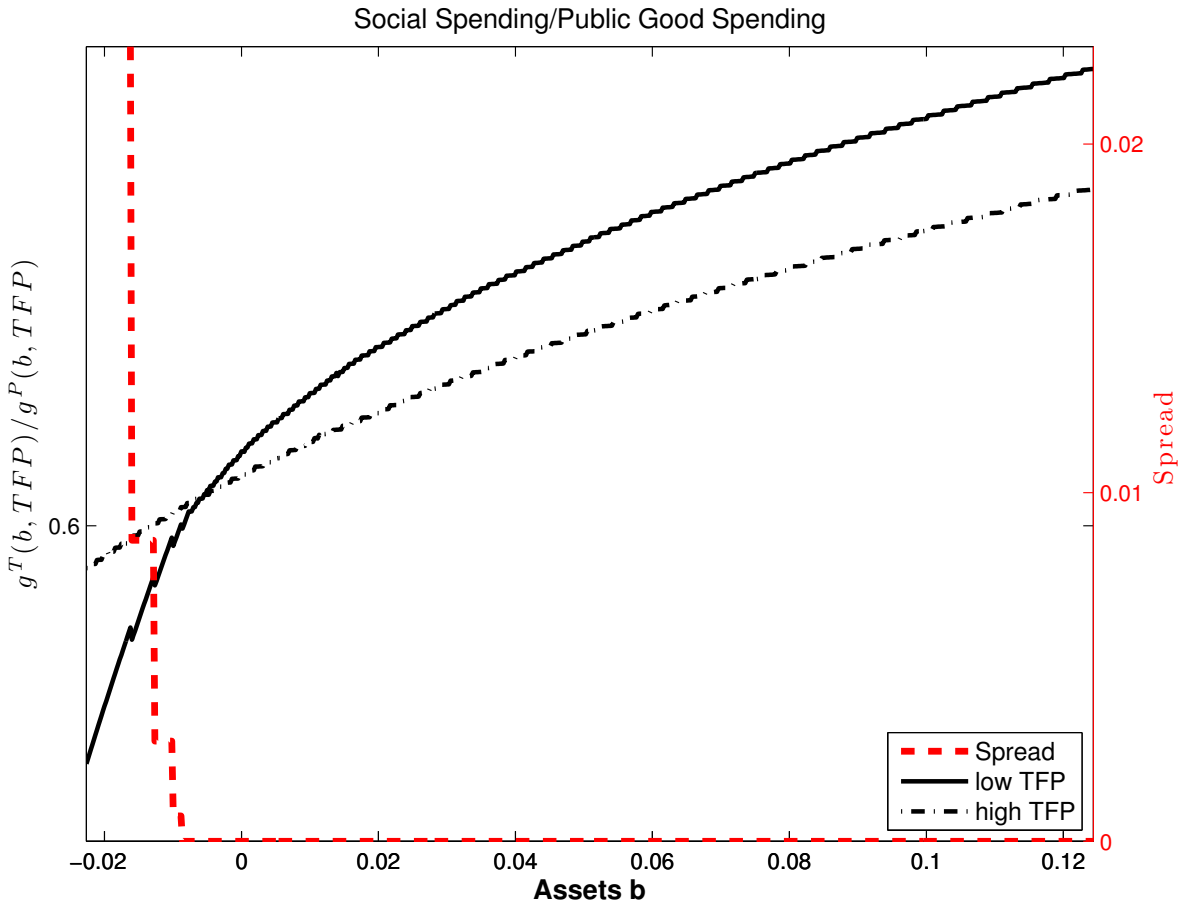


Figure: The ratio of transfer spending to public good

Reality Check

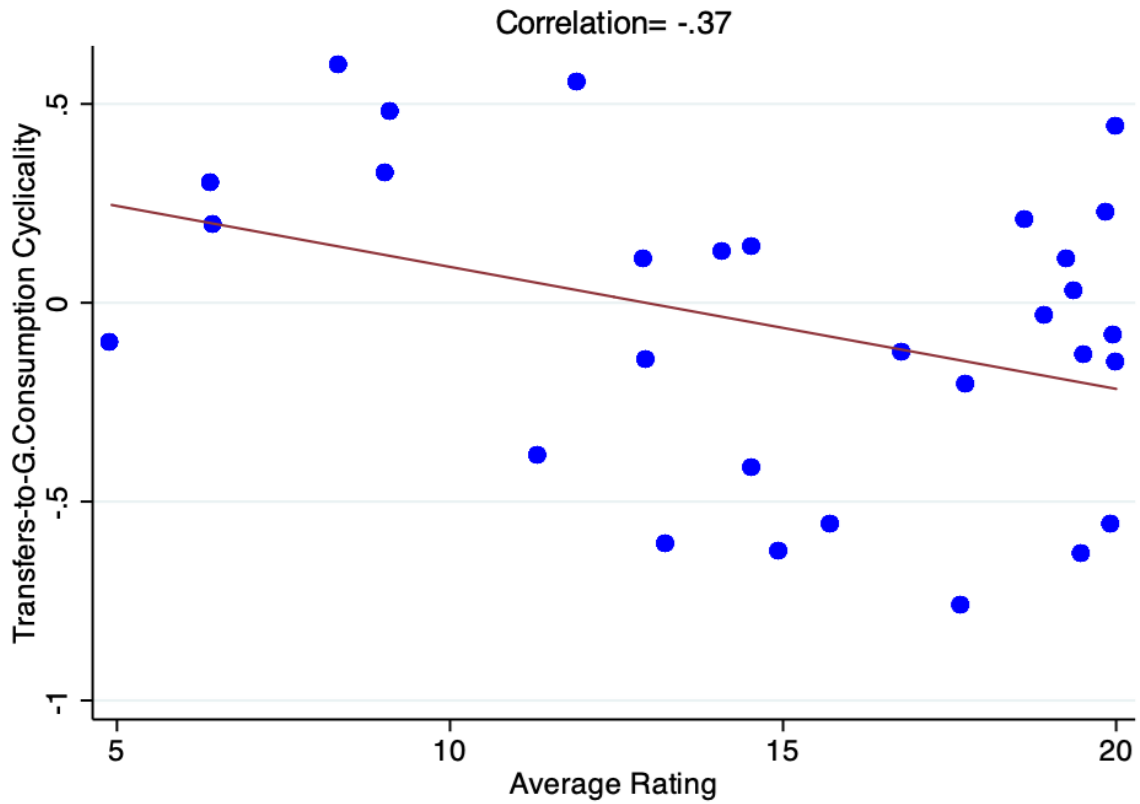


Figure: Cyclicality of the ratio of transfers to government consumption vs average rating

Summary

- Procyclical transfer policy can be rationalized by countercyclical borrowing constraints.
- While redistribution still possible, policy achieves opposite of consumption smoothing during periods of distress.
- "Procyclical bias":
  - Share of low-productivity types increases in a bust
- Role of IMF: Can IFI alleviate procyclicality?

The End

Thank you

Simulation

Statistic	Data	Benchmark Model	Lower Inequality	No Spreads/Low Debt
$GINI$	0.49	0.49	0.38	0.49
$std(Y)$	2.37	2.37	2.36	2.08
$std(C)/std(Y)$	1.22	1.10	1.10	0.78
$std(g^T)/std(Y)$	2.6	1.97	2.87	0.44
$std(g^{EXP})/std(Y)$	5.9	1.76	2.04	0.26
$corr(g^T, Y)$	0.41	0.78	0.67	-0.74
$corr(g^{EXP}, Y)$	0.35	0.82	0.77	-0.39
$corr(\tau, Y)$	-0.3	-0.41	-0.40	0.98
$std(TB/Y)/std(Y)$	0.85	0.28	0.28	0.30

Table: Results from Calibrated Model and Counterfactuals

Averages

	GDP	Fiscal Expenditure	Transfers	G.Consumption	Rating
Argentina	2.30	21.17	6.13	1.68	4.92
Austria	1.44	50.72	22.19	5.87	18.94
Belgium	1.25	51.67	22.39	3.98	18.65
Bolivia	2.23	21.27	3.74	4.26	6.42
Brazil	1.65	26.23	8.33	2.44	8.33
Canada	1.32	42.46	9.56	8.35	19.47
Chile	3.77	21.11	4.81	2.66	14.53
Czech Republic	2.40	36.72	16.32	3.59	14.53
Denmark	1.20	54.60	18.40	8.31	19.52
Dominican Republ	3.65	12.24	0.74	2.00	6.45
Finland	1.25	50.51	19.36	8.95	19.38
France	1.00	51.83	23.32	5.10	19.85
Germany	1.38	46.81	24.53	3.87	20.00
Greece	0.63	46.85	17.01	5.64	11.32
Hungary	2.44	50.80	16.73	7.69	11.91
Iceland	1.47	40.56	6.25	10.46	14.94
Ireland	3.47	36.69	12.42	5.07	17.68
Israel	1.81	43.58	12.26	9.39	14.09
Italy	0.36	48.72	19.64	4.88	16.79
Luxembourg	2.02	37.48	19.44	3.38	20.00
Netherlands	1.47	44.81	19.59	6.18	19.97
Poland	4.15	43.44	17.30	6.48	13.25
Portugal	1.06	43.93	15.75	4.74	15.73
Romania	3.45	33.85	10.83	6.62	9.02
Slovak Republic	3.90	43.20	17.05	6.02	12.96
Spain	1.13	39.61	15.57	4.57	17.76
Sweden	1.48	52.08	17.55	7.42	19.27
Thailand	3.35	17.09	1.74	5.33	12.91
United Kingdom	1.48	41.09	13.31	9.77	19.92
Uruguay	2.92	26.82	12.82	3.72	9.11
Total	1.95	40.17	14.44	5.84	15.45

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