Growth, Public Investment and Corruption with Failing Institutions

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Channels through which corruption hampers growth

Corruption...

1. acts as a tax on entrepreneurship and productive activity, discouraging investment;
2. pushes firms and activities into the informal sector;
3. diverts talent into rent-seeking;
4. decreases tax revenue and affects state budget equilibrium;
5. lowers the quality of public infrastructure and reduces public spending efficiency;
6. distorts the public spending structure.

Research question

- **Key question**: How does corruption distort the structure of public spending, therefore growth?

- **Antecedents**:
  - Mauro (1997)
    - Empirical results: Education expenditure are scaled down in countries with widespread corruption.
    - Model: Corruption acts as an additional tax on budget surplus and does not distort the composition of public spending.
  - Gupta et al. (2000)
    - Empirical results: Corruption increases military spending
  - Delavallade (2006)
    - Empirical results: Corruption modifies the composition of public spending
    - ... reduces the share of education and health spending

Our set-up

A model with endogenous corruption

- Two types of public investment with different exposition to rent-seeking.
- Households choose between productive activity and rent-seeking: the incentive constraint.
- Voters choose the allocation and level of public investment subject to the incentive constraint.
- Rent-seekers may have more political influence than others in the voting process.

Methodology

1. The dynamic growth model
   - How is standard growth theory modified by rent-seeking.
   - What are the key parameters.
2. A joint empirical estimation of a system of simultaneous equations with original instruments.
   - How are the intensity of corruption, the structure of public investment and GDP growth affected by the predatory technology and the distribution of political power?

Our contribution

- Bridge the gap between the static theory of corruption and growth.
- The object of corruption is explicit: Corruption technology allows rent-seekers to capture part of public spending.
- Estimation of the effect of failing institutions on the allocation of spending.

Technology

Two types of productive public capital: h_t and k_t.

$$(1+n)h_{t+1} = (1-\delta_H)h_t + g_t \quad (1)$$
$$(1+n)k_{t+1} = (1-\delta_K)k_t + (1-\nu x_t)i_t \quad (2)$$

ν: corruption technology

Production function:

$$q_t = b[1-x_t]f[h_t, k_t].$$

$1-x_t$: share of the population in the production sector

Technology

Budget of the government:

$$T_t = g_t + i_t$$

Firms are owned by the workers:

$$y_t = \frac{b[1 - x_t]}{1 - x_t} f[h_t, k_t] - T_t$$

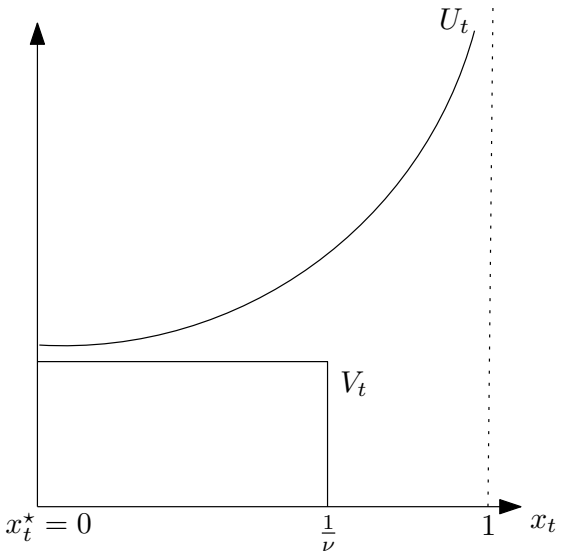
Utility in the production sector:

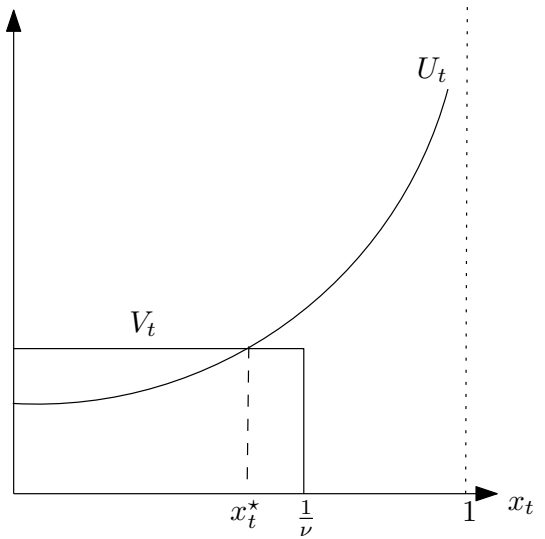
$$U_t = u[y_t]$$

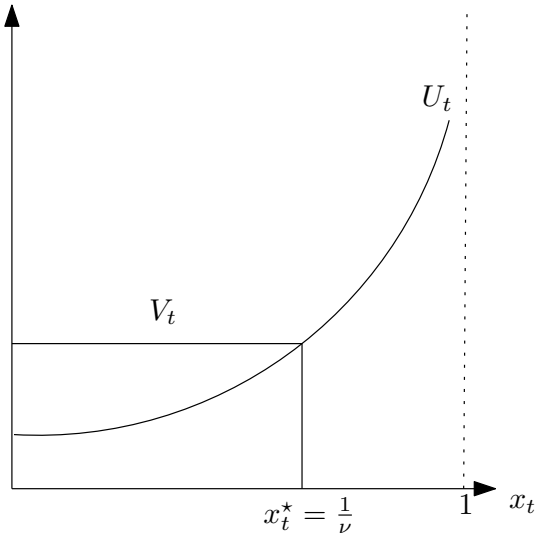
Utility in the rent-seeking sector:

$$V_t = u[\nu i_t - g_t - i_t]$$

Possible Regimes







Incentive Constraint

Proposition

If corruption at equilibrium satisfies $x_t \in (0, 1/\nu)$*, then the following constraint holds:*

$$U_t = V_t \quad \Rightarrow \quad \Gamma[1 - x_t] f[h_t, k_t] = \nu i_t. \tag{3}$$

Probabilistic Voting

Political parties maximize their vote share.
Equivalent to maximize a social welfare function:

$$\max \sum_{t=0}^{\infty} \rho^t W_t \text{ subject to } (1), (2), (3), \text{ and } h_0, k_0 \text{ given.}$$

with

$$W_t = (1 - x_t)U_t + (1 + \theta)x_t V_t \tag{4}$$

θ: political power of the rent-seekers.

Resolution: Kuhn-Tucker

Four possible regimes

- Regime with no corruption, no distortion (benchmark).
  - $x_t = 0$,
  - $\lambda_t = \mu_t$,
  - needs ν and θ low enough.
- Regime with no corruption, but with distortion
  - $x_t = 0$,
  - $\lambda_t < \mu_t$
- Interior regime with some corruption.
  - $x_t \in (0, 1/\nu)$,
  - Incentive constraint holds,
  - Public spending are distorted.
- Regime with maximum corruption. Only temporary.

A glimpse of the results

Proposition

Along a balanced growth path with h and k given by (5) and (6), if

$$\begin{aligned} \nu &< \frac{\Gamma[1] f'_H[h,k]}{(n+\delta_K)k} \\ 1+\theta &< \frac{u[y] + u'[y]\left(\nu(n+\delta_K)k + \Gamma'[1] f[h,k]\right)}{u[(\nu-1)(n+\delta_K)k - (n+\delta_H)h]}. \end{aligned}$$

1. *There is no corruption:* $x = 0$.
2. *The marginal productivity of both types of capital is equalized:*

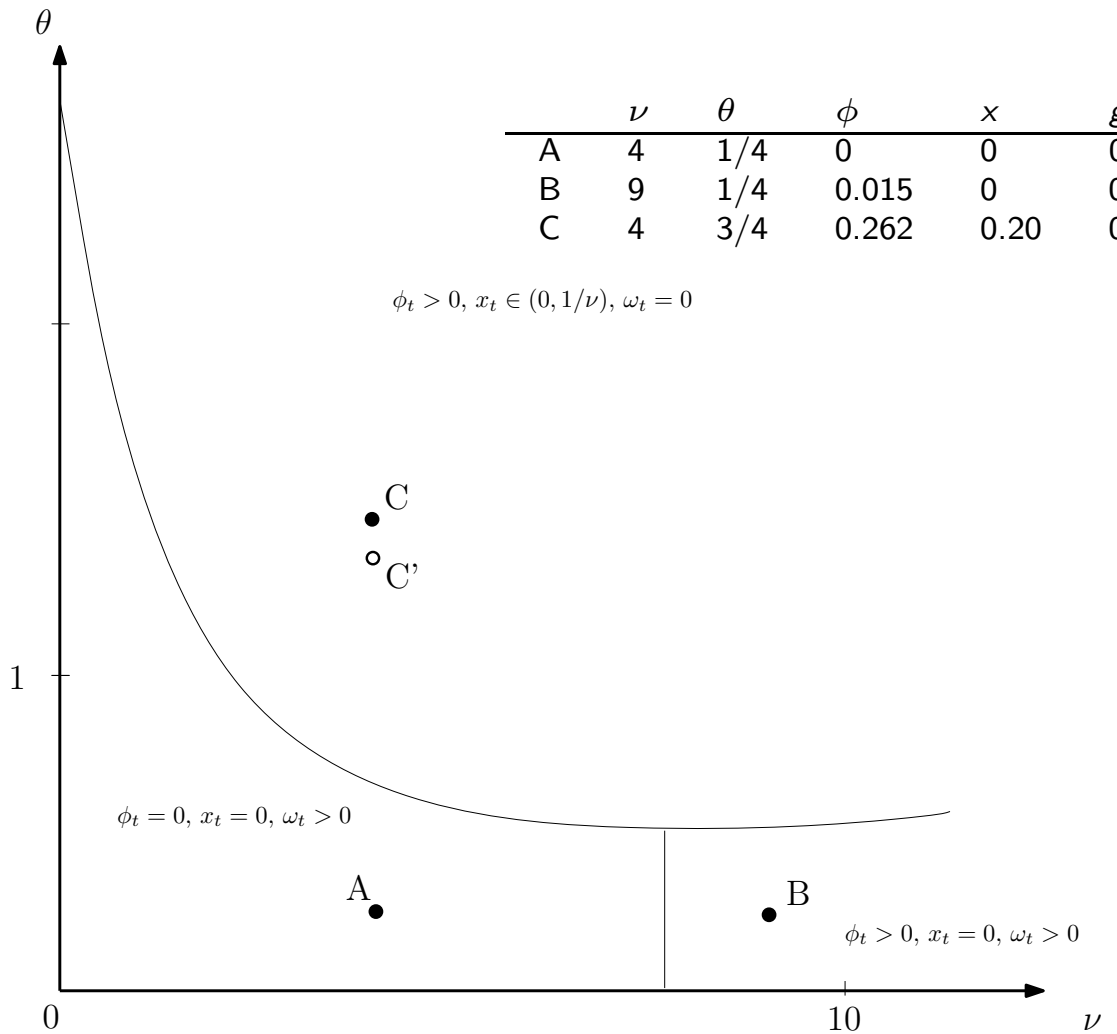
$$1 - \delta_H + \Gamma[1] f'_H[h,k] = 1 - \delta_K + \Gamma[1] f'_K[h,k]. \qquad (5)$$

3. *The Modified Golden Rule holds:*

$$1 - \delta_H + \Gamma[1] f'_H[h,k] = \frac{1+n}{\rho}. \qquad (6)$$

Possible regimes

	ν	θ	ϕ	x	g	i	g/i	h/k	y
A	4	1/4	0	0	0.37	0.37	1	1	2.13
B	9	1/4	0.015	0	0.36	0.30	1.19	1.19	2.04
C	4	3/4	0.262	0.20	0.24	0.54	0.45	2.02	1.38



System of simultaneous equations

three equations where each endogenous variable is a function of the measured parameters and initial conditions

$$
\begin{cases}
Ratio_{it} = \alpha_1 + \alpha_2 Techcor_{it} + \alpha_3 \left(\frac{Techcor}{\ln Y_0}\right)_{it} + \alpha_4 Polbias_{it} + \alpha_5 \left(\frac{Polbias}{\ln Y_0}\right)_{it} \\
\qquad + \alpha_6 Patience_{it} + \alpha_7 Pop_{it} + \alpha_8 Tropic_{it} + \alpha_9 Ldlock_{it} + \alpha_{10} \ln Y_{0it} + \varepsilon_{it} \\
Corrup_{it} = \beta_1 + \beta_2 Techcor_{it} + \beta_3 \left(\frac{Techcor}{\ln Y_0}\right)_{it} + \beta_4 Polbias_{it} + \beta_5 \left(\frac{Polbias}{\ln Y_0}\right)_{it} \\
\qquad + \beta_6 Patience_{it} + \beta_7 Pop_{it} + \beta_8 Tropic_{it} + \beta_9 Ldlock_{it} + \beta_{10} \ln Y_{0it} + \rho_{it} \\
Growth_{it} = \gamma_1 + \gamma_2 Techcor_{it} + \gamma_3 \left(\frac{Techcor}{\ln Y_0}\right)_{it} + \gamma_4 Polbias_{it} + \gamma_5 \left(\frac{Polbias}{\ln Y_0}\right)_{it} \\
\qquad + \gamma_6 Patience_{it} + \gamma_7 Pop_{it} + \gamma_8 Tropic_{it} + \gamma_9 Ldlock_{it} + \gamma_{10} \ln Y_{0it} + \varsigma_{it}
\end{cases}
$$

Endogenous variables

- Ratio g/i: Government Finance Statistics Yearbook
  - Share of spending for each sector in total spending
  - g = education, health
    i = housing, fuel and energy, agriculture, mining and manufacture, transport (and other economic activities)

- Level of corruption: 1 of the 6 World Bank governance indicators (Kaufmann, Kraay, Mastruzzi, 2003), transformed into a 0 to 5 index
  - Aggregated perceptions indicator of grand and petty corruption

- Growth rate: World Development Indicators (World Bank)

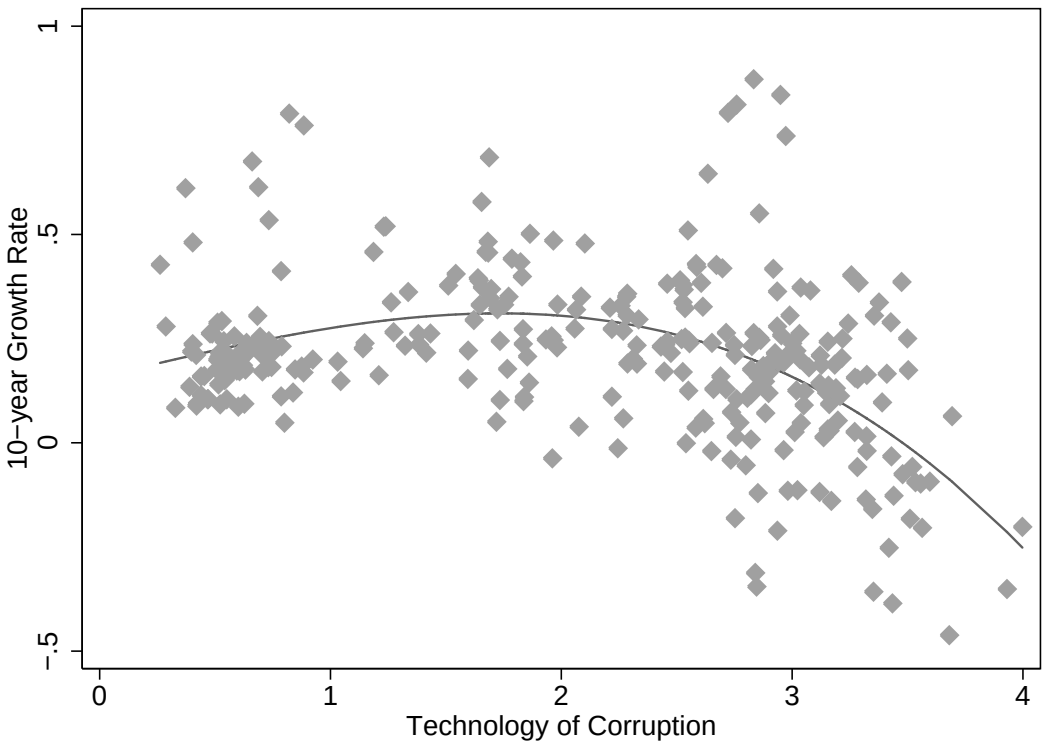
ν and θ

- **Techcor**: *Rule of Law* index
  - aggregate of perceptions of the incidence of crime,
  - of the effectiveness and predictability of the judiciary,
  - and of the enforceability of contracts.
- **Polbias**: indicator of the lack of political rights taken from *Freedom House*.
  Few political rights for the population indicate a strong concentration of power in the hands of a very few.

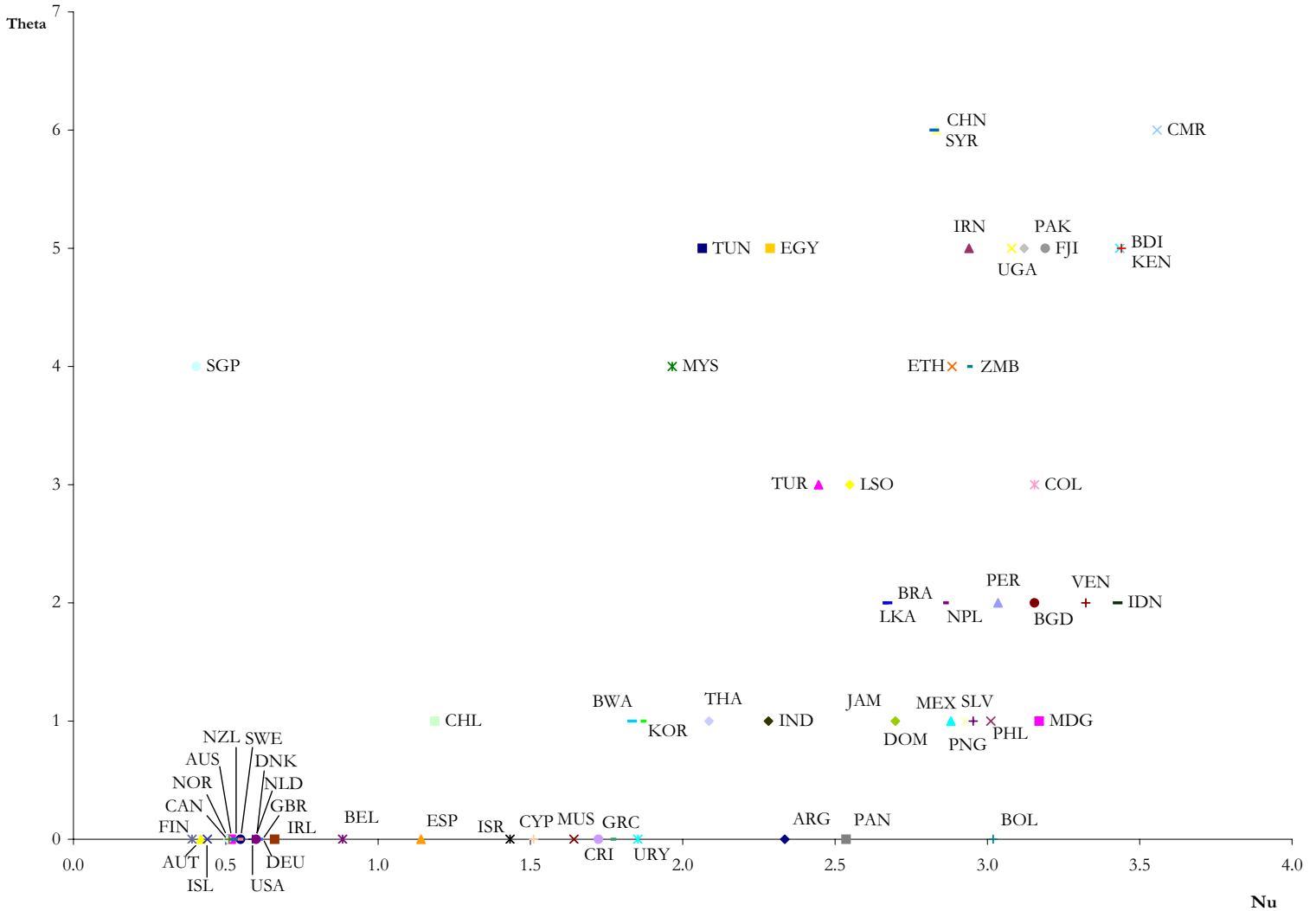
Non linear terms

We have included non-linear terms: $\alpha_2 Techcor_{it} + \alpha_3 \frac{Techcor}{\ln Y_0}_{it}$

In the benchmark regime, the endogenous variables are not affected by small variations in ν and θ.



63 Countries' Legal and Political Institutions



Estimation method

- Three-stage least squares:
  - Enables to take into account the correlation between residuals. Budgetary choices, corruption level and growth rate are interdependent: some of their omitted factors are common (institutional and political context).
  - Reduces endogeneity
- Instruments:
  - state antiquity
  - number of years of independence of the state
  - latitude of the country
  - origin of the legal system (french, british, socialist)
  - ten-year lagged index of political rights
  - ten-year lagged growth rate of the population
  - percentage of natural resources exports in GDP

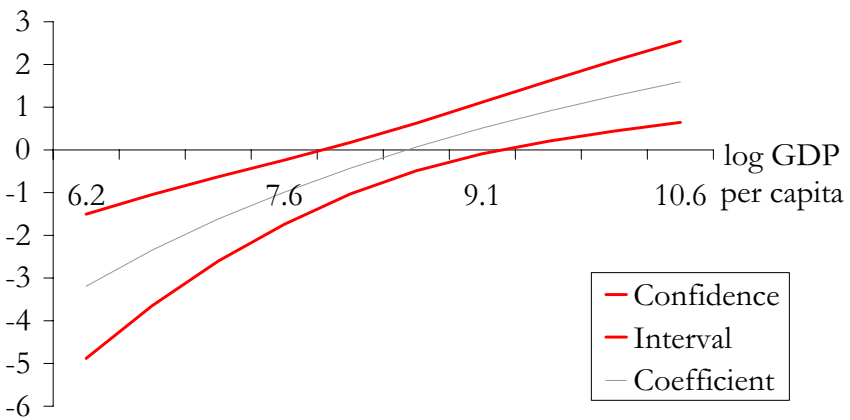
Do Instruments Predict the Endogenous Regressors?

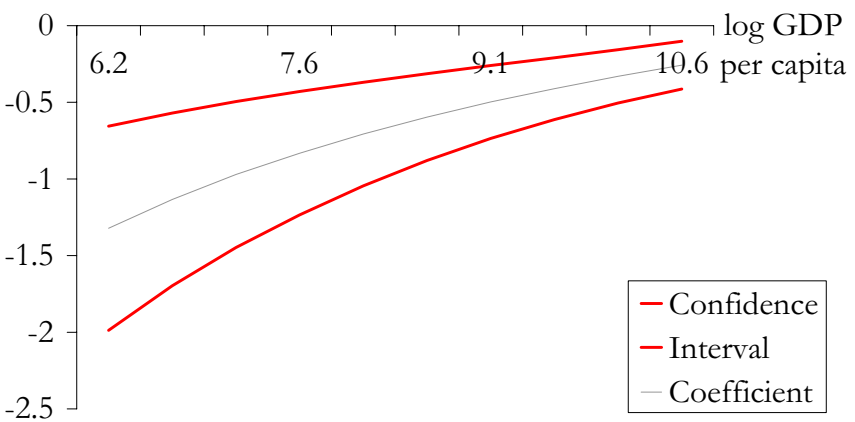
	Techcor	*Polbias*
antiq	0.32^b	1.30^a
	(2.44)	(3.95)
yrind	-0.16^a	-0.36^a
	(-4.14)	(-3.67)
$latit.10^{-1}$	-0.23^a	-0.01
	(-5.22)	(-0.12)
legfr	0.39^a	0.56^b
	(3.76)	(2.16)
legbr	-0.13	0.28
	(-1.18)	(1.02)
legsoc.10	0.07^b	0.34^a
	(2.56)	(5.09)
poplag	0.04	0.67^a
	(0.90)	(5.92)
polbiaslag	-0.03	0.41^a
	(-1.50)	(7.42)
$natres.10^{-3}$	-0.05^b	-0.08
	(-2.02)	(-1.36)
Ldlock	-0.20^b	-0.05
	(-2.09)	(-0.22)
Tropic	0.01	-0.36
	(0.09)	(-1.18)
ln Y_0	-0.55^a	-0.25^b
	(-11.22)	(-2.00)

Estimation results

	$Ratio.10^{-1}$	*Corrup*	*Growth*
Techcor	0.83^a	1.10^a	1.24^a
	(0.21)	(0.04)	(0.41)
$\frac{Techcor}{\ln Y_0}.10$	-0.71^a		-1.58^a
	(0.18)		(0.45)
Polbias	-0.50^a	0.29^c	
	(0.16)	(0.17)	
$\frac{Polbias}{\ln Y_0}.10$	0.45^a	-0.18	-0.08^b
	(0.14)	(0.12)	(0.03)
$Patience.10^{-1}$	-0.09^b	-0.10^b	0.19^a
	(0.03)	(0.04)	(0.05)
$Pop.10^{-1}$		-0.92^c	
		(0.55)	
Tropic	0.12^a		-0.14^b
	(0.04)		(0.06)
Ldlock	0.08^b	0.12^c	-0.13^b
	(0.03)	(0.07)	(0.06)
$\ln Y_0$			-1.11^a
			(0.22)
Observations		304	

Effect of "Rule of Law" on the ratio of spending and GDP growth





Counterfactual analysis

If Brazil had Chile's rule of law and democracy levels...

annual income growth would more than double (going from 1.1% to 2.8%),

its level of corruption would reach the Spanish one (going from 2.7 to 1),

its ratio of investment in education and health relative to investment in physical capital would decrease from 2 to 1.6.

Indeed, in Brazil where political power is not much concentrated, public investment is distorted in favor of expense in capital free(er) from corruption.

Robustness

Composition of g/i

Two alternative formulations:
– i includes expense on defense first (equation 4.2),
then expense on defense and culture, recreation (equation 4.3)
in addition to housing and economic activities

conclusion:
the lack of freedom, rather than the extent of corruption,
strengthens the portion of defense in the budget.

Defense and culture are also sectors subject to corruption, hence favored by a weak legal system and a strong concentration of power within rent-seekers, although a little less than economic activities and housing.

Conclusion

- Evidence that the limitations of the legal system and the concentration of political power may explain why poor countries have higher corruption than developed ones and why they have difficulties catching them up.
- A model of the distortion of public spending implied by corruption with multiple regimes: planning under an incentive constraint
- Empirical results in line with the main implications of the model:
  - Failing institutions enhance corruption and distort public spending in favor of spending in economic activities and housing and at the expense of education and health expenditure. Both also lower growth.
  - The marginal effects of technology of corruption and political power depend on the level of development.