

Economics 270B

Graduate Development Economics

Professor Fred Finan

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Today's Outline

- ▶ Overview of the corruption literature
- ▶ How do we measure corruption?
Fisman (2001) and Khwaja and Mian (2004)
- ▶ What determines corruption? Theory
Banerjee (1993) and Shliefer and Vishny (1993)
- ▶ What determines corruption? Evidence
Olken and Barron (2009)

Corruption

Research on corruption can be divided into three main questions:

1. What is corruption? or How do we measure corruption?
2. Does corruption matter for development?
3. What determines corruption? or How can we reduce or prevent corruption?

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 - ▶ \$1 billion of oil revenues, or \$77 per capita, vanished from Angolan state coffers in 2001 → 3× humanitarian aid received by Angola in 2001

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- ▶ Acquiring data is a key constraint → illicit nature makes it hard to measure
- ▶ Finding creative ways to measure corruption is still an active area of research

Measuring corruption

- ▶ Most common measures of corruption are the cross-country indices
 - ▶ **International Country Risk Guide (ICRG)** - likelihood that high government officials will demand special payments
 - ▶ **Corruption Perception Index (Transparency International)** - averages ratings reported by a number of perception-based sources
 - ▶ **Control of Corruption (World Bank)** - similar to TI but with a different aggregation technique
- ▶ Correlation between TI and World Bank is 0.97; TI and ICRG is 0.75 → Main difference is in coverage both in terms of countries and years

Cross-country measures of corruption

The Most Corrupt Countries

(the bottom 10 percent most corrupt countries from each data set)

Country	CC	Country	CPI	Country	ICRG	Country	ICVS
Equatorial Guinea	1.9 ^{c,i,v}	Bangladesh	8.7 ^v	Zimbabwe	5.8 ^v	Albania	0.75
Haiti	1.7 ^v	Nigeria	8.6	China	5 ^v	Uganda	0.36
Iraq	1.4 ^v	Haiti	8.5 ^v	Gabon	5 ^{c,v}	Mozambique	0.31
Congo, Dem. Rep.	1.4 ^{c,v}	Myanmar	8.4 ^v	Indonesia	5 ^v	Nigeria	0.30
Myanmar	1.4 ^v	Paraguay	8.4 ^v	Iraq	5 ^v	Lithuania	0.24
Afghanistan	1.4 ^{c,i,v}	Angola	8.2 ^v	Lebanon	5 ^v		
Nigeria	1.4	Azerbaijan	8.2	Myanmar	5 ^v		
Laos	1.3 ^{c,i,v}	Cameroon	8.2 ^v	Niger	5 ^{c,v}		
Paraguay	1.2 ^v	Georgia	8.2 ⁱ	Nigeria	5		
Turkmenistan	1.2 ^{c,i,v}	Tajikistan	8.2 ^{i,v}	Russia	5		
Somalia	1.2 ^{c,v}	Indonesia	8.2 ^v	Sudan	5 ^v		
Korea, North	1.2 ^{c,v}	Kenya	8.1 ^v	Somalia	5 ^{c,v}		
Zimbabwe	1.2 ^v	Cote d'Ivoire	7.9 ^v	Congo, Dem. Rep.	5 ^{c,v}		
Indonesia	1.2 ^v	Kyrgyzstan	7.9 ^{i,v}	Serbia and Montenegro	5 ^v		
Angola	1.1 ^v	Libya	7.9 ^v	Haiti	4.8 ^v		
Bangladesh	1.1 ^v	Papua New Guinea	7.9 ^v	Papua New Guinea	4.8 ^v		
Cameroon	1.1 ^v						
Niger	1.1 ^{c,v}						
Sudan	1.1 ^v						
Azerbaijan	1.1						
Tajikistan	1.1 ^{i,v}						
Sample size	195		133		140		44

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- ▶ Ordinal measures
 - ▶ We ultimately care about the magnitude of corruption

Measuring corruption - direct approach

- ▶ Svensson (2003) QJE - surveyed Ugandan firms directly
 - ▶ 80 percent of firms reported needing to pay bribes
 - ▶ Bribes amounted to 8 percent of the costs (conditional mean)
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- ▶ Ferraz and Finan (2007) QJE - exploit audit reports
 - ▶ Brazilian government audited municipal expenditure of federal funds
 - ▶ Corruption was detected in 78 percent of municipalities
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 - ▶ Truck drivers in Indonesia spend about 13 percent of total cost on bribes
- ▶ Sequeira and Djankov (2014) - direct observation of bribes at ports
 - ▶ Average cost of bribes as a share of shipping cost: 14% in Maputo; 4% Durban
 - ▶ Firms travel on average an additional 319 kms (doubling transportation costs) to avoid corruption

Measuring corruption - indirect approach

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- ▶ Di Tella and Schargrodsky (2003) JLE - compare prices paid for basic homogenous inputs at public hospitals before and after a corruption crackdown
 - ▶ prices paid fell by 15 percent during the first nine months of a crackdown on corruption in 1996-1997

Indirect approach - Fisman 2001

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- ▶ Rumors about Suharto's poor health during 1995-1997
 - ▶ Lexis-Nexis literature search (Suharto, Health, Indonesia) → 6 episodes

Indirect approach - Fisman 2001

- ▶ Suharto's health shocks could lead to political instability and a general drop in stock prices
 - ▶ But his loss of power would be particularly important for his “cronies”, including his children, all of whom were “successful” industrialists
- ▶ A local economic consulting firm had created a “Suharto dependency index” (POL_i) for 79 large firms, seen as a critical determinant of future profitability
 - ▶ Values from 1 (long-time opponents) to 5 (family)

Indirect approach - Fisman 2001

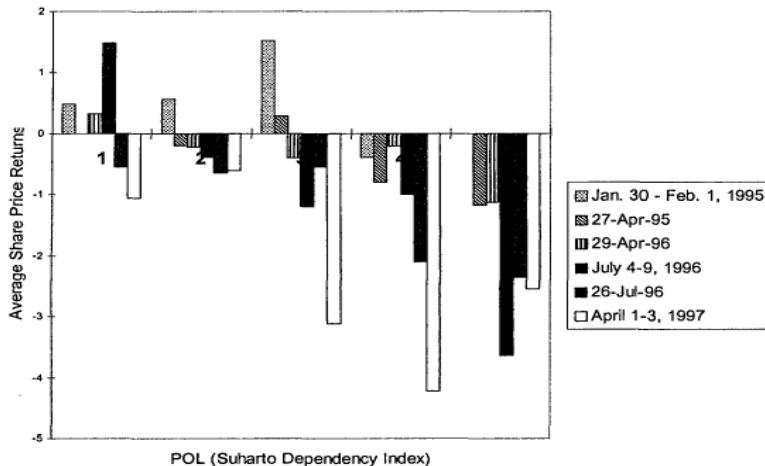


FIGURE 1. EFFECT OF POLITICAL DEPENDENCE ON SHARE PRICE RETURNS

Indirect approach - Fisman 2001

$$R_{ie} = \alpha + \beta_1 \text{POL}_i + \beta_2 \text{NR}_e + \beta_3 (\text{POL}_i \times \text{NR}_e) + \mu_{ie}$$

TABLE 3—EFFECT OF POLITICAL CONNECTIONS ON
CHANGES IN SHARE PRICE

	(1)	(2)
<i>POL</i>	-0.60** (0.11)	-0.19 (0.15)
<i>NR(JCI)</i>	0.25 (0.14)	-0.32 (0.28)
<i>NR(JCI) · POL</i>		0.28* (0.11)
Constant	0.88 (0.27)	0.06 (0.35)
<i>R</i> ²	0.066	0.078
Number of observations	455	455

- ▶ Investors estimated that JCI would drop 20% if Suharto died.
Given $\beta_3 + \beta_1 \rightarrow 22\%$ lower returns for most connected firms

Indirect approach - Political Connections

- ▶ Fisman's study has sparked a large literature on the value of political connections (mostly for firms)
- ▶ A nice and fairly recent example is Khwaja and Mian (2004)
- ▶ Examine loan-level data for the universe of corporate lending from 1996-2002 in Pakistan

Nature of Corruption

Pakistan's state bank ... moved to freeze the accounts of thousands of politicians... The move is seen as the start of a crackdown on the endemic corruption in Pakistan's political system military officials have asked banks to provide lists of anyone who has defaulted on a loan from a state bank... a notorious way of amassing funds by politicians of all parties.(The Guardian October 16th, 1999)

Data

- ▶ Detailed loan data for every corporate loan made in Pakistan from 1996-2002 (part of Credit Information Bureau)
 - ▶ each borrower's credit position by lender and quarter
 - ▶ amount of the loan outstanding, default amounts, recoveries against the loan
 - ▶ identifies of the firms and lenders
- ▶ Politically-connected firm: a firm who has a politician on its board
- ▶ Match is done by name

Sample

- ▶ Panel of 68 private domestic and 23 government banks lending to 93,316 unique firms during the 25 quarters
 - ▶ exclude government firms and foreign banks
- ▶ Observation: firm-bank level (collapse on the time dimension)

Summary Stat I

Panel A : Loan-level Variables					
Variable	Mean	S.D.	Obs.		
<i>Loan Size</i> ('000s of 1995 Pak Rs.)	6,669	89,298	112,685		
<i>Default Rate (%)</i> : Un-Weighted	16.85	30.22	112,685		
<i>Default Rate (%)</i> : Loan size weighted	17.61	31.06	112,685		
<i>Recovery Rate (%)</i> : (conditional on default)	8.55	24.50	24,562		
<i>Rate of Return (%)</i>	93.46	35.70	89,223		
<i>Interest rate (%)</i>	14.05	2.90	89,223		
<i>Loan Type</i>	<i>Fixed</i>	<i>Working Capital</i>	<i>Letter of Credit</i>	<i>Guarantees</i>	<i>Mixed</i>
Percent of total lending	32%	49%	7%	7%	5%

Summary Stat II

Panel B: Borrower/Firm Attributes

<i>Politically Connected</i>	<i>No</i>	<i>Yes</i>			
Percent of total firms	77%	23%			
Percent of total lending (of total loans)	63% (74%)	37% (26%)			
<i>Size (percentile)</i>	<i>0-50</i>	<i>50-75</i>	<i>75-95</i>	<i>95-99</i>	<i>99-100</i>
Percent of total lending (of total loans)	6% (42%)	3% (21%)	13% (23%)	23% (9%)	55% (5%)
<i>Location (City Size)</i>	<i>Small</i>	<i>Medium</i>	<i>Large</i>	<i>Unclassified</i>	
Percent of total lending (of total loans)	8% (17%)	12% (15%)	74% (52%)	6% (16%)	
<i>Foreign Firm</i>	<i>No</i>	<i>Yes</i>			
Percent of total lending (of total loans)	(99.8%)	4% (0.2%)			
<i>Business Group Size</i>	<i>Stand Alone</i>	<i>Intermediate</i>	<i>Conglomerate</i>	<i>Unclassified</i>	
Percent of total lending (of total loans)	20% (54%)	19% (17%)	39% (10%)	22% (19%)	

Are Politically Connected Firms Given Preferential Treatment?

$$Y_{ij} = \alpha_j + \beta_1 \text{Political}_i + \gamma_1 X_i + \gamma_2 X_{ij} + \epsilon_{ij}$$

Dependent Variable	Log Loan Size	Rate of Return	Default Rate	Recovery Rate	Interest Rate
	(1)	(2)	(3)	(4)	(5)
Politically Connected	0.37 (0.08)	-6.08 (2.46)	6.22 (1.98)	-1.09 (1.14)	0.09 (0.05)
Controls	YES	YES	YES	YES	YES
R ²	0.26	0.28	0.29	0.24	0.43
No of Obs	112,685	89,223	112,685	24,562	89,223

Default Rates

$$Y_{ij} = \alpha_i + \alpha_j + \beta_1(\text{Political}_i \times \text{Gov}_j) + \gamma_1 X_{ij} + \gamma_2(X_{ij} \times \text{Gov}_j) + \epsilon_{ij}$$

	Default Rate (%)					
	(1)	(2)	(3)	(4)	(5)	(6) Firms borrowing from both government and private banks
	Government Banks Only		Private Banks Only		All Banks	
Politically Connected	10.92 (4.12)	9.13 (1.92)	-0.02 (0.27)	-0.78 (0.26)	-0.78 (0.26)	--
Politically Connected * Government Bank					9.91 (1.90)	1.4 (1.04)
Constant	19.87 (2.60)	--	6.05 (2.03)	--	--	--
Controls	NO	YES	NO	YES	YES ¹	Firm Fixed Effects ²
R ²	0.02	0.3	0.004	0.15	0.33	0.78
No of Obs	61,897	61,897	50,788	50,788	112,685	18,819

Access to Credit

Dependent Variable	Log Loan Size		
	(1)	(2)	(3)
	Data restricted to firms that borrow from both government and private banks		
Government Bank	0.07 (0.03)	-1.19 (0.14)	-0.2 (0.03)
Politically Connected * Government Bank	0.29 (0.05)	-0.21 (0.22)	0.13 (0.05)
Government Bank * Log Firm Size		0.14 (0.02)	
Politically Connected * Government Bank * Log Firm Size		0.041 (0.03)	
Government Bank * Firm Default Rate			1.9 (0.11)
Politically Connected * Government Bank * Firm Default Rate			0.56 (0.17)
Firm Fixed Effect	YES	YES	YES
R ²	0.81	0.81	0.83
No of Obs	10,880	10,880	10,880

Additional Findings

- ▶ Firms with stronger politicians (as measured by vote share) obtain even greater preferential access to credit from government banks
- ▶ as a politician goes from losing to winning an election, the firm he is affiliated with receives (even) greater access to credit from government banks
- ▶ Reject Social lending: government banks lend to socially efficient but high risk projects, and firms with politicians on their boards undertake such socially efficient projects

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Does corruption matter for development?

*In terms of economic growth, the only thing worse than a society with a rigid, over-centralized, **dishonest** bureaucracy is one with a rigid, over-centralized and **honest** bureaucracy*

-Samuel Huntington

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- ▶ Theory of the second best approach – With excessive taxes and overly restrictive regulation, “speed money” or “grease payments” may also improve economic efficiency
- ▶ Punchline: Corruption may not be that costly if it only shift out the budget constraint, we only care if it changes “prices”

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 - ▶ Corruption contracts are not enforceable in a court of law → Bureaucrats can create holdup problems
2. Previous models assumed that corruption was exogenous → endogenizing corruption creates incentives for red tape (Banerjee 1993)

Red Tape - Banerjee 1993

- ▶ Consider a bureaucrat who is in charge of allocating some resource
- ▶ Set of slots of size 1
- ▶ N - population size $N > 1$
- ▶ Two types of agents $\{H, L\}$, with sizes N_H, N_L

Red Tape - Banerjee 1993

- ▶ $H(orL)$ - *social* benefit to give type $H(L)$ a slot
- ▶ $h(orl)$ - *private* benefit to give type $H(L)$ a slot
- ▶ $H > L$ and types are private information
- ▶ Note that we do not assume that private benefit equals social benefit
 - ▶ Society would like to give driver licenses to good drivers ($H > 0$) and not bad ones ($L < 0$), but both $h, l > 0$

Red Tape - Banerjee 1993

- ▶ Ability to pay for a slot:
 - ▶ $y_H \leq h$
 - ▶ $y_L \leq l$
- ▶ Suppose that bureaucrats have a testing technology for detecting types directly
 - ▶ If used on someone of type L for a period of time t , the probability that he will fail the test is $\phi_L(t)$
 - ▶ $\phi_H(t)$ is the corresponding probability for high types
 - ▶ δt - cost of being tested
- ▶ Mechanism \rightarrow Bureaucrat will announce two vectors: (price, testing time, probability of getting the slot)
 1. (p_H, t_H, π_H)
 2. (p_L, t_L, π_L)

Red Tape - Banerjee 1993

Suppose $H > L > 0$

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- ▶ $p_H = y_L + \epsilon$, $p_L = y_L$

- ▶ $\pi_H = 1$, $\pi_L = (1 - N)/N_L$

- ▶ self-selection works \rightarrow low-types cannot pay more than y_L and as long as ϵ is small enough, high-types will pay to increase chances of getting a slot

Red Tape - Banerjee 1993

What if the corrupt bureaucrat wanted to maximize revenue?

- ▶ One option

- ▶ $h - p_H \leq (h - y_L) \frac{1 - N_H}{N_L}$
- ▶ $p_H = \min\{y_H, (h - y_L) \frac{N-1}{N_L} + y_L\}$, $p_L = y_L$
- ▶ $\pi_H = 1$, $\pi_L = (1 - N)/N_L$

- ▶ But in this case, p_H might be much lower than y_H : the bureaucrat is not extracting all the rent

- ▶ Second option: Monopolist

- ▶ $p_L = p_H = y_H$
- ▶ Sell only to the high types

Red Tape - Banerjee 1993

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- ▶ p_H goes up at t_L
- ▶ t_L must satisfy L type IR constraint

$$(l - y_L) \frac{1 - N_H}{N_L} - \delta t_L \geq 0$$

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- ▶ p_H goes up at t_L
- ▶ t_L must satisfy L type IR constraint

$$(l - y_L) \frac{1 - N_H}{N_L} - \delta t_L \geq 0$$

- ▶ As long as the IR is not binding, raising t_L (red tape) will increase p_H

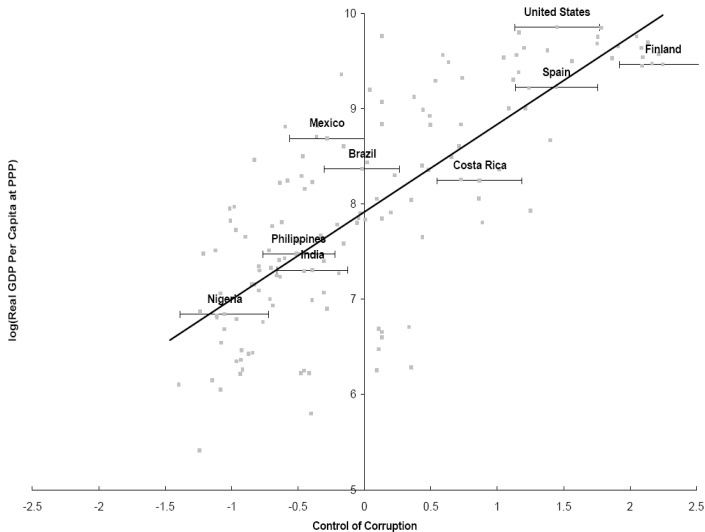
Red Tape

NB:

- ▶ The third option produces social inefficient red tap \rightarrow testing is unnecessary since there is a mechanism without testing that delivers the optimal allocation
- ▶ Red-tape is faced by the L-types and is in order to create some artificial scarcity
- ▶ Red-tape only emerges when $y_L < I$ which is more likely to occur with public goods
- ▶ Red-tape welfare dominates the monopoly outcome

Does corruption matter for development? - Empirical evidence

Figure 1A -- Control of Corruption and Per Capita Incomes



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 - ▶ Corruption is itself an equilibrium outcome → correlated with many other institutional factors that determine growth
- ▶ We have yet to estimate the **causal** effects of corruption!

Does corruption matter for development? - Empirical evidence

- ▶ Bates (1981) - in many sub-Saharan African countries, peasant farmers avoided corruption by taking refuge in subsistence production → subsequent decline in productivity and living standards
- ▶ Khwaja and Mian (2004) examine loan-level data that represents the universe of corporate lending in Pakistan between 1996-2002
 - ▶ politically-connected firms borrow 45 percent more and have 50 percent higher default rates
 - ▶ preferential treatment comes from government banks (not private banks)
 - ▶ Economy wide costs of the rents are estimated to be 0.3 to 1.9 percent of GDP every year

Does corruption matter for development? - Empirical evidence

- ▶ Bertrand et al (2006) conducted an experiments among individuals who were interested in getting a driver's license in India.
- ▶ They randomly assigned people into three groups:
 - ▶ bonus (offered a financial reward if they could obtain their license fast)
 - ▶ lesson (offered free driving lessons upfront)
 - ▶ control

Does corruption matter for development? - Bertrand et al 2006

Table 1: Results from Experimental Groups

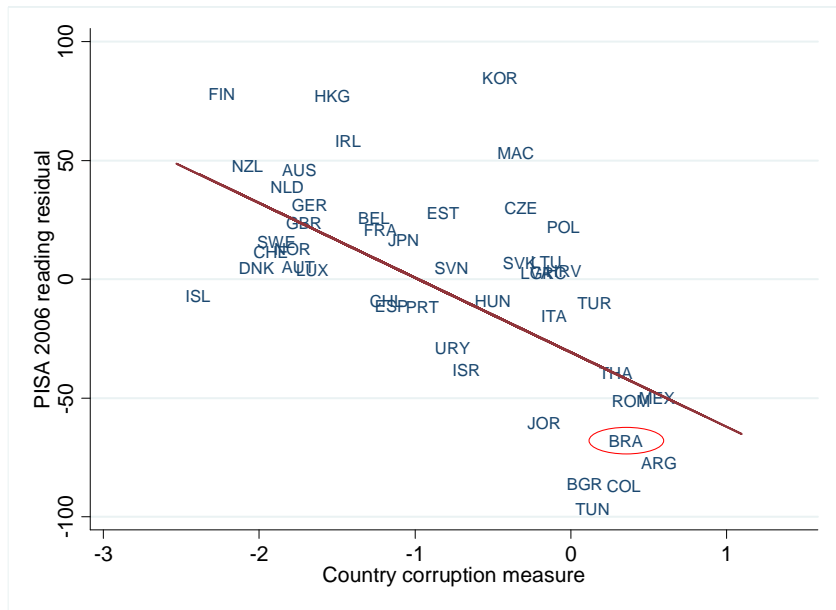
	Comparison (1)	Bonus (2)	Lesson (3)	P-values	
				Comp vs Bonus (4)	Comp vs Lesson (5)
(a) Who obtained a licence?					
Obtained license	0.48	0.71	0.60	0.00	0.02
Number of days between temporary and final licence	47.99	31.71	53.30	0.00	0.20
Took RTO licensing exam	0.29	0.38	0.51	0.20	0.00
Failed independent exam	0.61	0.64	0.15	0.61	0.00
(b) How did individuals try to obtain a licence?					
Did not learn to drive	0.49	0.74	0.17	0.00	0.00
Total expenditures	1,120.68	1,140.11	964.25	0.33	0.01
Paid direct bribe	0.01	0.02	0.01	0.68	0.99
Hired agent	0.78	0.80	0.59	0.79	0.00

Sample includes the 409 individuals that obtained a licence.

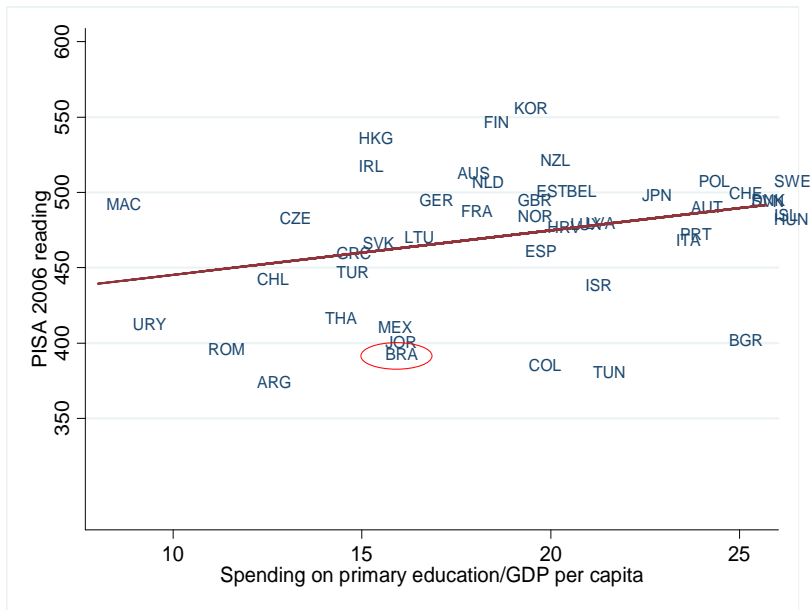
Long run impact of corruption

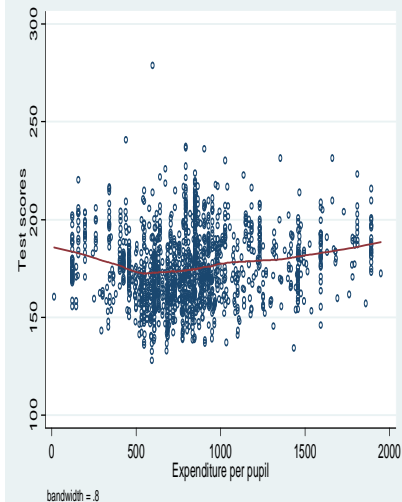
- ▶ Corruption in the public sector can reduce the provision and quality of key public services (e.g. education, health, infrastructure)
- ▶ If these human resources are important for development and economic growth, then corruption can impose serious long-run costs
- ▶ Ferraz, Finan, and Morreira (2009) examine this possibility using the audits data in Brazil

Ferraz, Finan, and Morreira 2009

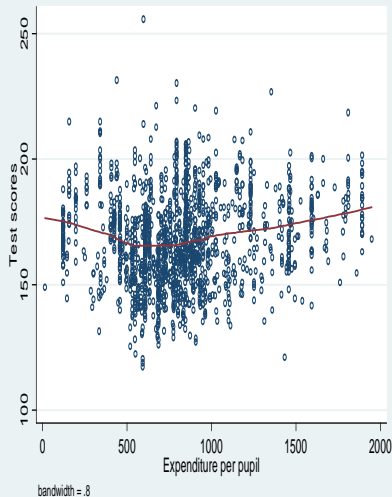


Ferraz, Finan, and Morreira 2009



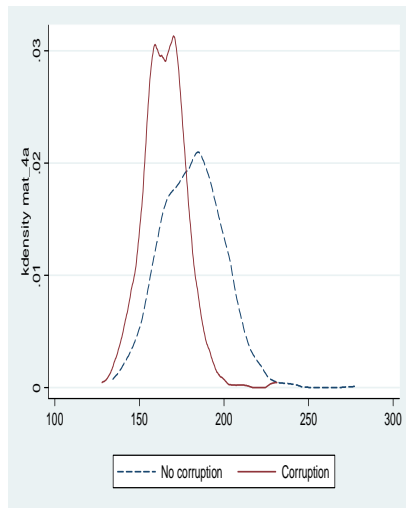


Panel A: Mathematics

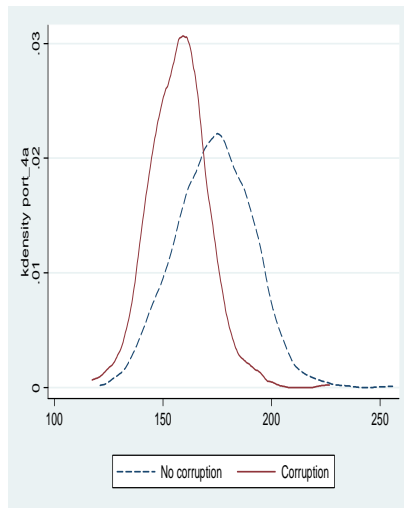


Panel B: Portuguese

Ferraz, Finan, and Morreira 2009



Panel A: Mathematics



Panel B: Portuguese

Dependent variable:	Mathematics	Portuguese	Dropout rates	Failure rates
	(1)	(2)	(3)	(4)
Corruption in education	-0.28 [0.120]**	-0.279 [0.100]***	0.034 [0.011]***	0.027 [0.012]**
Corruption in other sectors	0.023 [0.116]	0.014 [0.096]	0.011 [0.010]	0.012 [0.011]
Student characteristics	Yes	Yes	Yes	Yes
Municipal characteristics	Yes	Yes	Yes	Yes
Number of schools	1251	1251	1251	1251
R-squared	0.48	0.54	0.29	0.17

Corruption

Research on corruption can be divided into three main questions:

1. What is corruption? or How do we measure corruption?
2. Does corruption matter for development?
3. What determines corruption? or How can we reduce or prevent corruption?

What determines corruption?

- ▶ Ambiguous laws and regulations (Ades and di Tella 1997; Shleifer and Vishny 1993)

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- ▶ Ethnic heterogeneity (Alesina, Baqir, Easterly 2002)
- ▶ Historical and cultural factors (Kranton 1996; Fisman and Miguel 2006)
- ▶ Market structure (Shleifer and Vishny 1993)

I/O of corruption - Shleifer and Vishny 1993

- ▶ 2 goods that whose demands are inter-related \rightarrow increasing price of one good will shift the demand curve for the second good

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- ▶ 2 goods that whose demands are inter-related \rightarrow increasing price of one good will shift the demand curve for the second good
- ▶ If corruption is **centralized**, the joint monopolist will set the price of good 1 p_1 internalizing the effects on the demand for good 2 x_2 :

$$MR_1 + MR_2 \frac{dx_2}{dx_1} = MC_1$$

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- ▶ **Decentralized case:** $MR_1 = MC_1$ → with endogenous free entry, bribes go to infinity

I/O of corruption - Olken and Barron 2009

Olken and Barron (2009) test this insight using bribe data from truck drivers in Indonesia

- ▶ Examine two trucking routes in Aceh, where truck drivers often have to make illegal payments at checkpoints and weigh stations
 - ▶ Checkpoints are set up and operated by police and military
 - ▶ Weighing stations - trucks are fined if their cargo is more than 5 percent above the limit → drivers pay a bribe to avoid this fine
- ▶ Acehese surveyors accompany drivers on their regular routes from November 2005 to July 2006

I/O of corruption - Olken and Barron 2009

- ▶ Military conflicts between the Indonesian Army and the separatist GAM since 1970's
- ▶ In August 2005, a peace agreement was signed
- ▶ 31,690 out of 55,480 military and police withdrew from Aceh in 4 waves → variation in the number of checkpoints
- ▶ Withdrawals only affected the province of Aceh and not the North Sumatra
- ▶ Data was collected during the 3rd and 4th wave of the military withdrawal

I/O of corruption - Olken and Barron 2009



FIG. 1.—Routes

I/O of corruption - Olken and Barron 2009

Data collection - direct observation

- ▶ One of the innovations of this study
- ▶ Surveyors recorded the time, location, amount paid at every checkpoint and weigh station
- ▶ Potential Hawthorne Effects
 - ▶ Drivers are residual claimants → unlikely bribe behavior would be altered
 - ▶ Truck drivers typically drove with assistants
 - ▶ Bribes are routine so there is little stigma
- ▶ Not a random sample of trucking firms or even drivers

I/O of corruption - Olken and Barron 2009

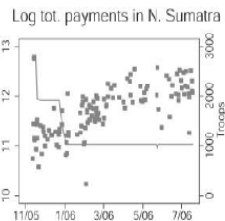
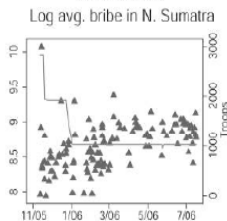
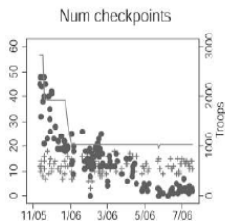
TABLE 1
SUMMARY STATISTICS

	Both Roads (1)	Meulaboh Road (2)	Banda Aceh Road (3)
Total expenditures during trip (rupiah)	2,901,345 (725,003)	2,932,687 (561,736)	2,863,637 (883,308)
Bribes, extortion, and protection payments	361,323 (182,563)	415,263 (180,928)	296,427 (162,896)
Payments at checkpoints	131,876 (106,386)	201,671 (85,203)	47,905 (57,293)
Payments at weigh stations	79,195 (79,405)	61,461 (43,090)	100,531 (104,277)
Convoy fees	131,404 (176,689)	152,131 (147,927)	106,468 (203,875)
Coupons/protection fees	18,848 (57,593)	. . .	41,524 (79,937)
Fuel	1,553,712 (477,207)	1,434,608 (222,493)	1,697,010 (637,442)
Salary for truck driver and assistant	275,058 (124,685)	325,514 (139,233)	214,353 (65,132)
Loading and unloading of cargo	421,408 (336,904)	471,182 (298,246)	361,523 (370,621)
Food, lodging, etc.	148,872 (70,807)	124,649 (59,067)	178,016 (72,956)
Other	140,971 (194,728)	161,471 (236,202)	116,308 (124,755)
Number of checkpoints	20 (13)	27 (12)	11 (6)
Average payment at checkpoint	6,262 (3,809)	7,769 (1,780)	4,421 (4,722)
Number of trips	282	154	128

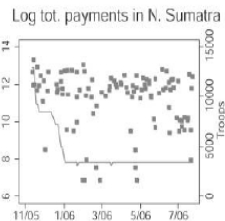
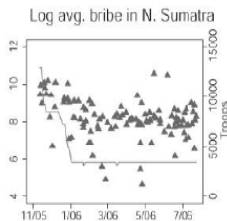
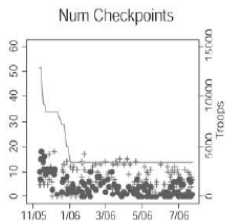
NOTE. — Standard deviations are in parentheses. Summary statistics include only those trips for which salary information was available. All figures are in October 2006 rupiah (US\$1.00 = Rp. 9,200).

I/O of corruption - Olken and Barron 2009

Meulaboh



Banda Aceh



I/O of corruption - Olken and Barron 2009

$$\text{LogPrice}_{ci} = \alpha_c + X_i' \gamma + \beta \text{LogExpectedPosts}_i + \epsilon_{ci}$$

- ▶ In centralized regime, $p_i = P/n$, so $\beta = -1$
- ▶ Otherwise, if market structure affects price $\partial p_i / \partial n < 0$ and $\beta \in (0, -1)$

I/O of corruption - Olken and Barron 2009

TABLE 2
IMPACT OF NUMBER OF CHECKPOINTS IN ACEH ON BRIBES IN NORTH SUMATRA

	Meulaboh OLS (1)	Meulaboh OLS (2)	Meulaboh (Pre-Press Conference) OLS (3)	Meulaboh IV (4)	Both Routes OLS (5)	Both Routes OLS (6)
A. Log Payment at Checkpoint						
Log expected checkpoints on route	-.545*** (.157)	-.580*** (.167)	-.684*** (.257)	-.788*** (.217)	-.701*** (.202)	-.787*** (.203)
Truck controls	No	Yes	Yes	Yes	Yes	Yes
Common time effects	None	None	None	None	Cubic	Month FE
Observations	1,941	1,720	1,069	1,720	2,369	2,369
Test elasticity = 0	.00	.00	.01	.00	.00	.00
Test elasticity = -1	.00	.01	.22	.33	.14	.29
B. Log Total Payments						
Log expected checkpoints on route	-.736*** (.064)	-.695*** (.069)	-.643*** (.237)	-.782*** (.131)	-1.107*** (.444)	-1.026*** (.405)
Truck controls	No	Yes	Yes	Yes	Yes	Yes
Common time effects	None	None	None	None	Cubic	Month FE
Observations	161	144	90	144	249	249
Test elasticity = 0	.00	.00	.01	.00	.01	.01
Test elasticity = -1	.00	.00	.14	.10	.81	.95

I/O of corruption - Olken and Barron 2009

Magnitudes

- ▶ Prices charged in North Sumatra increase as the number of checkpoints on the route in Aceh declines
- ▶ Prior to the withdrawal truck drivers stopped on average at 90 checkpoints
- ▶ Post withdrawal, truck drivers stopped on average at 18 checkpoints
- ▶ 80% reduction in checkpoints lead to a 51% reduction in costs at checkpoints
- ▶ Had prices been exogenous the reduction would have been 80% → endogenous responses offset about 36% of the potential reduction in corruption from removing the checkpoints

I/O of corruption - Olken and Barron 2009

- ▶ Are bribes fixed in advanced or determined through bilateral bargaining?

$$\text{LogPrice}_{ci} = \alpha_i + \alpha_c + \text{Gun}_{ci} + \text{NumOfficers}_{ci} + \epsilon_{ci}$$

I/O of corruption - Olken and Barron 2009

- ▶ Are bribes fixed in advanced or determined through bilateral bargaining?

$$\text{LogPrice}_{ci} = \alpha_i + \alpha_c + \text{Gun}_{ci} + \text{NumOfficers}_{ci} + \epsilon_{ci}$$

- ▶ Given bargaining, checkpoints create holdup problems?
 - ▶ Exploit data on trips going in both direction

$$\text{LogPrice}_{ci} = \alpha_i + \alpha_c + \beta \text{MeanPercentile}_{ci} + \epsilon_{ci}$$

I/O of corruption - Olken and Barron 2009

TABLE 4
BARGAINING VERSUS FIXED PRICES

	LOG PAYMENT		NEGOTIATE DUMMY	
	(1)	(2)	(3)	(4)
Gun visible	.166** (.066)	.154** (.070)	.049** (.018)	.047*** (.018)
Gun visible at subsequent checkpoint		.016 (.024)		.016 (.018)
Number of officers at checkpoint	.047*** (.010)	.050*** (.009)	.017*** (.004)	.016*** (.005)
Number of officers at subsequent checkpoint		-.003 (.007)		-.003 (.004)
Observations	5,260	4,968	5,281	4,989
Mean dependent variable	8.49	8.50	.13	.13

TABLE 5
SEQUENTIAL BARGAINING AND INCREASING PRICES

	Meulaboh (1)	Banda Aceh (2)
Mean percentile	.145*** (.045)	-.178 (.225)
Observations	4,190	1,089

I/O of corruption - Olken and Barron 2009

In sum, great paper!

- ▶ Provides strong evidence that market structure affects corruption
- ▶ Decentralized corruption can result in higher bribes charged than centralized
 - ▶ Tackling corruption at the top might lead to more corruption
- ▶ Reducing the number of corrupt bureaucrats may not low corruption since prices may respond endogenously