

# 14.770: Corruption Lecture 24-27a

Ben Olken

- Do we care?
  - Stylized facts:: Magnitude, prevalence, and efficiency costs
- The corrupt official's decision problem
  - Balancing risks, rents, and incentives
- Embedding corruption into larger structures
  - The IO of corruption: embedding the decision problem into a market structure
  - Corruption and politics
  - Corruption's general equilibrium effects on the economy

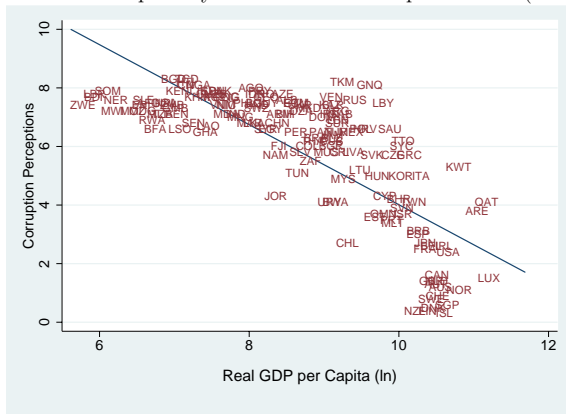
- A particular problem in empirical research on corruption is measurement: you can't just ask people how corrupt they are.
- So people take one of three basic approaches:
  - Perceptions of corruption
    - From surveys (usually cross-country data)
    - Inferred from the stock market
  - Comparing two measures of the same thing
    - Road building in Indonesia
    - Oil-for-food in Iraq
    - Education subsidies in Uganda
  - Direct measurement
    - Surveys of bribe-paying in Uganda
    - Observation of truck driver bribes in Indonesia
    - Audits of teacher attendance around the world
- Use theory to distinguish between corruption and "passive waste"
  - Taxes in Hong Kong vs. China
  - Procurement in Italy

# Poor countries are more corrupt

## Perceptions Based Measures

Figure 1: Cross-Country Relationship Between GDP and Corruption

Panel A. Transparency International Corruption Index (2005)

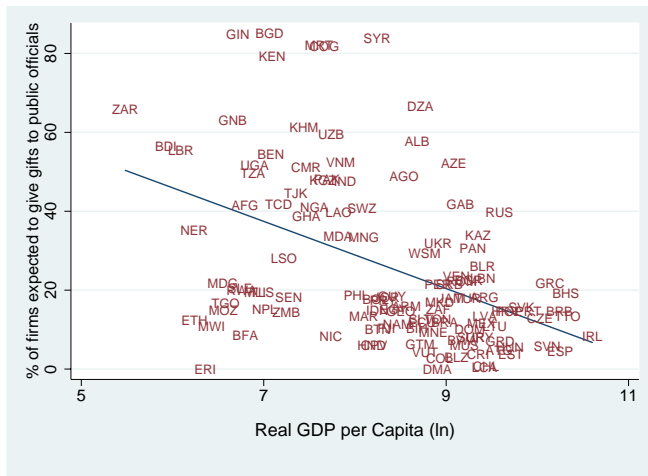


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# Poor countries are more corrupt

## Survey Based Measures

Figure 2: Relationship Between GDP and Corruption Using Survey Data from Firms



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# Is this causal?

## Theory and Evidence from Vietnam

- Why might this relationship occur?
- Bai et al propose one explanation:
  - Idea is that firms can relocate if taxes are too high
  - If there is some fixed cost of moving (i.e. if moving costs are all concave), then for a given bribe rate, I'm more likely to move if I'm larger
  - So growth of firms increases elasticity and reduces bribes
  - Particularly true for firms that are more mobile

# Empirical test

- To test this, we predict a firm's growth using other firms in its industry in other provinces, i.e., first stage is

$$\ln employ_{jrt} = \alpha_{rt} + \beta_j + \ln employ_{j-rt}$$

- Reduced form is therefore

$$bribes_{jrt} = \alpha_{rt} + \beta_j + \ln employ_{j-rt}$$

- Similar in spirit to Bartik (1991), Blanchard and Katz (1992), Notowidigdo (2013)
- What does this potentially solve?
- What is the identifying assumption?
- Do you believe it? What would the problem be?

# Results

First stage other provinces predict your province

Table 2: First Stage Results

	Dep. var.: Log total employment (own-province-industry-year level)
Log total employment (industry-year level, excluding own province)	0.724*** (0.107)
Observations	3,873
R-squared	0.958
Province-industry and year fixed effects	✓

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# Results

## Main results predicted growth reduces corruption

Table 3: Effect of Economic Performance on Bribes

Dependent variable: Firm's bribe payment as percentage of revenue

	(1)	(2)	(3)
	RF: OLS	RF: Ordered Probit	IV
Log total employment (at industry-year level, excluding own province)	-1.723** (0.76)	-0.275** (0.131)	
Log total employment (own-province-industry-year level)			-2.302** (1.00)
Province-industry and year fixed effects	✓	✓	✓
Observations	13,160	13,160	13,160

# Magnitudes: Perceptions based

Fisman 2001: Estimating the value of political connections

- Setting: Indonesia under Soeharto
- Empirical idea:
  - Use stock market event study to gauge the "market value" of political connections to Soeharto
  - Identification: when Soeharto gets sick, what is the effect on stock price of Soeharto-connected firms relative to unconnected firms
    - *"Whenever Mr. Soeharto catches a cold, shares in Bimantara Citra catch pneumonia" – Financial Times*
- Note that this is still perceptions in some sense, but it allows us to turn them into a number; we need to believe in efficient markets for this perception to be accurate

- Data on connections to Soeharto
  - Indonesian political consultancy rates each firm on scale of 0-4 of how close they are to Soeharto
  - Examples of "4" firms are those owned by Soeharto's children, Soeharto's cronies from childhood, and his relatives
- Data on dates of 6 Soeharto health shocks from Lexis-Nexis
- Then run a stock market event study for each event

$$R_{ie} = \alpha + \rho POL_i + \varepsilon_{ie}$$

- Since events are heterogeneous, measures total effect of event with net return of Jakarta stock exchange ( $NR(JCI)$ ), then estimates

$$R_{ie} = \alpha + \rho_1 POL_i + \rho_2 NR_e(JCI) + \rho_3 POL_i \times NR_e(JCI) + \varepsilon_{ie}$$

# Results

## Event by event

TABLE 2—EFFECT OF POLITICAL CONNECTIONS ON CHANGES IN SHARE PRICE, SEPARATE ESTIMATION FOR EACH EVENT

	Jan. 30–Feb. 1, 1995	April 27, 1995	April 29, 1996	July 4–9, 1996	July 26, 1996	April 1–3, 1997
<i>POL</i>	-0.58* (0.34)	-0.31 (0.18)	-0.24* (0.15)	-0.95*** (0.27)	-0.57*** (0.22)	-0.90** (0.35)
Constant	1.29 (0.79)	0.21 (0.32)	0.12 (0.46)	0.83 (0.64)	-0.07 (0.41)	0.77 (0.97)
$R^2$	0.037	0.043	0.025	0.147	0.078	0.075
Observations	70	70	78	79	79	79

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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)
$R^2$	0.066	0.078
Number of observations	455	455

# The value of connections

- Need to examine the counterfactual event where Soeharto died and firm connections went to 0.
  - Fisman uses JCI return to benchmark this, since JCI also declines whenever Soeharto gets sick
  - Specifically, he asked investment bankers what would happen to JCI if Soeharto died and value of connections went to 0 – their estimate was a decline of 20%
  - This implies that coefficient on *POL* would be  $.28 * -20 - .19 = -5.8$  in such a scenario.
  - So for a firm with maximum connections ( $POL = 4$ ), Soeharto's death would reduce firm value by about 23 percent.
- What do we infer from this?

# An international comparison

Fisman, Fisman, Galef and Kharuna (2006)

- One can repeat the same exercise in different countries to gauge the value of political connections in that country
- Fisman et al. (2006) do the exact same exercise in the US– they look at the value of connections to Dick Cheney
- Definitions of connections:
  - Halliburton (Cheney was CEO)
  - Board ties (Cheney was on board, or overlap with Halliburton's board)
- Events:
  - Heart attacks
  - Self-appointment as VP-nominee
  - Changes in probability of Bush-Cheney victory
  - Changes in probability of war in Iraq

# Results: No detectable impact

*Table 2. Average excess returns for Cheney-connected firms over the two-day period following an event that affects Cheney's ability to provide political favors.*

The sample consists of all Cheney-connected firms (columns 1 and 3) and of Halliburton only (columns 2 and 4).

	Risk-adjusted returns		Risk-adjusted returns relative to industry median	
	(1)	(2)	(3)	(4)
	All connected firms	Halliburton only	All connected firms	Halliburton only
4/19/2000: Cheney becomes head of running mate selection committee	.0058 (.0226)	-.0073 (.0000)	.0035 (.0143)	.0000 (.0000)
7/21/2000: Cheney appoints himself as running mate	-.0091 (.0286)	-.0566 (.0000)	.0079 (.0224)	-.0264 (.0000)
11/22/2000: Heart attack	.0062 (.0189)	-.0054 (.0000)	.0029 (.0135)	.0041 (.0000)
3/5/2001: Heart attack	.0043 (.0205)	.0144 (.0000)	.0006 (.0156)	.0009 (.0000)
<i>N</i>	13	1	13	1

Courtesy of Rakesh Khurana, Raymond Fisman, Julia Galef, and Yongxiang Wang. Used with permission.



# Results: No detectable impact

Table 3. Relationship between probability of a Bush victory and excess returns, across all connected firms, over both a one-day and five-day period.

Dependent variable	Returns over one-day period			Returns over five-day (weekly) period		
	Risk-adjusted returns (all connected firms)	Risk-adjusted returns relative to industry median (all connected firms)	Risk-adjusted returns relative to industry median (Halliburton only)	Risk-adjusted returns (all connected firms)	Risk-adjusted returns relative to industry median (all connected firms)	Risk-adjusted returns relative to industry median (Halliburton only)
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta$ Bush	0.016 (0.026)	0.021 (0.014)	0.022 (0.099)			
$\Delta$ Bush				0.060 (0.078)	0.062 (0.072)	-0.039 (0.058)
<i>N</i>	1729	1729	133	338	338	26
<i>R</i> <sup>2</sup>	0.00	0.00	0.00	0.03	0.02	0.00

Robust standard errors in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

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# Magnitudes: Comparing two measures

Fisman and Wei (2004): Tax Rates and Tax Evasion: Evidence from Missing Imports in China

- Question: what is the 'elasticity' of tax evasion with respect to tax rates?
  - This is a key parameter in determining the optimal tax rate
- Empirical challenge: very hard to measure what the true tax assessment should be.
- Fisman and Wei's idea:
  - Look at both sides of the China - Hong Kong border, where China is the 'high evasion' side and Hong Kong is the 'low evasion side'
  - Denote the difference between what Hong Kong (low corruption) and China (high corruption) reports as evasion, i.e.,

$$gap\_value = \log(\text{export\_value}) - \log(\text{import\_value})$$

- Key regressions:

$$gap\_value_k = \alpha + \beta_1 tax_k + \varepsilon_k$$

$$gap\_value_k = \alpha + \beta_1 tax_k + \beta_2 tax\_o_k + \varepsilon_k$$

- Findings:
  - $\beta_1 = 3$ : One percentage point increase in taxes on your product increase evasion gap by 3%
  - $\beta_1 = 6, \beta_2 = -3$ : Less evasion when nearby products also have higher tax rates implies reclassification is an important mechanism
- Reasonable? Concerns?

# Education

Reinikka and Svensson (2004): Local Capture: Evidence from a Central Government Transfer Program in Uganda

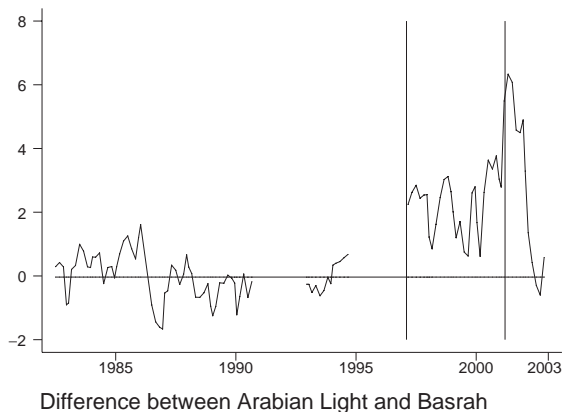
- Setting: Education in Uganda
- Empirical idea:
  - Each school receives a block grant from the central government
  - Sent surveyors to the schools to track how much block grant each school received
  - Compared the amount the schools received to the amount the central government sent to the schools
- Finding: schools reported receiving only 13 percent of what the central government sent out
- Follow-up work: after the results were published, they did the same exercise again and found 80 percent was being received
- Interpretation?

# Iraqi Oil

Hsieh and Moretti 2006: Did Iraq Cheat the United Nations? Underpricing, Bribes, and the Oil-for-Food Program

- Setting: UN Oil-for-Food Program
- Empirical idea:
  - Saddam Hussein's regime was allowed to sell oil on the private market to pay for food
  - Examine the difference between Iraqi oil prices and comparable oil prices to measure 'underpricing' of oil – which they infer were likely used for kickbacks
  - Show that underpricing starts when Oil-for-Food program begins, and ends after UN eliminates Iraqi price discretion
  - Show that gap is higher when volatility in oil is higher (so harder for UN to monitor)
- Estimate total of \$3.5 billion in rents through underpricing, or about 6 percent of value of total oil sold. Standard markups in the industry imply 1/3 of this went to the Iraqis.

**FIGURE I**  
**Difference between the Market Price of Close Substitutes  
and the Official Selling Price of Iraqi Oils**



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# Magnitudes: Direct evidence

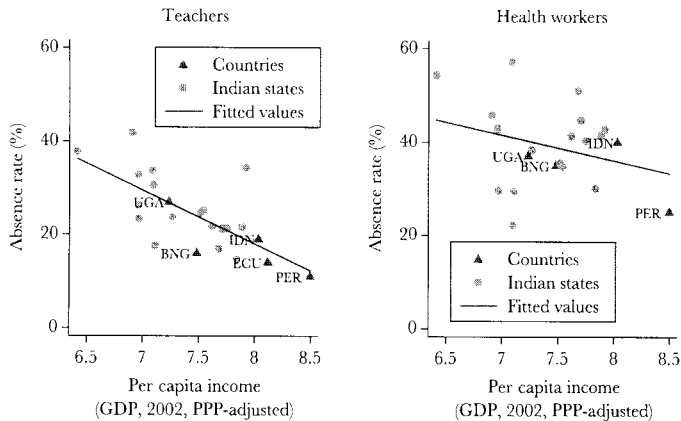
Chaudhury, Hammer, Kremer, Muralidharan, and Rogers: Missing in Action: Teacher and Health Worker Absence in Developing Countries

- Setting: primary schools and health clinics in Bangladesh, Ecuador, India, Indonesia, Peru, and Uganda
- Empirical idea: surveyors randomly arrived and noted what percent of workers were present in the facility at the time of the spot check
- Results: on average, 19 percent of teachers and 35 percent of health workers weren't present
- Higher in poorer countries and poorer states in India
- Is this corruption?

# Correlation with Income

Figure 1

## Absence Rate versus National/State Per Capita Income



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# Summary of Magnitudes

- Three main ways to measure corruption
  - Perceptions
  - Comparing two measures of the same thing
  - Direct measurement
- Estimated magnitudes vary substantially – from 2% (Iraq Oil For Food) to 80% (Ugandan Education)
- Selection bias problems – we may be systematically over-estimating corruption by only measuring it in places where, a priori, we think it is high
- To the extent we believe these estimates there is substantial heterogeneity we need to understand

# A framework

Banerjee, Hanna, and Mullainathan (2009): Corruption Handbook Chapter

- Idea: Mechanism design approach to corruption.
- Setting: two actors: supervisor (the bureaucrat) and participants in the economy (the agents).
- Setup:
  - Set of slots of size 1 that need to be allocated to a population of size  $N$ .
  - Two types of agents: Type  $H$  and type  $L$ , numbering  $N_H$  and  $N_L$  respectively. Types are private information.
  - For type  $H$ , the:
    - Social benefit of giving a slot to  $H$  is  $H$ .
    - Private benefit is  $h$ .
    - Ability to pay is  $y_H \leq h$ .
  - Define all variables similarly for  $L$  types.
  - Assume  $H > L$ , but ordering of  $(h, l)$  and  $(y_H, y_L)$  can be arbitrary.

# Four cases

cases	$y_H > y_L$	$y_H \leq y_L$
$h > l$	I: Aligned	III: Partial Misalignment
$h \leq l$	II: Partial Misalignment	IV: Misaligned

- Examples of Case I ( $y_H > y_L, h > l$ )
  - Choosing efficient contractors for road construction: Type  $H$  are more efficient contractors. For the same contract, they make more money:  $h > l$ . Since they are the ones who will get paid, the price they pay on the contract is just a discount on how much they are getting paid. Plausibly therefore  $y_H = h$  and  $y_L = l$ .
  - Allocating licenses to import: like road construction, but in this case there may be credit constraints

# Four cases

cases	$y_H > y_L$	$y_H \leq y_L$
$h > l$	I: Aligned	III: Partial Misalignment
$h \leq l$	II: Partial Misalignment	IV: Misaligned

- Examples of Case II ( $y_H > y_L, h \leq l$ )
  - Merit goods like subsidized condoms against HIV infection:  $H$  are high risk-types. They like taking risks:  $h < l$ . But perhaps richer:  $y_H > y_L$
- Examples of Case III ( $y_H \leq y_L, h < l$ )
  - Hospital beds:  $H = h > L = l > 0, y_H = y_L = y$ , i.e. no systematic relation between ability to pay and willingness to pay.
  - Public distribution system:  $H = h > L = l > 0, y_H < y_L$ .

cases	$y_H > y_L$	$y_H \leq y_L$
$h > l$	I: Aligned	III: Partial Misalignment
$h \leq l$	II: Partial Misalignment	IV: Misaligned

- Examples of Case IV ( $y_H \leq y_L, h \leq l$ )
  - Law enforcement:  $H > 0 > L, y_H = y_L = y, h = l$ : the slot is not going to jail.
  - Driving Licenses:  $H > 0 > L, y_H = y_L = y, h < l$ .
  - Speeding tickets:  $H > 0 > L, y_H = y_L = y = h = l$ : the slot is not getting a ticket.
  - Let the slot be a "does not need to pay taxes" certificate. Suppose  $H$  types are those who should not pay taxes and type  $L$ 's are those who should pay an amount  $T_L$ .
    - In other words,  $h = l = T_L$ .
    - Finally assume that  $y_H < y_L = T_L$

- Suppose corruption means that bureaucrat can allocate slots to the highest bidder
  - What are the efficiency allocations? How does it depend on what case we're in?
- Some implications
  - Case I: Government and bureaucrat incentives are aligned: give it to the highest willingness to pay. Bureaucrat may introduce screening (red tape) to further increase revenue. Efficiency losses come from the red tape.
  - Case IV: Government and bureaucrat incentives are opposed: suggests corruption pressure will be great.
- Optimal contract
  - Full model introduces 'testing' so bureaucrat can determine types
  - Government sets rule, bureaucrat can violate rule by paying some cost
  - More detail on the problem set

# Efficiency costs

Suktankar 2013: Much Ado About Nothing? Corruption in the Allocation of Wireless Spectrum in India

- Setting: Indian spectrum allocations
  - In most countries, wireless spectrum is auctioned
  - In India, they sold it at fixed prices in ways that allowed the minister to allocate it in return for bribes
  - For example, On September 24, 2007, announced would be open to accept new applications, but only until October 1, 2007. Ex-post, they then reset the deadline to September 25 and disqualified anyone who had applied after that.
  - Then, on January 10 at 2:45PM one day, they announced that you needed to pay between 3:30-4:30pm that day or else lose your slot. Needed bank guarantees for millions of dollars within minutes!
  - Clearly, minister could sell advance notice of this in return for bribes
  - Accused of taking over \$1 billion in bribes
- What would the framework above predict? What might you want to do to test this?

# Efficiency costs

- Idea of this paper: this is a super corrupt allocation.
- But, does it matter? Why might it matter? Why not?
- Basic idea is Coase theorem: corruption is about allocating rents (estimated at \$9 billion). But then owners should re-sell to efficient owners.
- Suktankar estimates whether markets with more or less of these corrupt licenses (i.e. those which were estimated to be shell companies) end up with better or worse cell phone service, prices, etc
- Finds? Not much. Challenge is differential trends so a bit hard to tell



# Efficiency costs

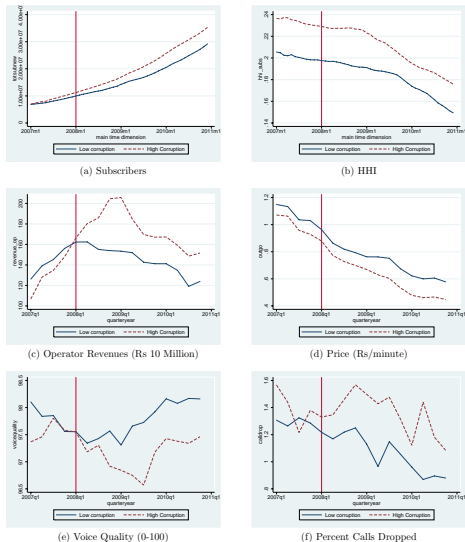


Figure 1: Outcomes over Time in More Corrupt (More Licenses to Firms deemed Ineligible by CAG)/Less Corrupt Areas

Courtesy of Sandip Sukhtankar. Used with permission.

# Efficiency costs

Bertrand, Djankov, Hanna, and Mullainathan 2007: Obtaining a Driver's License in India: An Experimental Approach to Studying Corruption

- Setting: Obtaining driver's license in India
- Question: Does corruption merely 'grease the wheels' or does it actually create inefficiency?
- Experiment: Experimentally create three groups of people:
  - "Bonus group" offered a large financial reward to obtain license in 32 days
  - "Lesson group" offered free driving lessons
  - Control
- For each group, measure driving ability with driving tests, find out about bribe paying process, whether obtained license.
- What would "efficient corruption" predict? What would "inefficient corruption" predict?

TABLE III  
OBTAINING A LICENSE

	Obtained license (all tracked) (1)	Obtained license (2)	Obtained license in 32 days or less (3)	Obtained license without taking licensing exam (4)	Obtained license and did not have anyone teach them to drive (5)	Obtained license and attended a driving school (6)	Obtained license and automatically failed ind. exam (7)	Obtained license and exam score <50% (8)
Comp. group mean	0.45	0.48	0.15	0.34	0.23	0.03	0.29	0.32
Bonus group	0.24 (0.05)***	0.25 (0.05)***	0.42 (0.04)***	0.13 (0.05)***	0.29 (0.04)***	0.03 (0.02)	0.18 (0.05)***	0.22 (0.05)***
Lesson group	0.12 (0.05)**	0.15 (0.05)***	-0.05 (0.04)	-0.03 (0.05)	-0.12 (0.04)***	0.35 (0.03)***	-0.22 (0.04)***	-0.18 (0.05)***
<i>N</i>	731	666	666	666	666	666	666	666
<i>R</i> <sup>2</sup>	0.12	0.14	0.31	0.12	0.26	0.26	0.24	0.20
<i>F</i> stat	14.24	13.50	87.60	7.48	61.38	52.83	64.48	51.12
<i>p</i> -value	.00	.00	.00	.00	.00	.00	.00	.00

TABLE IV  
PAYMENTS AND PROCESS

	Payment above official fees (1)	Tried to bribe (2)	Hired an agent (3)	Hired an agent and obtained license (4)	Payment to agent above official fees (5)	Obtained license and took more than three trips (6)
Comp. group mean	338.21	0.05	0.39	0.37	313.97	0.05
Bonus group	178.4 (46.33) <sup>***</sup>	0.02 (0.02)	0.19 (0.05) <sup>***</sup>	0.21 (0.05) <sup>***</sup>	142.4 (45.54) <sup>***</sup>	0.03 (0.02)
Lesson group	-0.24 (44.38)	-0.02 (0.02)	-0.02 (0.05)	-0.02 (0.05)	-42.22 (43.77)	0.05 (0.02) <sup>**</sup>
<i>N</i>	666	666	666	666	666	666
<i>R</i> <sup>2</sup>	0.13	0.11	0.12	0.13	0.11	0.09
<i>F</i> -stat	12.06	2.53	14.07	16.45	11.98	2.11
<i>p</i> -value	.00	.08	.00	.00	.00	.12

# Summary of results

- Bonus group was:
  - 25 pct. points more likely to obtain a license
  - 42 pct. points more likely to obtain a license quickly
  - 13 pct. points more likely to obtain a license without taking an exam
  - 18 pct. points more likely to obtain license without being able to drive
  - Paid about 50% more
- Lesson group was:
  - 15 pct. points more likely to obtain a license
  - 0 pct. points more likely to obtain a license quickly
  - 0 pct. points more likely to obtain a license without taking an exam
  - 22 pct. points less likely to obtain license without being able to drive
  - Paid no more than control
- So what do we conclude? Is corruption efficient or inefficient?

- One important result is that almost all of the change in the bonus group comes from using agents
- To study what agent can and cannot do, author conducted an "audit study":
  - Hired actors to approach agents to request assistance obtaining a drivers' license
  - Varied their situation (can drive, can't drive, etc), and measured whether agent states he can produce a license and, if so, the price

TABLE VI  
AUDIT STUDY

Group	Agent can procure license (Mean = 0.57)		Final price if agent can procure license (Mean = 1,586)	
	(1)	(2)	(3)	(4)
Constant	1 (0.00)***	1.02 (0.04)***	1,277.89 (57.36)***	1,303.17 (83.21)***
Cannot drive	0 (0.00)	-0.01 (0.02)	62.65 (81.66)	110.54 (85.76)
No residential proof	-0.5 (0.08)***	-0.51 (0.08)***	1,285.26 (99.34)***	1,295.81 (102.30)***
No age proof	-0.21 (0.07)***	-0.23 (0.07)***	329 (87.18)***	366.85 (90.96)***
Cannot come back	-0.95 (0.04)***	-0.94 (0.04)***	317.11 (256.50)	411.55 (263.70)
Need license quick	-0.92 (0.05)***	-0.91 (0.05)***	855.44 (212.03)***	850.51 (214.55)***
Actor fixed effects		X		X
N	226	226	128	128

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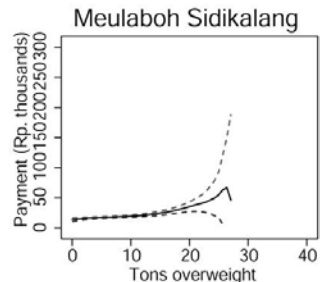
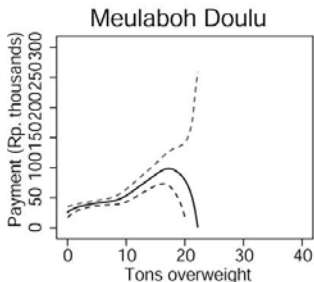
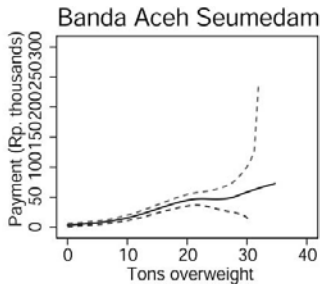
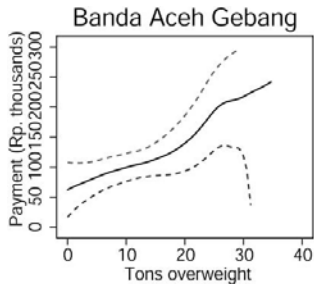
# Another example: trucking

Barron and Olken (2009): The Simple Economics of Extortion: Evidence from Trucking in Aceh

- Setting: long-distance trucking in Aceh, Indonesia
- Investigate corruption at weigh stations:
  - Engineers in the 1950s figured out that road damage rises to the 4th power of a truck's weight per axle
  - Thus weight limits on trucks are required to equate private marginal cost of additional weight with social marginal cost
  - In Indonesia, the legal rule is that all trucks more than 5% overweight supposed to be ticketed, unload excess, and appear in court
- What happens with corruption?
  - Among our 300 trips, only 3% ticketed, though 84% over weight limit (and 42% of trucks more than 50% over weight limit!)
  - The rest paid bribes
  - What do we need to know to think about efficiency?



# Results



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# Summary of findings

- Payments at weigh stations increasing function of truck weight
  - Note that the intercept is greater than 0 – so some extortion
  - On average, Rp. 3,400 (US \$0.3) for each ton overweight
  - Much more concave than official fine schedule
- Price discrimination makes it even more concave: the Gebang station offers menu of two-part tariffs!
  - Arrive at weigh station, pay  $\$18.50 + \$1.20 \times \max(\text{weight} - 10, 0)$
  - Buy date-stamped coupon from criminal organization in advance for \$16.30, then pay fixed bribe at weigh station of \$5.50
  - Crossing point around 16 tons
  - Those who tend to be more overweight tend to purchase the coupon, but lots of errors both ways
- Interesting question: how should the government design the rules, knowing they will be used as the threat point in a corrupt bargaining game?

- Three main ways to measure corruption
  - Perceptions
  - Comparing two measures of the same thing
  - Direct measurement
- Efficiency implications
  - Depends on whether the government's interests are aligned with or against private interests
  - Efficiency costs likely to be higher when government interests are against private willingness to pay
  - Examples from trucking and drivers' licenses suggest that this may be the case

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