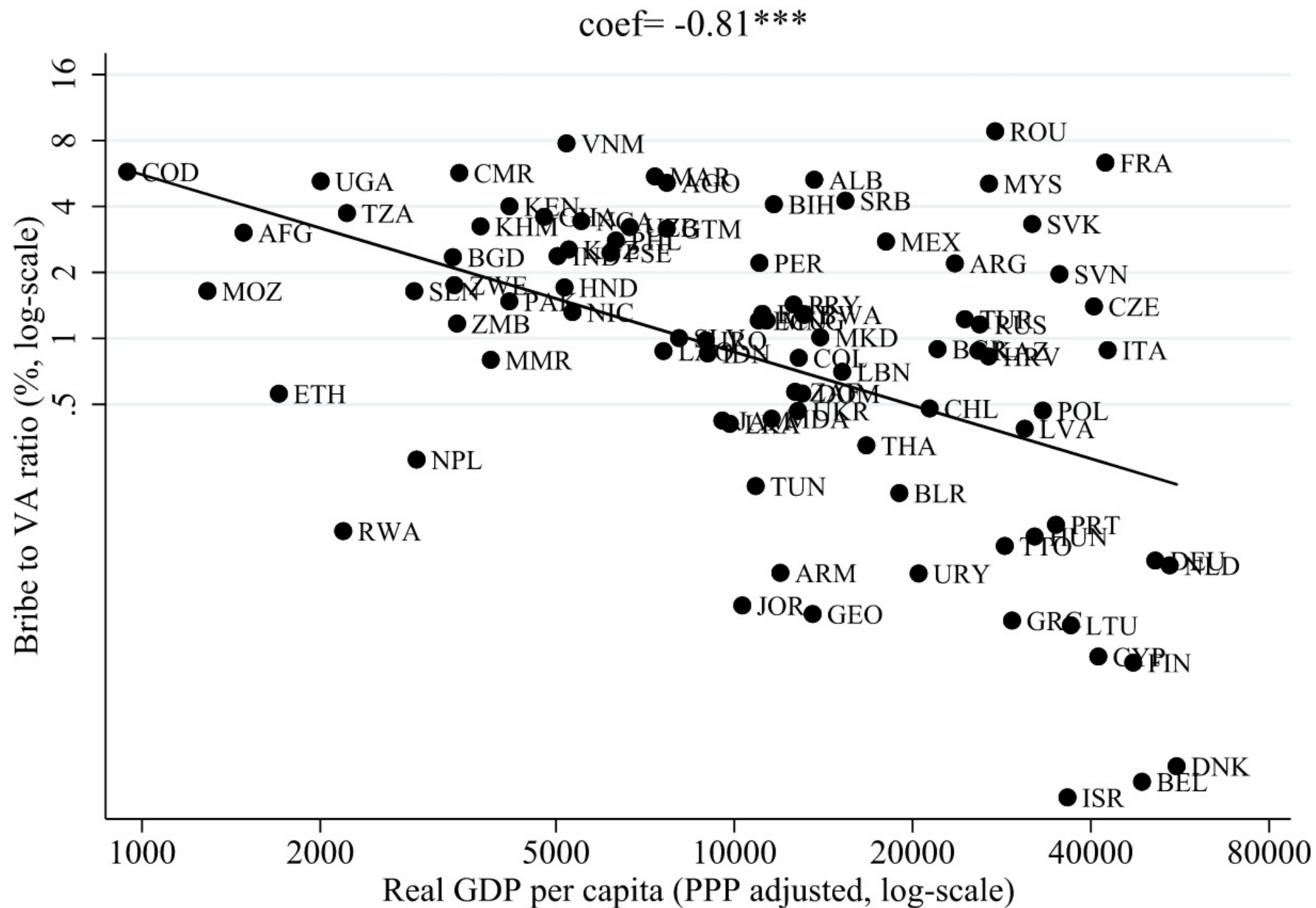


Tamkoç, M. N. (2024). Bribery, plant size and size dependent distortions. *Journal of Development Economics*, 171, 103361.

小组会讨论

Introduction

Facts (Data Source: World Bank Enterprise Survey, WBES)



Introduction

Motivation

- Why some countries are poorer and have lower productivity levels (corruption and bribery may be one reason).
- Given these facts, this paper asks what the effects of the interplay between size-dependent distortions and bribery are on plant size distribution and aggregate output.
- These questions have not been answered by the previous literature, even though bribery is prevalent in developing countries.
- Answers to these questions provide a better understanding of the relationship between bribery, plant size distribution, GDP per capita, and the effects of various policies, such as removing the bribery mechanism and increasing distortions in an economy.

Introduction

Literature and Contribution

- Misallocation: Size-dependent policies as one of the direct sources of misallocation. The size-dependent distortions favor small plants and levy higher regulations, fines, fees and taxes on bigger plants. （优惠政策扶持小企业，而征税常常“抓大放小”，大厂面临的税收扭曲更大）
- Corruption- Bribery: Corruption can be defined as the misuse of public power for private gain . There are two sides of corrupt activities, corrupt officials that are asking for bribes to ‘get things done’ and bribe payers.
- One strand of the literature focuses on how corruption and special deals can “get things done” and weaken the adverse effect of inefficient formal institutions （腐败的“润滑剂”作用） .
- 贡献： 强调了size-based的政策扭曲的重要性（量化了大小厂的区别）； 模型刻画上，基于卢卡斯的增长模型，设定腐败的环境/经济体是外生的，但是行贿的行为是内生的。

Introduction

Main Findings

- 用基于产出征收的税来刻画经理所经营的大厂或小厂面临的扭曲程度高低。
- 建立了一个能力高低的经理人经营大小厂、是否支付贿赂的生产函数。把是否处于腐败环境中、规模重要性、贿赂多少以及贿赂的回报和实际税率模型化。
- 理论表明，处于腐败的环境（这样才有行贿的条件）中，支付贿赂会使得扭曲程度降低。
- 使用土耳其的数据估计模型和反事实实验，结果表明：1.不腐败环境中大厂（以雇佣员工数衡量）面临的扭曲更大2.腐败环境中，大小厂都在支付贿赂，大厂支付的贿赂占其增加值的比例远小于小厂，但对税率降低的幅度却更大，这说明大厂更有能力通过行贿“撬动”更多利益，使得最终扭曲降低

Model

Distortion, bribery and manager's problem

$$\sum_{t=0}^{\infty} \beta^t \log(C_t) \quad y = Az (k^\nu n^{1-\nu})^\gamma$$

- 效用：家庭部门无限期消费折现
- 生产函数：卢卡斯（1978）公司规模控制模型
- 管理者能力 z 与控制范围参数 γ 结合，反映了管理者的管理跨度。管理者能力越高，他们能够有效管理的工厂规模就越大，但超过一定规模后，每增加一个单位的管理者能力对产出的贡献会减少。

y ：工厂的产出。

A ：技术参数，代表整体生产效率，对所有管理者都是相同的。

z ：管理者的能力，以管理跨度来衡量。

k ：资本投入，即工厂使用的资本量。

n ：劳动力投入，即工厂雇佣的工人数量。

γ ：控制范围参数，它决定了管理者的管理能力如何随着工厂规模的扩大而减少。当工厂规模增加时，管理者的效率降低，因为他们需要管理更多的工人。

ν ：资本的产出弹性，它表示产出对资本投入变化的敏感度。

Model

Distortion, bribery and manager's problem

$$\alpha(z) = \frac{\alpha_0}{\alpha_0 + z^{\alpha_1}}$$

$$T(z, b) = 1 - \lambda (z - v(z, b))^{-\tau} \quad v(z, b) = z \frac{\phi b}{1 + \phi b}$$

$$\pi_c(z, W, R) = \max_{\{k, n, b\}} (1 - T(z, b)) y - Wn - Rk - Wb - \tilde{b}$$

$$\pi_{nc}(z, W, R) = \max_{\{k, n\}} (1 - T(z, 0)) y - Wn - Rk$$

- $\alpha(z)$: 能力 z 的人所处在腐败经济体/政府中的概率，设定成 z 的函数因为 z 是天生的，认为一个人拥有什么样的能力和工作时和什么样的政府打交道都是命。
- $T(z, b)$: 实际税率，取决于经理的能力（也就是企业的大小）和支付的贿赂
- τ : controls size dependency/反映了公司规模大小的重要性
- ϕ : the return on bribe.
- 最优化问题：利润最大

Model

Household problem

$$\max_{\{C_t, K_{t+1}, \tilde{z}_{c,t}, \tilde{z}_{nc,t}\}_0^\infty} \sum_{t=0}^{\infty} \beta^t L_t \log \left(\frac{C_t}{L_t} \right)$$

s.t

$$C_t + K_{t+1} = I_t(\tilde{z}_{c,t}, \tilde{z}_{nc,t}, W_t, R_t) L_t + (1 - \delta + R_t) K_t + T_t$$

$$\begin{aligned} I_t(\tilde{z}_{c,t}, \tilde{z}_{nc,t}, W_t, R_t) = & W_t \left(\int_{\underline{z}}^{\tilde{z}_{c,t}} \alpha(z) f(z) dz + \int_{\underline{z}}^{\tilde{z}_{nc,t}} (1 - \alpha(z)) f(z) dz \right) + \\ & \int_{\tilde{z}_{t,c}}^{\bar{z}} \pi_c(z_t, W_t, R_t) \alpha(z) f(z) dz \\ & + \int_{\tilde{z}_{t,nc}}^{\bar{z}} \pi_{nc}(z_t, W_t, R_t) (1 - \alpha(z)) f(z) dz \end{aligned} \quad (5)$$

- 代表性家庭的家庭成员要么是worker，要么是manager
- 家庭的收入：如果是worker，就只能拿到wage这个部分，只有当能力足以成为manager才能有利润
- 消费者做决策的变量是消费、资本（储蓄）和劳动时间
- 政府部门把税收以一次性直接转移支付的形式给到家庭部门

Model

F.O.C (先求解经理问题, **manager**在**n**、**k**和**b**上做决策, 使得利润最大)

$$n_c(z, W, R) = \left[\lambda A (\tau \phi)^\tau \gamma^{1-\tau} (1-\nu)^{-\tau} \right]^{\frac{1}{1-\gamma-\tau}} \left(\frac{1-\nu}{W} \right)^{\frac{1-\nu\gamma}{1-\gamma-\tau}} \left(\frac{\nu}{R} \right)^{\frac{\nu\gamma}{1-\gamma-\tau}} z^{\frac{1-\tau}{1-\gamma-\tau}}$$

$$k_c(z, W, R) = \left[\lambda A (\tau \phi)^\tau \gamma^{1-\tau} (1-\nu)^{-\tau} \right]^{\frac{1}{1-\gamma-\tau}} \left(\frac{1-\nu}{W} \right)^{\frac{\tau+\gamma(1-\nu)}{1-\gamma-\tau}} \left(\frac{\nu}{R} \right)^{\frac{1-\tau-\gamma(1-\nu)}{1-\gamma-\tau}} z^{\frac{1-\tau}{1-\gamma-\tau}}$$

$$b(z, W, R) = \left[\lambda A \tau^{1-\gamma} \phi^\tau \gamma^\gamma (1-\nu)^{\gamma(1-\nu)} \right]^{\frac{1}{1-\gamma-\tau}} \left(\frac{1}{W} \right)^{\frac{1-\nu\gamma}{1-\gamma-\tau}} \left(\frac{\nu}{R} \right)^{\frac{\gamma\nu}{1-\gamma-\tau}} z^{\frac{1-\tau}{1-\gamma-\tau}} - \frac{1}{\phi}$$

$$n_{nc}(z, W, R) = [\lambda A \gamma]^{\frac{1}{1-\gamma}} \left(\frac{1-\nu}{W} \right)^{\frac{1-\nu\gamma}{1-\gamma}} \left(\frac{\nu}{R} \right)^{\frac{\nu\gamma}{1-\gamma}} z^{\frac{1-\tau}{1-\gamma}}$$

$$k_{nc}(z, W, R) = [\lambda A \gamma]^{\frac{1}{1-\gamma}} \left(\frac{1-\nu}{W} \right)^{\frac{\gamma(1-\nu)}{1-\gamma}} \left(\frac{\nu}{R} \right)^{\frac{1-\gamma(1-\nu)}{1-\gamma}} z^{\frac{1-\tau}{1-\gamma}}$$

Model

Discussion/重点讨论经理问题

$$\pi_c^*(z, W, R) = [\lambda A (\tau \phi)^\tau \gamma^\gamma]^{-\frac{1}{1-\gamma-\tau}} \left(\frac{1-\nu}{W} \right)^{\frac{\gamma(1-\nu)}{1-\gamma-\tau}} \left(\frac{1}{W} \right)^{\frac{\tau}{1-\gamma-\tau}} \left(\frac{\nu}{R} \right)^{\frac{\nu\gamma}{1-\gamma-\tau}} (1-\tau-\gamma) z^{\frac{1-\tau}{1-\gamma-\tau}} - \tilde{b} - \frac{W}{\phi}$$

$$\pi_{nc}^*(z, W, R) = [\lambda A \gamma^\gamma]^{-\frac{1}{1-\gamma}} \left(\frac{1-\nu}{W} \right)^{\frac{\gamma(1-\nu)}{1-\gamma}} \left(\frac{\nu}{R} \right)^{\frac{\nu\gamma}{1-\gamma}} (1-\gamma) z^{\frac{1-\tau}{1-\gamma}}$$

$$\frac{y}{nW} = \frac{1}{\gamma(1-\nu)} \frac{1}{1-T} \propto \frac{1}{1-T}$$

- Assume that $\gamma > \tau \geq 0$ and $1-\gamma-\tau > 0$ throughout the paper.
- The profit functions of both types of managers are convex functions of ability, z , and the slope of π_c with respect to z is higher than that of π_{nc} .
- 参考HK（2009），定义扭曲程度为企业增加值与员工工资（劳动收入）的比值，推导得出企业面临的扭曲与实际税率成正比

Model

Discussion/家庭部门

$$R^* = \frac{1}{\beta} + \delta - 1$$

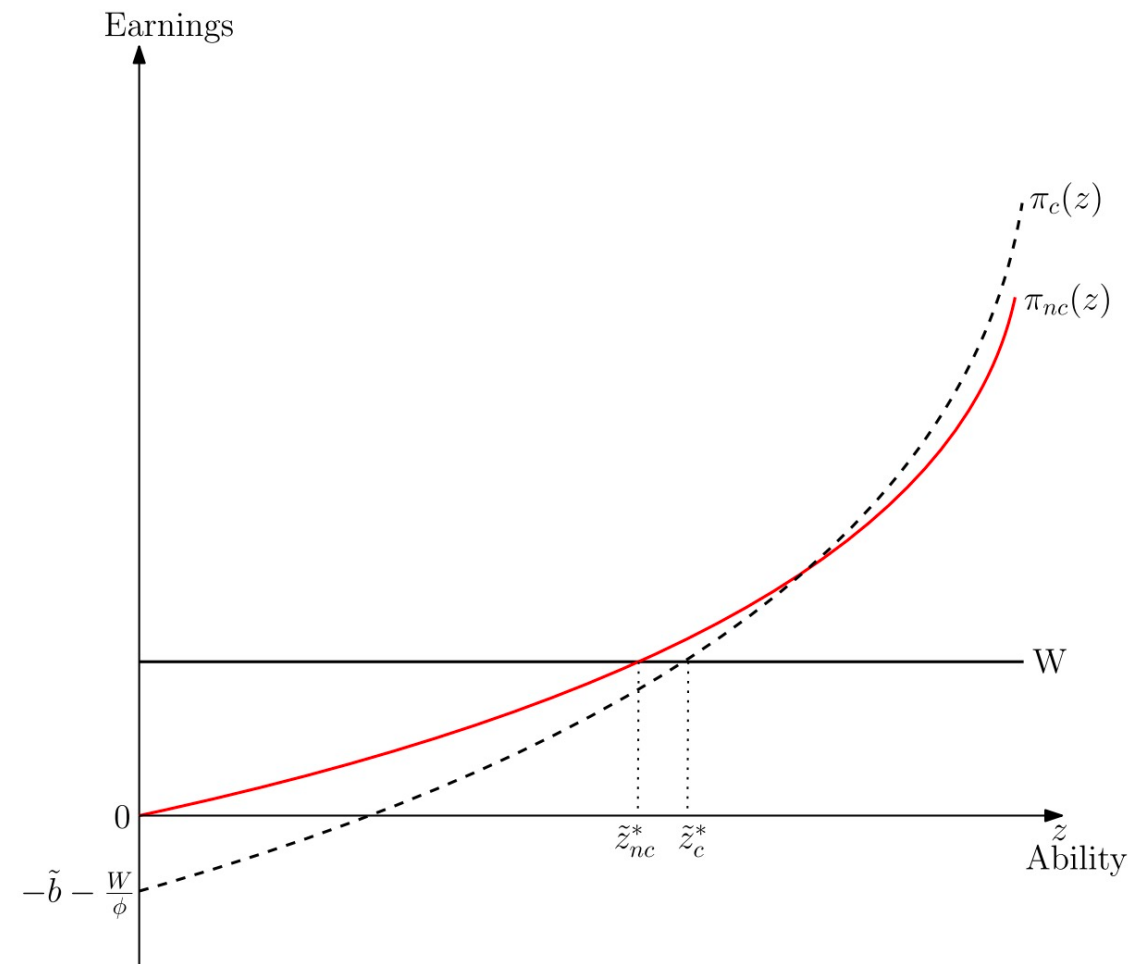
$$\frac{k_c^*(z, W, R)}{n_c^*(z, W, R)} = \frac{k_{nc}^*(z, W, R)}{n_{nc}^*(z, W, R)} = \frac{\nu}{1 - \nu} \frac{W}{R}$$

- 不论所处的环境腐败与否，资本与劳动的要素投入比例是一样的
- 腐败/行贿改变的是实际的税率

Model

Discussion and proposition

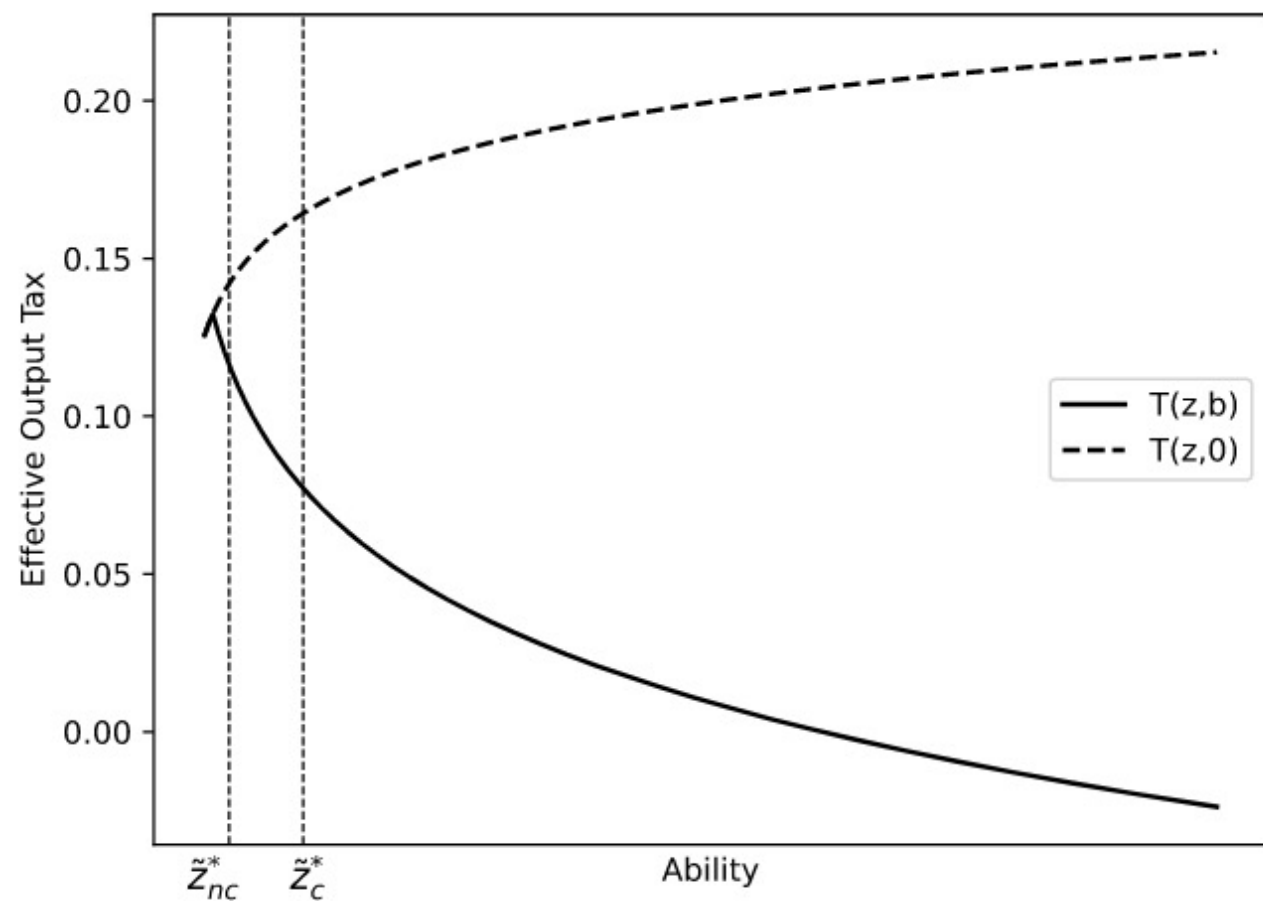
- 腐败的经济体中从 worker 变成 manager 的能力门槛值更大（直觉上，因为要有能力挣到去贿赂的部分）
- 处于腐败的经济体中的管理者利润随管理者才能变化的曲线更“陡峭”
- 当管理者能力较低的时候，在不腐败经济体中获得的利润更高；当管理者能力较高的时候，在腐败经济体中获得的利润更高



Model

Discussion and proposition

(a)



(b)



Model

Discussion and Proposition

$$T(z, b^*) = 1 - [\lambda^{1-\gamma} A^\tau (\tau \phi)^{\tau(1-\gamma)} \gamma^{\gamma\tau}]^{\frac{1}{1-\gamma-\tau}} \left(\frac{\nu}{R}\right)^{\frac{\gamma\tau\nu}{1-\gamma-\tau}} \left(\frac{1-\nu}{W}\right)^{\frac{\tau(1-\nu\gamma)}{1-\gamma-\tau}} \left(\frac{1}{1-\nu}\right)^{\frac{\tau(1-\gamma)}{1-\gamma-\tau}} z^{\frac{\gamma\tau}{1-\gamma-\tau}}$$

$$\frac{1 - T(z_0, b^*(z_0))}{1 - T(z_1, b^*(z_1))} = \left(\frac{z_0}{z_1}\right)^{\frac{\gamma\tau}{1-\gamma-\tau}} \geq 1 \quad \text{where } z_0 \geq z_1 \quad \frac{1 - T(z_0, 0)}{1 - T(z_1, 0)} = \left(\frac{z_0}{z_1}\right)^{-\tau} \leq 1 \quad \text{where } z_0 \geq z_1$$

- 存在腐败和行贿行为时，经理能力越强，税后利润率越高（实际税率越低）
- 不存在腐败和行贿行为时，经理能力越强，税后利润率越低（实际税率越高）
- 将能力与经营的规模结合起来，有能力的经理往往经营着更大的工厂
- 那么，（理论上）在腐败的经济体中，大厂行贿的规模会更大，因为如果是基于产出征税，大厂承担的有效税率及其带来的扭曲更大，行贿带来的边际收益很大；反之，小厂（能力弱的经理）不会选择行贿。
（比如贿赂100万，大厂相当于能让自己少交1000万的税，而小厂只能让自己少交80万的税，得不偿失）

	大厂	小厂
腐败环境/行贿	更有利	更不利
不腐败，不行贿	更不利	更有利

Calibration

Data Description

- 世界银行的企业调查（含土耳其）和土耳其的工业企业问卷数据，包含1344家企业
- 表1是问卷中问到企业主“是否收到过公共部门的行贿要求”，如果有大于等于一次，就定义为有bribery
- 表2是企业接受调查时报告的行贿金额占企业增加值的比重

Table 1

Bribery in Türkiye, 2013.

Source: WBES.

Size	Bribery during public transactions	Bribe to secure government contract	Overall bribery rate
All	1.91%	12.43%	8.72%
5–99	1.84%	12.74%	8.81%
100+	3.08%	10.69%	7.02%

Table 2

Bribery payment in Türkiye, 2013.

Source: WBES.

size	Bribery to VA ratio in extensive margin	Bribery to VA ratio in intensive margin	Refusal rate of bribery payment question
All	1.37%	13.54%	1.47%
5–99	1.50%	13.83%	1.53%
100+	0.11%	3.48%	0.38%

Calibration

Parameter values.

Parameter	Description		Value
$\underline{z}$	Lowest ability level		1
A	Technology parameter		1
δ	Depreciation rate of capital	借鉴其他文章直接用的	0.055
β	Discount rate		0.93
τ	Size dependency of distortions		0.03
λ	Level of distortions		0.87
ϕ	Efficiency of bribery		19.71
α_0	Level of prob. of meeting the corrupt official		1.63
α_1	Curvature of prob. of meeting the corrupt official		1.39
γ	Span-of-control		0.60
s	Shape parameter of Pareto dist.	假设经理能力服从帕累托分布， 分布函数的参数是s	2.54
ν	Importance of capital		0.68
$\tilde{b}$	Fixed bribery cost		10.53

Empirical Results

土耳其的情况

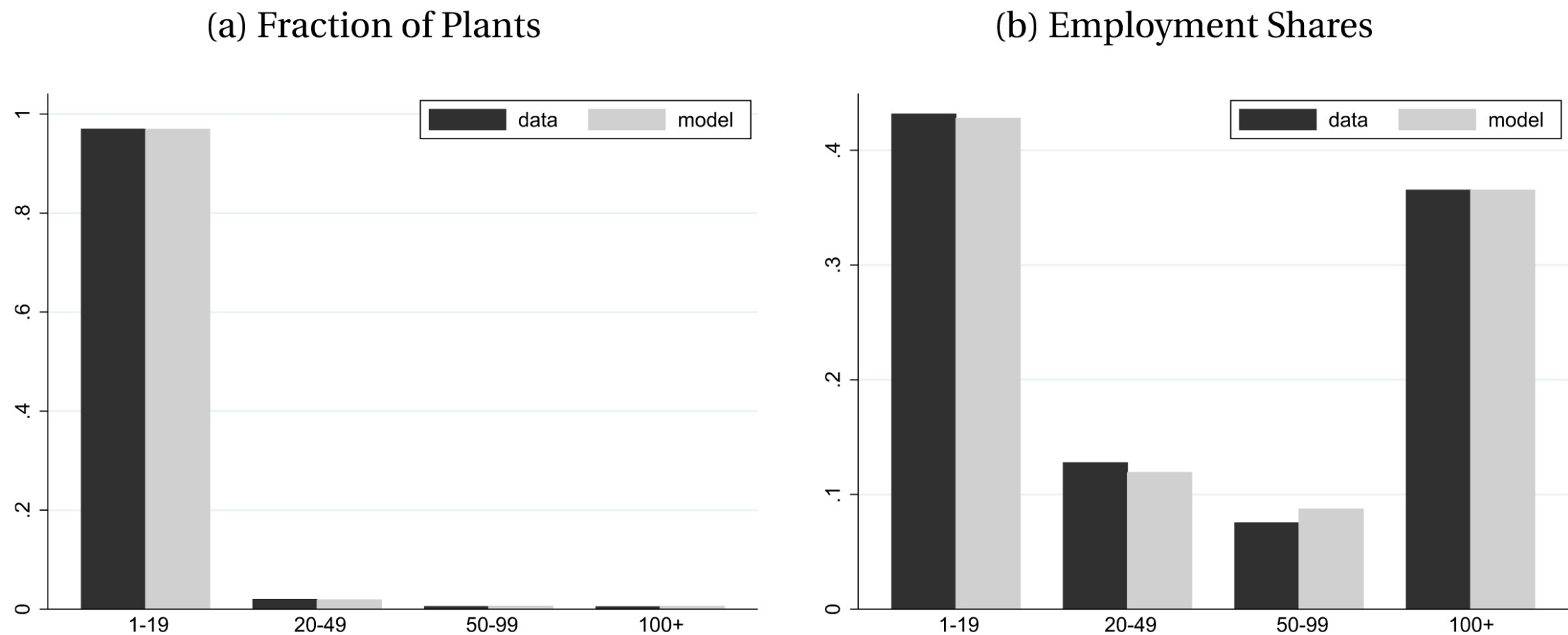


Fig. 4. Plant size distribution in the benchmark calibration.

Notes: This figure shows compares to the resulting plant size distribution of the benchmark calibration with that of TurkStat data. Panel (a) and (b) compares the fraction of plants and the employment share of plants in different size categories, respectively. See Section 5 for details.

Source: TurkStat and the author's calculations.

Empirical Results

- 外生环境不腐败的时候，大厂承担了更高的实际税率，且企业选不选择去贿赂差别不大（贿赂没用）
- 调整 size dependency 参数，这个参数越大，实际税率越高（基于规模的扭曲越大）

Size dependent distortions without bribery ($\phi = 0$).

	$\tau = 0.03$	$\tau = 0.05$	$\tau = 0.075$	$\tau = 0.1$
Mean Size	4.73	4.49	4.11	3.69
Output	99.39	96.08	91.98	88.36
Emp. Share 100+	36.67	34.21	30.99	27.70
Avg. Tax-small-bribe (%)	17.03	19.87	23.25	26.54
Avg. Tax-big-bribe (%)	20.03	24.74	30.31	35.57
Avg. Tax-small-no bribe (%)	15.07	16.63	18.40	19.90
Avg. Tax-big- no bribe (%)	20.26	25.09	30.79	36.13
Avg. Bribe-small (%)	10.67	11.11	11.66	11.93
Avg. Bribe-big (%)	0.50	0.52	0.54	0.55
Avg. Managerial Quality	98.92	98.02	95.04	91.09
$\tilde{z}_c$	4.21	4.27	4.36	4.45
$\tilde{z}_{nc}$	1.73	1.69	1.64	1.57
Tax Revenue	103.19	118.88	134.47	146.78
Total Fixed Bribes ($\tilde{b}$)	83.28	79.34	73.28	67.79

Empirical Results

- 外生环境腐败的时候，小厂支付着远高于大厂的贿赂（相对于自己的产值），但却承担了更高的实际税率（在做一些得不偿失的事，白干）
- 调整 size dependency 参数，越大对大厂越有利，但降低了总产出和总税收规模

Size dependent distortions with Bribery.

	Benchmark			
	$\tau = 0.03$	$\tau = 0.05$	$\tau = 0.075$	$\tau = 0.1$
Mean Size	4.84	4.56	4.40	4.46
Output	100	97.32	94.32	91.40
Emp. Share 100+	36.54	33.91	31.32	30.82
Avg. Tax-small-bribe (%)	7.93	1.70	-9.12	-23.33
Avg. Tax-big-bribe (%)	2.60	-8.26	-26.04	-49.60
Avg. Tax-small-no bribe (%)	15.09	16.67	18.59	20.58
Avg. Tax-big- no bribe (%)	20.27	25.16	30.98	36.62
Avg. Bribe-small (%)	13.83	17.17	20.93	25.56
Avg. Bribe-big (%)	3.48	6.14	10.58	16.96
Avg. Managerial Quality	100	98.19	97.39	98.46
$\tilde{z}_c$	4.01	3.83	3.56	3.30
$\tilde{z}_{nc}$	1.75	1.71	1.69	1.71
Tax Revenue	100	110.83	114.27	99.23
Total Fixed Bribes ($\tilde{b}$)	100	118.99	156.81	206.67

Empirical Results

- 调整行贿的回报率参数
- 贿赂更有利可图的时候，大小厂的实际税率都显著降低，大厂降了一半左右，总产出增加，总税收减少

Table 11
Role of return on bribe.

	Benchmark			
	$0.25 * \phi_{\text{bech}}$	$0.5 * \phi_{\text{bech}}$	$\phi_{\text{bech}} = 19.7$	$1.5 * \phi_{\text{bech}}$
Mean Size	4.85	4.84	4.84	4.83
Output	99.74	99.86	100	100.11
Emp. Share 100+	36.79	36.67	36.54	36.46
Avg. Tax-small-bribe (%)	11.77	9.88	7.93	6.78
Avg. Tax-big-bribe (%)	6.66	4.66	2.60	1.38
Avg. Tax-small-no bribe (%)	15.09	15.09	15.09	15.09
Avg. Tax-big- no bribe (%)	20.26	20.27	20.27	20.27
Avg. Bribe-small (%)	13.13	13.56	13.83	14.05
Avg. Bribe-big (%)	3.34	3.41	3.48	3.53
Avg. Managerial Quality	99.92	99.96	100	100.03
$\tilde{z}_c$	4.14	4.09	4.01	3.96
$\tilde{z}_{nc}$	1.75	1.75	1.75	1.75
Tax Revenue	101.28	100.68	100	99.57
Total Fixed Bribes ($\tilde{b}$)	88.93	93.47	100	105.27

Empirical Results

- 被“分配”到腐败环境中的概率的影响
- α_0 是概率函数的level参数， α_1 是概率函数的斜率参数。如果 α_1 为正，表示能力越高的经理有更低的概率遇上腐败的政府（扭曲更小）
- 如果 α_1 为负，说明能力越高的经理有更高的概率（好惨）遇上腐败的政府（扭曲更大）

Role of corrupt officials.

	Benchmark			
	$\alpha_0 = 2.0$ $\alpha_1 = 1.14$	$\alpha_0 = 1.63$ $\alpha_1 = 1.14$	$\alpha_0 = 1.63$ $\alpha_1 = 0$	$\alpha_0 = 1.63$ $\alpha_1 = -1$
Mean Size	5.07	4.84	8.64	13.73
Output	99.73	100	102.42	103.90
Emp. Share 100+	37.17	36.54	49.33	55.17
Avg. Tax-small-bribe (%)	7.91	7.93	7.66	7.66
Avg. Tax-big-bribe (%)	2.58	2.60	2.17	2.20
Avg. Tax-small-no bribe (%)	15.09	15.09	15.05	14.85
Avg. Tax-big- no bribe (%)	20.26	20.27	20.32	20.20
Avg. Bribe-small (%)	13.94	13.83	10.83	10.45
Avg. Bribe-big (%)	3.49	3.48	3.32	3.31
Avg. Managerial Quality	100.66	100	114.52	132.43
$\tilde{z}_c$	3.99	4.01	4.07	4.09
$\tilde{z}_{nc}$	1.73	1.75	1.80	1.82
Tax Revenue	99.06	100	52.21	25.76
Total Fixed Bribes ($\tilde{b}$)	120.83	100	460.37	663.41

Conclusion

- This study shows that big plants in Türkiye spend a smaller fraction of their output on bribery compared to small plants.
- Given that bribery opportunities exist, the effect of size dependent distortions is reduced, as managers can decrease them with bribery.
- In addition, changes in the distortion level have smaller effects on the aggregate economy, as they can be ruled out by bribery compared to cases without bribery opportunities.
- Future studies can conduct more precise calibrations with more detailed datasets for both plant size and bribery payments.