A Model of Transnational Corruption

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Outline

Introduction

- There are many forms and different typologies of corruption:
  - Magnitude of corruption: grand corruption and petty corruption
  - Examples of forms of corruption: bribery, collusion, embezzlement of public funds and theft, fraud, extortion, favoritism, clienteles, nepotism, the sale of government property by public officials etc.

- "**Transnational corruption** is one of the most complex, serious and intriguing forms of criminal activity that impacts the developing world" (Ware and Noone, 2005).

- Transnational bribery – the most dominant form of transnational corruption, occurs when people from one country bribe public officials from another country.

Consequences of corruption

- Institutional: "*It undermines democracy and the rule of law, leads to violations of human rights, distorts markets, erodes the quality of life and allows organized crime, terrorism and other threats to human security to flourish*" (UN General Assembly resolution, 2003).
- Economic (empirical evidences):
  - Slowdown of economic growth and private investment (Mauro, 1995).
  - Reduction of foreign direct investment (Wei, 1997; Smarzynska and Wei, 2000; Al-Sadig, 2009; Warren and Laufer, 2009).
  - Limitation of international trade (Ades and Di Tella, 1999).
  - Corruption continues to cost around US$ 1 trillion (World Bank 2005 estimates), with a large share of that being paid to officials of weak governments by corporations to extract and trade natural resources.

Economic mechanism

- Corruption acts as a **tax** on businesses, significantly reducing foreign investments. However, it is more costly than taxation because of its **uncertainty** and **secrecy** (Wei, 1997).
- A 1% increase in the bribery rate leads to a 3% reduction in firm growth and that effect is about three times greater than that of taxation (Fisman and Svensson, 2007).
- Capture of a significant share of the wealth that should have been invested into the economy.

Actions to combat corruption

Growing trend in efforts to regulate the supply side of transnational corruption:

- US Foreign Corrupt Practices Act (1977): limit the US firms' ability to pay bribes in foreign markets.
- OECD Anti-Bribery Convention (1997): put legal constraints on multinational enterprises (MNEs) to supply bribes overseas.
- United Nations Convention Against Corruption (General Assembly resolution 58/4 of 31 October 2003): requires parties to criminalize the bribery of foreign public officials.

Gap in the literature

- The existing studies of transnational corruption lack theoretical foundation, with the most dominant models of corruption tending to focus more on the misbehavior of public officials (bribe takers: demand side) but overlook the role of bribe suppliers (bribe givers: supply side).
- These models might not explain transnational corruption which is distinct from domestic corruption in two key aspects:
  - i) Foreign firms tend to have higher **bargaining powers** than domestic firms in dealing with public officials (Lee et al., 2010).
  - ii) Transnational corruption is regulated by both MNEs' home country and host country laws.

  i)+ii) call for comprehensive model of transnational corruption to understand the multiplex powerplay between MNEs and public officials in a host country, with the role of bargaining powers of firms in dealing with corrupt officials.

Objective of the study (cond't)

- Develop a stylised model of corruption based on a combination of two different literature strands: i) the **industrial organization perspective** of corruption from (Shleifer and Vishny (1993) and ii) the **property right or incomplete contract theory** by Grossman and Hart (1986, 1988), and Hart and Moore (1990).

- Shleifer and Vishny (1993): **principal-agent** model of corruption, i.e., the top level of government. A bureaucrat is assumed to have all the bargaining power in demanding a bribe from a firm. Competition among buyers is important for the spread of corruption. However the government good as strictly homogenous for all private clients.
- The GHM model: define a firm as a collection of assets on which the owner has residual control rights, i.e., all rights to determine the uses of assets except those specifically listed in the contract.

Introduction

Objective of the study

- We provide a comprehensive outlook of transnational corruption at both the **supply** and **demand** sides.
- We analyse different market structures of corruption, e.g **bilateral monopolists**, **independent monopolists**, **competing monopolists** and we apply these market structures into a specific corruption transaction setting rather than a general transaction.
- We take into account the role of the firms' rent-seeking efforts. In our framework, relative bargaining powers among parties do not only depend on their degrees of control rights but also on each party's rent-seeking investments, and the ability **to walk away from the transaction**.

Flavor of Main Findings

1. For a firm willing to engage in corruption, i) the bribe increases with its relation-specific investments, ii) decreases with the mobility parameter of the firm's controlled assets and with the probability of not getting the government good after bribing.
2. The likelihood of a firm to engage into corruption transactions decreases with the mobility parameter and decreases with the probability of not getting the government good after bribing.
3. Competition on the demand and supply sides has an adverse effect on transnational corruption: i) competition among public officials drives the equilibrium bribe rate down, ii) competition among firms drives the equilibrium bribe rate up.
4. Risk-averse public officials tend to ask a higher bribe than their risk-neutral counterparts, and risk-averse multinational firms pay less in bribes on average than their risk-neutral peers.

General Settings

The model is partly derived from the *widget* model of Hart and Moore (1999).

Widgets: specialized intermediate inputs needed by final-good producers. Widgets are government goods supplied by officials on behalf of the government.

We also use the Hellman et al. (2002) classification of corruption transaction:

1. **State capture**: the extent to which firms make illicit private payments to public officials in order to influence the formation of laws, rules, regulations or decrees by state institutions.
2. **Public procurement kickbacks**: illicit private payments to public officials to secure public procurement contracts.
3. **Facilitation payments**: private payments to public officials in order to facilitate implementation of administrative regulations placed by the state on the firm's activities.

General Settings

The model relies on four assumptions, the same as in the GHM model:

- parties can make relationship-specific investments
- ex-post parties can renegotiate
- ex-post parties have symmetric information
- any gains from trade can be realized

The provision of the *widget* occurs within three different market structures Shleifer and Vishny (1993):

- bilateral monopolists
- independent monopolists
- competing monopolists

In addition, corruption could either be with theft (collusive corruption), or without theft (non-collusive corruption).

Ex-ante Bargaining Stage

Initial parameters of the model:

- K, the firm's assets (capitals) per employee,
- a_1, accessible assets per employee to the firm,
- a_2, firm's assets per employee controlled by the public official.

The ex-ante relative *bargaining power* of the official is defined as:

$$\varphi = \frac{a_2}{a_1 + a_2} \quad \in (0, 1)$$

The relative bargaining power of the firm is therefore $1 - \varphi$.
In addition, let denote:

- $i (i \geq 0)$, the firm's rent-seeking investments per employee,
- $e (e \geq 0)$, the official's cost of widget provision.

Ex-ante Bargaining Stage

The table below summarizes the actual and the residual ownership of the parties over K.

Table: Ex-ante ownership structures

	Firm	Official
Actual ownership	K	0
Residual ownership	$(1-\varphi)K$	φK

The Benchmark Model

The benchmark model relies on four major assumptions:

- the firm only needs one government good,
- the provision of the government good is done under a bilateral monopoly,
- the transaction is non-collusive,
- the parties are risk-neutral.

Additional parameters:

- B, bribe rate of the transaction,
- $\tau(\tau \geq 0)$, host-country's detecting probability of the corruption transaction,
- P, requisite price of the government good,
- g and f, host-country's exogenous *fines* on the official and the firm respectively,

The Benchmark Model

- $u(u \geq 0)$, anti-corruption effectiveness of host-country,
- $v(v \geq 0)$, anti-corruption effectiveness of home-country,
- $\tau_h(\tau_h \geq 0)$, home-country's detecting probability of the corruption transaction,
- f_h, home-country's exogenous fine on the firm,
- π, the profit of the firm.

The host-country's detecting probability depends positively on e and u:

$$\tau \equiv \tau(e, u)$$

The home-country's detecting probability positively depends on v:

$$\tau_h \equiv \tau_h(v)$$

Finally, the firm's profit increases with i (rent-seeking investments):

$$\pi \equiv \pi(i)$$

The Benchmark Model

Ex-post surplus of the official if *trade*:

$$S_o^t = B - \tau(e,u)g \tag{1}$$

Ex-post surplus of the firm if *trade*:

$$S_f^t = \pi^t(i) - \tau(e,u)f - \tau_h(v)f_h - P - B \tag{2}$$

Total ex-post surplus of the transaction:

$$S^t = \pi^t(i) - \tau(e,u)(f+g) - \tau_h(v)f_h - P \tag{3}$$

$\pi^{nt}(i)$, the firm's profit if *no-trade*.
If *no-trade*, the official's surplus is zero while the firm's surplus is $\pi^{nt}(i)$, and then the total surplus becomes:

$$S^{nt} = S_f^{nt} = \pi^{nt}(i) \tag{4}$$

The gains from *trade* compared to the *non-trade* scenario equal:

$$G = S^t - S^{nt} = \pi^t(i) - \pi^{nt}(i) - \tau(e,u)(f+g) - \tau_h(v)f_h - P \tag{5}$$

The surpluses after bargaining for the firm and the official are respectively:

$$S_f^t = S_f^{nt} + (1-\varphi)G \tag{6}$$

$$S_o^t = S_o^{nt} + \varphi G \tag{7}$$

The equilibrium bribe rate of the firm obtained by equating (2) and (6) is:

$$B^* = \varphi\Delta\pi + (1-\varphi)\tau(e,u)g - \varphi(\tau(e,u)f + \tau_h(v)f_h + P) \tag{8}$$

where $\Delta\pi = \pi^t(i) - \pi^{nt}(i)$.

The Benchmark Model

Cobb-Douglas profit function from Cooper and Haltiwanger (2006):

$$\pi(A, K, \theta) = AK^{\theta} \tag{9}$$

- A is the profitability shocks, and reflects both the shocks to the revenue function and the variations in input costs such as demand shocks and price shocks.
- θ ($\theta \geq 0$) is the profit elasticity which measures the responsiveness of the profit to a change in levels of assets.

Firm's profit function if *trade*:

$$\pi_f^t = A[\ (1-\varphi)K]^{\theta_1}[\ (1-\epsilon)(\varphi K)^{\theta_2} + \epsilon(\alpha\varphi K)^{\theta_1}] \tag{10}$$

- θ_1, and θ_2 denote the firm's profit elasticities of the non-controlled assets $(1-\varphi)K$ and that of the controlled assets φK. We assume that $\theta_2 > \theta_1$, which reflects the fact that the profitability of the corruption-related assets is higher than the one of the remaining assets.
- $\alpha \in [0, 1]$: mobility (technology) parameter of the firm's controlled assets.
- ϵ: probability of not getting the government good after bribing, which reflects the uncertainty of corruption transaction.

Profit function if *no-trade* ($\epsilon = 1$):

$$\pi_f^{nt} = A[\ (1-\varphi)K]^{\theta_1}[\ (\alpha\varphi K)^{\theta_1}] \tag{11}$$

Substituting the explicit profit functions into equation (8) changes the equilibrium level of bribe into:

$$B^* = A\varphi(1-\epsilon)[(1-\varphi)K]^{\theta_1}[(\varphi K)^{\theta_2} - (\alpha\varphi K)^{\theta_1}]$$

$$+(1-\varphi)\tau(e,u)g - \varphi(\tau(e,u)f + \tau_h(v)f_h + P)$$

Proposition 1: *For a firm willing to pay a bribe, then* B^*:

(i) *increases with its relation-specific investments* i,

(ii) *decreases with the mobility parameter of the firm's controlled assets* α. *Whether the negative effect of* α *on* B *goes crescendo or not, depends on the profit elasticity* θ_1 *of non-controlled assets*,

(iii) *decreases with the fine* f_h *from the home country*,

(iv) *decreases with the probability* ϵ *of not getting the government good after bribing.*

Comments

(i) Once the firm made significant investment in dealing with the government (non-trivial or relation-specific investments), the firm is more willing to pay and pay higher bribe. Evidence from Kaufmann (1999): firms paying more bribes are also those likely to spend more management time with bureaucrats.

(ii) States that the more mobile technologies and assets the firm has, the less bribe it has to pay. Consistent with Svensson 2002: firms with refusal powers, i.e., with a higher alternative return to capital, pay less bribes.

(iii) The negative effect of f_h on B^* indicates that a higher punishment from the home country will lead a decrease in the level of corruption. Foreign firms with stricter overseas anti-bribery rules tend to pay less bribes. There is however little empirical evidence to support this finding and therefore remains a fertile area for future research on transnational corruption.

(iv) suggests that a higher probability of not getting the government good after the transaction reduces the level of bribe the firm is willing to pay. This captures the effect of uncertainty on corruption transactions.

Firm Heterogeneity and Probability to Corrupt

If the profitability from the corruption transaction is above a certain value $\Delta\pi^*$, a firm is willing to pay the bribe. Threshold profitability of corruption transaction:

$$\Delta\pi^* = \tau(e,u)(g+f) + P + \tau_h(v)f_h$$

Profit elasticity of controlled assets:

$$\theta_2(i^*) = log_{\varphi K}\left[\frac{\tau(e,u)(g+f)+P+\tau_h(v)f_h}{A\varphi(1-\epsilon)[(1-\varphi)K]^{\theta_1}} + (\alpha\varphi K)^{\theta_1}\right] = log_{\varphi K}X^*$$

Threshold relation-specific investment level i^*:

$$i^* = \theta_2^{-1}\{log_{\varphi K}X^*\}$$

Where $X^* = \frac{\tau(e,u)(g+f)+P+\tau_h(v)f_h}{A\varphi(1-\epsilon)[(1-\varphi)K]^{\theta_1}} + (\alpha\varphi K)^{\theta_1}$.

The Benchmark Model

Proposition 2: *The likelihood of a firm to engage into corruption transactions: i) decreases with the mobility parameter α of the firm's controlled assets, ii) decreases with the probability ϵ of not getting the government good after bribing, iii) decreases with the expected fine $\tau_h(v)f_h$ and $\tau_h(e,u)f$ from the home and host country resp.*

Comments

(i) suggests that the mobility degree of technology limits the likelihood of a firm to corrupt and reduces the proportion of firms bribing in the economy. See evidence from Svensson (2002).

However, due to the possibility of a reverse causation between the likelihood of corruption and the mobility of technologies, an ample empirical evidence regarding this relationship remains limited. The firm manager's perception of a higher corruption level might lead to a more mobile technology choice of its controlled assets.

(ii) When corruption is more uncertain, firms are less likely to bribe. The rationale behind this statement is that shocks from uncertainty of corruption might lead to a higher required relation-specific investment to proceed with the transactions.

Competition and Corruption

While our baseline model uses the bilateral monopoly, here we will investigate how competition affects the mechanics of transnational corruption.

A. Competition among Officials

- The government good is now supplied by two independent rival public officials (competition from the demand side),
- $\bar{B}$, bribe to be paid to the rival official,
- $\bar{\tau}$, host-country's detecting probability of the rival transaction.

Following the same steps as in the benchmark case, the new equilibrium bribe rate becomes:

$$B_{c1}^{*} = \varphi\Delta\pi_{c1}(i) + \varphi(\bar{\tau} - \tau(e,u))f + (1-\varphi)\tau(e,u)g + \varphi\bar{B}$$

Comparing the new value of B to its benchmark value, we get:

$$B_{c1}^{*} - B^{*} = \varphi\left(\Delta\pi_{c1}(i) - \Delta\pi(i) + \bar{\tau}f + \tau_h(v)f_h + \bar{B} + P\right) < 0$$

Which is equivalent to:

$$B_{c1}^{*} < B^{*}$$

B. Competition among Firms

- The government good is now sold to a rival firm if the incumbent firm decides to walk away from the transaction (competition from the supply side),
- $\tilde{B}$, bribe to be paid by the rival firm,
- $\tilde{\tau}$, host-country's detecting probability of the rival transaction.

Following the same steps as in the benchmark case, the new equilibrium bribe rate becomes:

$$B^*_{c2} = \varphi\Delta\pi_{c2}(i)+(1-\varphi)(\tau(e,u)-\tilde{\tau})g+(1-\varphi)\tilde{B}-\varphi(\tau(e,u)f+\tau_h(v)f_h+P)$$

Comparing the new value of B to its benchmark value, we get:

$$B^*_{c2} - B^* = (1-\varphi)(\tilde{B} - \tilde{\tau}g) = (1-\varphi)S^{nt}_o > 0$$

Which is equivalent to:

$$B^*_{c2} > B^*$$

Competition and Corruption

Proposition 3: *Competition on the demand and supply sides has an adverse effect on transnational corruption. More specifically:*

(i) *Competition among public officials drives the equilibrium bribe rate down,*

(ii) *Competition among firms drives the equilibrium bribe rate up.*

Comments

(i) suggests that corruption could be effectively lowered by subsequently increasing competition among public officials who supply the government goods. Therefore, increasing competition among these suppliers can be one anti-corruption tool at the disposal of national governments.

(ii) When a firm faces a competition from other firms who are equally willing to bribe the same official, its bargaining power gets weakened. The official aware of the existence of alternative bribe suppliers will maximise its gains by asking the highest bribe. That further increases the pressure on each firm to make a better offer than its rivals. Competition among firms drives the equilibrium bribe level up.

A. Collusion in Transnational Corruption

- The public official and the firm now agree to report only a fraction or none of the requisite price P of the government good,
- φP corresponds to the fraction of the fee that goes to the official.

Following exactly the same steps as in the previous sections, we get the equilibrium bribe rate of the *collusive* corruption transaction:

$$B^*_{col} = \varphi\Delta\pi(i) + (1-\varphi)\tau(e,u)g - \varphi\tau(e,u)P - \varphi(\tau(e,u)f + P + \tau_h(v)f_h)$$

Substituting the profit functions of the firm by their explicit expressions, we get:

$$B^*_{col} = A\varphi(1-\epsilon)[(1-\varphi)K]^{\theta_1}[(\varphi K)^{\theta_2} - (\alpha\varphi K)^{\theta_1}]$$

$$+(1-\varphi)\tau(e,u)g - \varphi\tau(e,u)P - \varphi(\tau(e,u)f + P + \tau_h(v)f_h)$$

Further Extensions

Comparing the equilibrium bride rates under the collusive and the non-collusive regimes of corruption gives:

$$B^*_{col} - B^* = \varphi\tau(e,u)P \geq 0$$

Which is equivalent to:

$$B^*_{col} \geq B^*$$

Proposition 4: *Firms are more likely to corrupt and pay higher bribes when corruption transactions are collusive, and the difference in the bribe rates increases with the requisite price of the government good.*

Comments

In many collusive transactions where corruption is mutually beneficial between an official and a firm, none of the two parties have an incentive to report against each other. As a result, this type of corruption is more difficult to detect. Corruption is more pervasive and persistent when a firm might collude with a corruptible official to embezzle from the government.

B. Risk-Aversion and Corruption

- The firm now is *risk-averse*,
- B_{Rf} denotes the bribe level when the firm is risk-averse,
- γ represents the coefficient of relative risk-aversion of the firm,

The ex-post surplus of the firm if *trade* is:

$$S_f^t = \frac{\pi^t(i)^{1-\gamma} - 1}{1-\gamma} - \tau(e,u)f - \tau_h(v)f_h - P - B_{Rf}$$

After computation, the new equilibrium bribe rate gets down to: $B_{Rf}^* = \frac{\varphi}{1-\gamma}\left(\pi^t(i)^{1-\gamma} - \pi^{nt}(i)^{1-\gamma}\right)$

$$+(1-\varphi)\tau(e,u)g - \varphi\left(\tau(e,u)f + \tau_h(v)f_h + P\right)$$

Comparing B_{Rf}^* to B^* in the benchmark case, we get:

$$B_{Rf}^* - B^* = \varphi\left[\frac{\pi^t(i)^{1-\gamma}}{1-\gamma} - \pi^t(i) - \left(\frac{\pi^{nt}(i)^{1-\gamma}}{1-\gamma} - \pi^{nt}(i)\right)\right] < 0$$

which is equivalent to: $B_{Rf}^* < B^*$

Further Extensions

- The public official now is *risk-averse*,
- B_{Ro} denotes the bribe level when the official is risk-averse,
- δ represents the coefficient of relative risk-aversion of the official,

The ex-post surplus of the official if *trade* is:

$$S_o^t = \frac{B_{Ro}^{1-\delta} - 1}{1-\delta} - \tau(e,u)g$$

After computation, the new equilibrium bribe rate gets down to: $B_{Ro}^* = \pi^t(i) - \pi^{nt}(i) + \frac{1-\varphi}{\varphi(1-\delta)} + \frac{1-\varphi}{\varphi}\tau(e,u)g$

$$- (\tau(e,u)f + \tau_h(v)f_h + P)$$

Comparing B_{Ro}^* to B^* in the benchmark case, we get:

$$B_{Ro}^* - B^* = (1-\varphi)\left[G + \frac{1}{\varphi(1-\delta)} + \tau(e,u)g + \frac{1-\varphi}{\varphi}\tau(e,u)g\right] > 0$$

which is equivalent to: $B_{Ro}^* > B^* \quad \forall \delta \in [0,1)$

Risk-Aversion and Corruption

Proposition 6: *Risk-aversion on the demand and supply sides has an adverse effect on transnational corruption. More specifically:*

(i) *Risk-averse public officials tend to ask a higher bribe than their risk-neutral counterparts.*

(ii) *Risk-averse multinational firms pay less in bribes on average than their risk-neutral peers.*

Comments

Different dynamics from whether we are in the demand or the supply side of transnational corruption. Public officials who happen to be risk-averse face the risks of being fired, fined or jailed, according to the magnitude and frequency of their wrongdoings, and therefore will ask a higher bribe from the firms in order to compensate for those risks.

Reversely, firms face the risks of being fined, expelled from the country, but also the risk of not receiving the government good despite having paid the bribes. Therefore, paying less is the best strategy for risk-averse multinationals.

Conclusion

- First theoretical model of transnational corruption, departing from the traditional approach of corruption modeling by combining the incomplete contract theory and the industrial organization perspective of corruption.

- We distinguish between corruption without theft (non-collusive corruption) and corruption with theft (collusive corruption). We find that firms are more likely to corrupt and pay higher bribes when transactions are collusive, and that the difference in the bribe rates increases with the requisite price of the government good.

- We consider the risk-attitudes on both the demand and supply sides of transnational corruption. Most economic models of corruption consider risk-neural economic agents while in reality corruption is a very risky business for a stream of reasons.

Conclusion

- **Policies**:
  - *Demand side:* i) encouraging the joint provision of complementary government goods and services by different agencies could help reduce the scope of bribery and the bureaucratic burden, ii) increasing competition among different suppliers of the same government goods or services, fixing higher financial penalties on corrupt officials and improving the anti-corruption effectiveness of the host-countries governments could curb the demands of corruption.
  - *Supply side*: stricter anti-corruption regulations from home-countries of MNEs, higher financial penalties from local governments and encouraging FDIs from MNEs with more mobile technologies and assets are few measures that could limit transnational corruption.
- **Further research**: endogenize the bargaining power of parties (officials vs. MNEs) in a strategic game setting with asymmetric information, in *a la* Mortensen-Pissarides matching model with equilibrium search and matching.


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Баярлалаа
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thank you
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dankie
dhanyavad
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তোমাকে ধন্যবাদ
감사합니다
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