Intermediaries in corruption markets

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Abstract

Consider a government transfer to a group of people "deserving" the transfer. Corruption happens when undeserving candidates obtain the transfer with the help of corrupt officials. Often, such corrupt activities are carried out with the help of other people who act as intermediaries between undeserving candidates and corrupt officials. This paper argues that intermediaries have no function in an economy where all government officials are corrupt. Intermediaries assume a meaningful role in societies where only some officials are corrupt, or when such officials are wary of engaging in corrupt transactions with agents they do not know—perhaps for fear of being caught and punished. We show that, under fairly general conditions, all candidates including perfectly deserving candidates take the help of an intermediary. We term this “endemic” corruption.

JEL Classification numbers: H80, K42.
Keywords: endemic corruption, intermediaries.
1. Introduction

Corruption is a ubiquitous activity in most underdeveloped countries. While corruption may be practised unilaterally (e.g. embezzlement), a wide variety of corrupt practices involve more than one agent (e.g. bribery). In the typical instance of corruption, a public official allows a private agent a privilege which that agent is legally not entitled to, in return for a payment in cash or kind. The privilege may be that of importing a dutiable good without paying the duty, or obtaining information on rival bids for a government contract. Such corruption requires cooperation between two parties—the official and the agent seeking the privilege—and must involve agreement on a price. Every such act thus presupposes a market transaction.

It is a special characteristic of this market, however, that buyers and sellers cannot publicly go about their search for trading partners. This distinguishes it from markets for everyday goods. Since information about potential partners is difficult to acquire, some individuals find it profitable to specialise in the acquisition and dissemination of such information. In economies where corruption is said to be “endemic”, there is usually a well-developed network of intermediaries; as a consequence it is easy to locate potential partners and negotiate prices, making corruption and rent-seeking an attractive and lower-cost alternative to legal activities. Agents therefore choose corrupt transactions over legal ones, in turn ensuring that the intermediaries stay in business.

This paper presents a simple model of intermediation in corruption activities, where intermediaries capitalise on specialised knowledge about the identities of corrupt government officials. In our model intermediaries act as a conduit between government officials and members of the public in the disbursement of a public benefit. All members of the public value the benefit, only some are entitled to it. Corruption then consists of an official conferring the benefit to a citizen who is not entitled to it. We show that the existence of intermediaries increases participation in corrupt acts, which is unsurprising, and that it encourages even honest agents to employ intermediaries, which is less so.

Much of the literature on corruption analyses the problem using the principal-agent model. Corruption is the outcome of a moral hazard problem which arises because of an information asymmetry between the government (principal) and the public servant (agent) (e.g. Bardhan 1997, page 1321). The government cannot perfectly monitor the agent, so the latter has some discretion over his actions. He may use this discretion in a manner that promotes personal gain, e.g. by accepting a bribe to authorise an application that does not meet relevant guidelines.

Since corruption is the outcome of asymmetric information, the remedy is to reduce information asymmetry. Rose-Ackerman (1978, pp. 17-29)
shows that legislative corruption cannot survive in a world of perfect information as long as penalties are enforced effectively. Even if information is imperfect so that acts of corruption may escape detection with some probability, Becker’s (1968) model indicates that a high enough penalty will deter corruption. Basu et al. (1992) point out that, if enforcement authority is itself susceptible to corruption, then the penalty is not as efficient a deterrent. Marjit and Shi (1998) show that this problem can be alleviated by using part of the penalty to reward the agent who brings him to justice. Other work on corruption using the principal-agent problem includes Barro (1973), Becker (1983), Klitgaard (1988), Grossman and Helpman (1994), Rose-Ackerman (1999), Rasmusen and Ramsayer (1994) and Banerjee (1997).

A second approach to corruption analyses it as a rent-seeking problem (Krueger 1974, Shleifer and Vishny 1993). In its purest form, successful rent-seeking realises potential surplus by appropriately reallocating resources to high-surplus uses. Thus when many individuals are waiting in a queue, one of them who has a high opportunity cost for waiting may be willing to “buy” the place in front of the queue from another individual who has a lower cost of waiting. Alternatively, the clerk at the window may effectively “auction” the place in front of the queue, by serving first the client who is willing to pay the highest bribe (see, e.g., Lui 1985, Beck and Maher 1986). Thus this kind of corruption increases efficiency by suitably reallocating resources to their best uses. However, Shleifer and Vishny (1993) distinguish between corruption “without theft” and corruption “with theft”, and show that the efficiency argument does not hold uniformly.

The literature, however, is largely silent on the subject of corruption intermediaries, though the most cursory casual empiricism indicates that these agents are thick on the ground in any underdeveloped economy. In an early paper, Basu (1986) analysed the power of the intermediary as arising from a coordination of expectations. Very recently, Mullianathan et al. have found substantial empirical evidence of both the existence and potency of intermediaries in the ”market” for driving licenses in Delhi. They found that the services of an agent was more useful in obtaining a driving license than were superior driving skills.

Intermediaries have no function in an economy where all government officials are corrupt and willing to accept bribes indiscriminately from members of the public. They assume a meaningful role when only some officials are corrupt, or when such officials are wary of engaging in corrupt transactions with agents they do not know—perhaps for fear of being caught and punished. The citizen employs an intermediary to obtain the service for him—it is perfectly legal to hire an agent to stand in line with an application—and the official can safely accept the bribe from the trusted intermediary. In this paper we examine various scenarios in which intermediaries may be active, and compare the equilibrium outcomes with the benchmark case where there
is no intermediation.

We characterise equilibria in three different settings. The most important findings are:

(a) In the economy with intermediaries, all agents use intermediation, including deserving candidates who do not pay bribes.

(b) If the benefit is very generous, then even deserving candidates pay a positive fee for intermediation.

(c) Intermediaries can enforce collusive agreements with officials.

The next section sets out the model and establishes equilibrium in the corruption market when there is no intermediation. Section 3 investigates equilibrium with a monopolist intermediary. The following two sections analyze collusion between the intermediary and officials, and competition between intermediaries, respectively.

2. The Model

The focus is on a service that is publicly provided to qualified citizens. There is a large population of citizens, out of which a randomly selected subset of \((M + N)\) citizens need the service in any given period. Of these, \(M\) are qualified to receive the service, and \(N\) are not. We will call the two types “deserving” (D) and “undeserving” (U) candidates, respectively.

The service is a transfer of amount \(B\), received from the public exchequer. We assume that when the transfer is made to a deserving candidate, it increases social welfare by an amount \(\alpha B\) \((\alpha > 0)\), whereas when an undeserving candidate receives the transfer, social welfare is unaffected. Any private transfers between agents (e.g. bribes paid to clerks) also leave net social welfare unaffected.

To receive this transfer, candidates have to go to a counter, prove their credentials and pick up the money. There are \(K\) such counters and each candidate can go to any one of them. The documents a candidate has to bring have sufficient information to establish whether he, or she, deserves to get the transfer.

Assuming that all counters have honest officials, any one who is not deserving will immediately be identified as such and will be denied the transfer. Any deserving candidate will similarly be identified as such and obtain the transfer. There is a cost of queuing up at the windows and, hence, it does not pay any undeserving candidate to come to any window. Only deserving candidates will then stand in line and their benefit will be \(B - \gamma(x)\), where
$x$ is the expected length of the line at any counter and $\gamma(\cdot)$ is the cost of standing in queue. We assume:

**A. 1:** \[ \gamma(0) = 0, \quad \gamma'(\cdot) > 0, \quad \gamma''(\cdot) \geq 0. \]

Therefore, when all officials are honest and the technology for identifying a deserving candidate is perfect (i.e., the identification is without any error), the utility of a deserving candidate is

\[ V_D(M, 0; 1) = B - \gamma\left(\frac{M}{K}\right) \tag{1} \]

Where $V_j(x, y; \theta)$ is the utility of a type $j = D, U$, given that $x$ deserving candidates and $y$ undeserving ones apply for the transfer, and $\theta$ is the proportion of officials that are honest. $\frac{M}{K}$ is the expected length of the line at any counter assuming that candidates choose counters randomly. We will always assume that

**A. 2:** \[ B > \gamma\left(\frac{M}{K}\right). \]

Now suppose that only $k$, $0 \leq k \leq K$ officials are honest. A dishonest official can make the transfer to an undeserving candidate but cannot deny the transfer to a deserving candidate. Since the undeserving candidate is getting a transfer she is not entitled to, the dishonest official can charge an unofficial fee, or bribe, to affect this transfer. We assume that the bribe is determined by symmetric Nash bargaining, so that both the candidate and the official get $\frac{B}{2}$.

A candidate has no way of knowing which counter has an honest official and which does not. Define $\theta = \frac{k}{K}$ and suppose that $n$ of the $N$ undeserving candidates apply. We continue with our assumption that candidates are randomly allocated to the counters. We also assume:

**Assumption 1.** Counter officials are drawn at random from the population of all officials. The proportion $\theta$ of honest counter officials is constant and equal to the corresponding proportion in the population of all officials.

With probability $\theta$ the undeserving candidate will meet an honest official and with probability $(1 - \theta)$ she will meet a dishonest official. Her utility is then given by

\[ V_U(M, n; \theta) = (1 - \theta)(\frac{B}{2}) - \gamma\left(\frac{M + n}{K}\right) \tag{2} \]

The corresponding utility of a deserving candidate is:

\[ V_D(M, n; \theta) = B - \gamma\left(\frac{M + n}{K}\right). \tag{3} \]
Proposition 1. A deserving candidate will always apply.

Proof. This follows directly from A.2 if no undeserving candidate is applying. An undeserving candidate will apply only if the utility in (3) is non-negative, which implies that $V_D$ in (3) must be strictly positive.

Proposition 2. The number of undeserving candidates that apply decreases in $\theta$ and increases in $K$.

Proof. As long as $V_U$ in (2) is positive, undeserving candidates have an incentive to apply. Thus the equilibrium number of undeserving candidates that apply is the number that reduces $V_U$ in (2) to zero. The proposition then follows directly from (2).

Let $Z(K)$ be the cost of maintaining counters, including the salaries of officials and the infrastructure costs of setting up the counters. Suppose only deserving candidates apply for the transfer. Then the net social cost is $Z(K) + M\gamma(M/K)$ (operating cost plus waiting cost), and the social benefit is $\alpha MB$. An increase in the number of counters $K$ increases the direct operating cost $Z(K)$, but reduces the average waiting cost $\gamma(M/K)$. Let $K_0$ maximize social welfare when only deserving candidates apply;

$$K_0 = \arg \min_K Z(K) + M\gamma(M/K) \quad (4)$$

When undeserving candidates also apply and obtain the benefit with positive probability, the social cost increases to $Z(K) + (M + n)\gamma(M+n/K)$ while the social benefit remains unchanged at $\alpha MB$. To deter undeserving candidates altogether, the waiting cost must be large enough to swamp the expected gain. Let $K_1$ be the largest number of counters for which this holds, i.e.,

$$K_1 \text{ satisfies } (1 - \theta)(\frac{B}{2}) - \gamma(\frac{M}{K}) = 0 \quad (5)$$

Proposition 3. Social welfare decreases in $K$ for $K \geq K_1$.

Proof. When $K \geq K_1$, the number of undeserving applicants, $n$, will increase until $V_U(M, n; \theta) = 0$ in equation 3. So in equilibrium, for any $K$, the total number of applicants must be such that the average waiting cost is $(1 - \theta)(\frac{B}{2})$. Thus any increase in $K$ is matched by a proportional increase in applicants. The net social cost from waiting increases proportionally, and the average waiting cost is not reduced.
3. The model with a monopolist intermediary

Now suppose there is a single “intermediary” $I$, who has invested by finding out exactly which of the clerks are dishonest. A candidate who wants to be directed to a corrupt (or honest) clerk can approach the intermediary and acquire this information for a price. Below we present the intermediary’s optimization problem, and establish the corresponding equilibrium.

Undeserving candidates have an obvious reason to seek the help of the intermediary; by going to a corrupt clerk they improve their probability of accessing the benefit from $(1 - \theta)$ to unity, and avoid the cost of waiting in line at an honest counter. As some of them do so, however, the lengths of the lines at corrupt counters become longer than those at honest counters. Thus, some deserving candidates may also find it profitable to access the intermediary’s services and be directed to the honest counters where the lines are now shorter.

Note that the intermediary can set different prices at which he sells information to the two types of candidates, without needing to verify their types (e.g. by evaluating their applications). A candidate asks the intermediary to direct him to a corrupt (respectively, honest) counter, and is pointed to an appropriate counter. If the number of counters is large, then this information is not especially useful to a candidate who in fact wishes to find an honest (respectively, corrupt) counter. Thus it does not pay the candidates to misrepresent their types to the intermediary.

Let $m'$ and $n'$ be the numbers of deserving and undeserving candidates, respectively, that go to the intermediary. Then there are $m = M - m'$ deserving candidates who approach a counter without any information. Similarly, let $n$ be the number of undeserving candidates that approach a counter without acquiring information from the intermediary. Any of the numbers $m, m', n, n'$ may be zero.

The candidates that do not access the intermediary pick a counter randomly. Those who do are allocated in a straightforward way, as described below.

Lemma 1. The intermediary directs all deserving clients to honest counters, and all undeserving clients to corrupt counters.

Proof. For the first part, note first that if no D-candidates access $I$, then the expected wait at the corrupt counter must be at least as long as that at the honest counter. This is because the D (and any unmediated U) are distributed randomly, while mediated U, if any, are directed to the corrupt counters. Thus if any D-candidates approach $I$, it is to be directed to the shorter queue which is at the honest counter. The wait at the honest counter can be longer only if $I$ directs sufficient numbers of deserving candidates to those queues. But then $I$ is performing a disservice, and hence D-candidates
will not approach him. The second part is self-evident.

The length of the line at an honest counter is then:

\[ l_h = \frac{M - m' + n}{K} + \frac{m'}{\theta K} \quad (6) \]

and that at a corrupt counter is:

\[ l_c = \frac{M - m' + n}{K} + \frac{n'}{(1 - \theta)K} \quad (7) \]

An unmediated candidate’s expected waiting cost is \( \theta \gamma (l_h) + (1 - \theta) \gamma (l_c) \). If a candidate accesses \( I \), his waiting cost changes by the difference between this value and the cost of waiting in the appropriate line. For a D-candidate this is the sole gain, and is given by

\[ W_{m'} = [\theta \gamma (l_h) + (1 - \theta) \gamma (l_c)] - \gamma (l_h) = (1 - \theta) (\gamma (l_c) - \gamma (l_h)) \quad (8) \]

An unmediated U-candidate, if he enters the market, stands in a randomly chosen line, and obtains the benefit with a probability \( 1 - \theta \). Thus his expected gain is:

\[ V_n = (1 - \theta) [B/2] - [\theta \gamma (l_h) + (1 - \theta) \gamma (l_c)] \quad (9) \]

U-candidates will enter the market as long as this gain is positive, thus in equilibrium this gain will be driven to zero or less. Of course if \( V_n \leq 0 \), then no uniformed U-candidate enters the market. Thus the condition that determines the number of unmediated U-candidates in the market, given arbitrary \( m, m', n' \) is:

\[ V_n \leq 0, \quad n \geq 0, \quad nV_n = 0. \quad (10) \]

The expected gain of a U-candidate who accesses \( I \) is:

\[ W_{n'} = [B/2] - \gamma (l_c). \quad (11) \]

Note that equations (8) and (11) show gross benefits before payments to the intermediary. All of the amount \( W_{n'} \) is attributable to information from \( I \), since in absence of this information the undeserving candidate would either not enter the market and hence get zero, or would compete with other unmediated U-candidates (if any), in which case his payoff would also be driven down to zero (by condition 10 above). The gain of the deserving candidate, \( W_{m'} \), is similarly attributable to information transmitted by the intermediary.
We assume that the intermediary prices his services (to each type of candidate, respectively) to extract the entire surplus that is attributable to information. Thus we are ascribing the entire bargaining power to the intermediary. An alternative is to assume that the intermediary and the candidate splits these gains according to a symmetric Nash bargaining outcome. It will be easily seen from what follows that this does not qualitatively alter the results.

For any given configuration of $m', n'$, the profit-maximizing intermediary will charge D-candidates a fee of $W_{m'}$ and U-candidates a fee of $W_{n'}$. Thus his total revenue is:

$$R(m', n') = m'W_{m'} + n'W_{n'}.$$  

His objective is to maximize $R(m', n')$ with respect to the two arguments. The number of unmediated U-candidates is simultaneously determined according to the condition (10). An equilibrium for this market is a triple $(m', n', n)$ such that $R(m', n')$ is maximized and condition 10 is satisfied.

Using (8) and (11) we can rewrite the intermediary’s revenue as:

$$R(m', n') = m'[(1 - \theta)(\gamma(l_c) - \gamma(l_h))] + n'[(B/2) - \gamma(l_c)].$$  

(12)

His maximization problem is

$$\max_{m', n'} R(m', n') \text{ s.t. } 0 \leq m' \leq M; \quad n' \geq 0, \quad \text{and } (10)$$

**Proposition 4.**

(a) If $\frac{B}{2} > \gamma(\frac{M}{n})$, then some undeserving candidates use the intermediary’s services (i.e., $n' > 0$).

(b) If $n' > 0$ then $m' > 0$, i.e. some deserving candidates also use the intermediary’s services.

**Proof.** (a) For any $(m', n', n)$, the expected payoff of an unmediated U-candidate $V_n = (1 - \theta)W_{n'} - \theta \gamma(l_h)$ is weakly dominated by $W_{n'}$, the gross payoff of a mediated U-candidate. Thus if $n' = 0$, then $n = 0$ and there are no U-candidates in the market. But if $\frac{B}{2} > \gamma(\frac{M}{n})$ and there are no U-candidates, then the gross payoff of the marginal U-candidate who goes to the intermediary is positive, thus $n' > 0$.

(b) If $n' > 0$ and $m' = 0$ then $l_c > l_h$ by (6) and (7), so a D-candidate will be willing to pay a positive amount for I’s services. Further, if I directs some deserving candidates to honest lines this reduces the length of the corrupt lines, so I can charge a higher price from undeserving clients. Thus I will provide services to a positive number of deserving clients.

**Proposition 5.** In equilibrium, if the intermediary is active, then he serves deserving and undeserving candidates such that either
(a) \( m' \) is interior and the lines at the corrupt and honest counters are of equal length, or
(b) \( m' = M \) and lines at the corrupt counters are longer than those at honest counters.

**Proof.** One of the first-order conditions for equilibrium with \( m' > 0 \) is
\[
\frac{\partial R(m', n')}{\partial m'} \geq 0, \quad m' \leq M, \quad (M - m'). \frac{\partial R(m', n')}{\partial m'} = 0.
\]
Using (6), (7) in (12) and differentiating, we get
\[
\frac{\partial R(m', n')}{\partial m'} = (1 - \theta)[\gamma(l_c) - \gamma(l_h)] + m'(1 - \theta)\left[\gamma'(l_c)\left(-\frac{1}{K}\right) - \gamma'(l_h)\left(\frac{1 - \theta}{\theta}\right)\frac{1}{K}\right] + n'\gamma'(l_c)\frac{1}{K}
\]
\[
= (1 - \theta)\frac{1}{K}\left[(\gamma(l_c) - \gamma(l_h)) - m'[\gamma'(l_c) + \frac{1 - \theta}{\theta}\gamma'(l_h)] + \frac{1}{(1 - \theta)}n'\gamma'(l_c)\right]
\]
\[
= (1 - \theta)\frac{1}{K}\left[(\gamma(l_c) - \gamma(l_h)) - m'[\theta\gamma'(l_c) + (1 - \theta)\gamma'(l_h)] + \frac{n'}{(1 - \theta)}\gamma'(l_c)\right]
\]

Now note that \( \frac{n'}{(1 - \theta)} > \frac{m'}{\theta} \) implies that \( l_c > l_h \), hence \( \gamma(l_c) > \gamma(l_h) \).
Then by convexity of \( \gamma, \gamma'(l_c) \geq \gamma'(l_h) \), so in particular \( \gamma'(l_c) \geq [\theta\gamma'(l_c) + (1 - \theta)\gamma'(l_h)] \).
Hence we must have
\[
\frac{n'}{(1 - \theta)}\gamma'(l_c) > \frac{m'}{\theta}[\theta\gamma'(l_c) + (1 - \theta)\gamma'(l_h)].
\]
So the last line of (13) must be positive, hence \( m' = M \). Conversely, by an argument similar to the one above, the RHS of (13) vanishes if and only if \( \frac{n'}{(1 - \theta)} = \frac{m'}{\theta} \). Thus if \( m' \) is interior, the lines at the honest and dishonest counters must be equal. \( \square \)

**Corollary 1.** If \( m' < M \), then the intermediary provides his services free to the deserving candidates.

This follows directly from (8) and the fact that the lines are equal.

**Proposition 6.** If \( \frac{B}{2} \leq \frac{1 - \theta}{\theta}\frac{M}{K} \), then in equilibrium all undeserving candidates that apply for the service go through the intermediary.

**Proof.** If \( m' < M \), then by proposition 5 lines at all counters are equal, and
\( n' = \frac{(1 - \theta)}{\theta}m' \). Thus \( M + n' = \frac{1}{\theta}[(1 - \theta)M + (1 - \theta)m'] \) and the length of each line is
\( \frac{1}{K}[M + n' + n] = \frac{1}{\theta K}[\theta M + (1 - \theta)m' + n] \). Each unmediated applicant obtains
\[
(1 - \theta)\frac{B}{2} - \frac{1}{\theta K}[\theta M + (1 - \theta)m' + n]
\]
which equals zero in equilibrium, thus the number of unmediated applicants in the market is

\[ n = (1 - \theta)K \frac{B}{2} - \frac{1}{\theta} [\theta M + (1 - \theta)m'] \]

Correspondingly, the intermediary makes \( \theta \frac{B}{2} \) from each undeserving candidate that he serves.

now suppose that \( n > 0 \). Let the intermediary serves one more undeserving client. We know that agents will be reallocated so that line lengths remain equal, and \( n \) will fall by one since \( V_n \) must continue to equal zero. Thus the price the intermediary charges his undeserving clients does not change, and he now serves one more undeserving customer, so his revenue must increase. Thus it is profitable for the intermediary to increase \( n' \) (and the clients are indifferent between being mediated or unmediated) at least until there are no more unmediated clients in the market, or \( m' \) rises to equal \( M \). But the former must occur before the latter, since at \( m' = M \ n \leq 0 \) by the condition in the proposition.

There are a couple more minor results in this section.

Welfare in the economy with an intermediary is lower than in that without an intermediary.

4. Collusion between intermediary and officials

Unmediated undeserving candidates make the lines longer and thus reduce the potential profits of the intermediary (whose price varies inversely with waiting times) and also of the corrupt clerks (because some applicants who would have shared their gains with the clerk go to the honest counters). Thus there is scope for collusion between the clerks and the intermediary.

In particular, there is additional surplus that can be generated if clerks do not serve unmediated undeserving candidates. An agreement to this effect between clerks and the intermediary can be enforced by the latter, since the intermediary can punish a clerk by directing undeserving traffic away from his counter.

This section characterizes the equilibrium with collusion.

5. Competition between intermediaries

6. Conclusion

The most significant results are:
In the economy with intermediaries, all agents use intermediation, including deserving candidates who do not pay bribes.

If the benefit is very generous, then even deserving candidates pay a positive fee for intermediation.

Intermediaries can enforce collusive agreements with officials.

References


