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The Political Economy of Corruption & the Role of Financial Institutions

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The Political Economy of Corruption and the Role of Financial Institutions*

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Abstract

In many developing and transition countries, we observe rather high levels of corruption. This is surprising from a political economy perspective, as the majority of people in a corrupt country suffer from high corruption levels. Our model is based on the fact that corrupt officials have to pay entry fees to get lucrative positions. In a probabilistic voting model, we show that a lack of financial institutions can lead to more corruption as more voters are part of the corrupt system and, more importantly, as the rents from corruption are distributed differently. Thus, the economic system has an effect on political outcomes. Well-functioning financial institutions, in turn, increase the political support for anti-corruption measures.

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1 Introduction

In many developing and transition countries, we observe rather high levels of corruption. This is surprising from a political economy perspective, since the majority of people in a corrupt country should suffer from high corruption levels. Thus, citizens should have an interest in the reduction of corruption. Why then does the political market seem not to solve this problem, i.e. why do citizens not exert enough political pressure to reduce the corruption level?

In order to answer this question, we analyze the interaction between economic institutions which shape political preferences and the political outcomes - in our case, the corruption level. We take a closer look at the situation in developing and transition countries. Here, corruption generally spreads over all levels of the bureaucracy. The lower-level officials dealing with firms and households demand bribes for providing particular services. The upper level bureaucrats also profit from corruption by demanding an entry fee for granting access to these lucrative lower-level positions in the bureaucracy.[1] The corrupt officials and their superiors are thus the groups of citizens that benefit from corruption. However, their share of the population is too small to explain the persistence of corruption.

We show that an explanation for high corruption levels can be found in the existence of entry fees for lucrative positions and the way they are financed. Entry fees are often financed by relatives and friends. Yet, in a developing economy, financial institutions gain increasing influence. Banks provide both access to credit and investment opportunities, but they may take different approaches to corruption. Some banks subscribe to a code of ethics, committing themselves to refusing all interactions that could be linked to corruption.[2] Other banks, in contrast, may even "dirty money", i.e., they take deposits and grant loans that are used to finance bribes (see report on Russian banking in The Economist, 01/27/ - 02/02/2007, p. 68). We thus have to explain: how does the emergence of financial intermediation change the support for anti-corruption measures? And how does the attitude of banks toward financing entry fees affect this outcome?

In our model, the corrupt officials must pay entry fees to their superiors. Since the entry

[1] For example, engineers of the water irrigation system in India pay entry fees of up to 14 times their annual salary. See Wade (1982, p. 305) and the discussion in section 2.

[2] For example, twelve global banks form the Wolfsberg Group. Its members promote, in collaboration with Transparency International, anti money-laundering principles and published statements on the financing of terrorism and on monitoring, screening and searching (http://www.wolfsberg-principles.com).

fees cannot be fully financed by the officials' wealth, they have to borrow part of the amount. If financial markets are absent, they may resort to their relatives or friends. As the relatives' return depends on the corruption level, these financial transactions give them a stake in corruption. Thus, in such a case, relatives do not have the incentive to support anti-corruption campaigns. With financial markets, citizens may have access to loans and the relation between corrupt officials and relatives may be softened, depending on the role banks choose to play in the economy. When banks do not grant loans used to finance an entry fee, the corrupt officials will still borrow from their relatives.

However, compared to the case without financial institutions, all citizens now have the opportunity to save at a bank. This new outside option reduces the net surplus from corruption that is shared among corrupt officials and relatives. When banks do not differentiate credits according to their purpose, corrupt officials, too, have access to bank loans. While the corrupt officials would still prefer to borrow from their relatives in order to give them a vested interest in corruption, they can no longer coordinate to do so. As a result, corruption is lower in the presence of a functioning financial system. Interestingly, given that a banking system exists, the fact that banks do not give loans for entry fees does not necessarily reduce the corruption level compared to the case where banks finance entry fees.

Our paper contributes to the literature on the causes of and the impact of economic institutions on corruption.[3] The predominant cause for corruption at lower levels of the bureaucracy is seen in the principal-agent relationship between bureaucrats and their superiors.[4] The different levels of the bureaucracy at which corruption occurs are mostly studied separately; only a few papers focus on corruption in hierarchies. Hillman and Katz (1987) show that rent seeking provokes contests for the positions that grant authority to appropriate the transfers made in the initial rent-seeking contest. This creates further social costs. Bac (1996a, 1996b) argues that if low-level bureaucrats are monitored, they may collude with their superior by paying him *ex ante* or by transferring a portion of their revenues from corruption to him in order to avoid punishment. In line with the models on corruption in hierarchies, we argue that administrative

[3]For literature surveys on corruption see, for example, Bardhan (1997), Jain (2001), and Aidt (2003).

[4]In this model, we do not discuss measures to reduce administrative corruption. Papers in this rich strand of literature look at the design of the wage structure (see Fan, 2006, Acemoglu and Verdier, 1998 and 2000, and Besley and McLaren, 1993) as well as of the penalties for corrupt behavior (Laffont and Guessan, 1999, Mookherjee and Png, 1995, Rose-Ackerman, 1975)

corruption spreads over several levels of the bureaucracy as corrupt officials have to pay an entry fee.

Both economic and political institutions influence the scope of corruption. In their seminar papers, La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997, 2000) show that (legal) institutions affect both the financing decisions of firms and corporate governance. Economic institutions influence the rents from corruption and thereby determine the corruption level: Ades and Di Tella (1999) show that high rents in an industry, due to a lack of competition or natural resources, are connected to high corruption levels.

Foellmi and Oechslin (2007) draw the attention to the link between financial institutions and corruption: they argue that with imperfect financial markets, firms receive credit only if they can offer sufficient collateral. However, firms have to pay bribes to start a business. This reduces the available collateral and drives some firms out of the credit market. Thus, they provide an efficiency argument why corruption distorts investment decisions. In contrast to our paper, they focus on the consequences, not the causes, of corruption due to imperfect financial institutions. Corruption can also lead to an inefficient allocation of inputs because of coordination failures: Murphy, Shleifer, and Vishny (1993) show that when more resources are allocated to rent-seeking, returns to productive activities fall faster than returns to rent-seeking. Thus, the opportunity costs of further rent-seeking are reduced, making it more attractive. In a different context, Acemoglu (1995) argues that rent-seeking exerts a negative externality on rewards to talent, resulting in inefficient allocations of talent to unproductive activities. In our model, too, the persistence of corruption is the result of a coordination failure, caused by political externalities. The agents' incentives to support anti-corruption measures are determined by their investment opportunities which, in turn, depend on the existence of a functioning financial system. In the absence of financial institutions, it is individually rational for citizens to invest in activities linked to corruption and then support policies that protect these rents.

Concerning the impact of political institutions on corruption, the empirical evidence shows that countries with a majoritarian electoral system and with a longer exposure to democracy are less corrupt (Persson, Tabellini, and Trebbi, 2003, Treisman, 2000). It is particularly interesting to study the persistence of corruption in a democratic regime. There, opposition to a corrupt system has the most influence. But also in democracies, self-interested politicians will only have incentives to implement anti-corruption policies if there is widespread political support

for such measures.[5] Corruption has been the decisive issue in the national elections in many developing countries (World Bank, 2000). Some recent examples are the Ukraine (2004), Kenya (2003), or Pakistan (2002) (source: BBC). With our model, we argue that financial institutions shape the policy preferences of the constituents by offering them a broader set of financing opportunities. Through this channel, the political support for anti-corruption measures increases with the effectiveness of financial institutions. Thus, in spirit our model is close to Hoff and Stiglitz (2004) who model the endogenous development of market-supporting institutions in the political process. However, we study the opposite direction of causality, namely how economic institutions influence the political outcome.

The paper is organized as follows: Next, we study corruption and the market for lucrative jobs in developing and transition countries. In section 3, we set up the model and discuss the differences between the cases with and without a functioning financial sector. In section 4, we study the effects of financial institutions on corruption. For this, we first develop a probabilistic voting model on anti-corruption policies. We derive and then compare the equilibrium corruption level for different scenarios with and without financial institutions. Section 5 concludes.

2 Corruption, Financial Institutions, and Entry Fees

The empirical literature suggests that countries with better institutions are less corrupt (Abed and Davoodi, 2002, Dreher et al., 2007). Yet it is very difficult to distinguish causes and consequences of corruption. When trying to explain the causes of corruption, a possible link between financial institutions and the incidence of corruption in a country is the mode of financing the entry fee for lucrative positions in the bureaucracy. There is evidence from several developing countries that bureaucrats who obtain a lucrative job have to pay entry fees. In turn, officials have to be bribed for a variety of services. A World Bank survey (1998) conducted among 350 enterprises in Georgia indicates that most instances of corruption occur during tax and financial inspections and at customs. According to this survey, 71% of the enterprises would be willing to pay higher taxes if corruption were eliminated. Those enterprises that indicate their willingness to pay higher taxes would pay additional taxes of up to 22% of their revenues in order to eliminate corruption. These figures indicate that the total amount of bribes paid by enterprises

[5] An empirical study on Uganda shows that providing the population with information and thus improving their ability to monitor corrupt officials reduces embezzlement dramatically (Reinikka and Svensson, 2004).

must be substantial.[6]

For the officials, the bribes translate into high rents from office. Evidence from the Ukraine suggests that bribery accounts for at least 20 per cent of the total wage compensation in the public sector (Gorodnichenko and Sabirianova, 2007). The existence of entry fees for positions in the bureaucracy is well known not only among the officials but also in the general public. The entry fee increases with the amount of bribes that can be appropriated in a particular position. In Georgia, the percentage of public officials believed to have purchased their position exceeds 50% for customs and tax inspectors. More than one third of the positions of natural resource licensers, judges, investigators, and prosecutors are believed to have been purchased (World Bank, 1998).[7]

The seminal article on the market for public office is by Wade (1982). He collected evidence for the "corruption system" found in the canal irrigation industry in India, which is still among the most corrupt countries of the world (in 2006, India ranked 70th in the Transparency International CPI ranking). Irrigators pay officials in order to ensure the water supply either for the whole season or for emergencies. On average, an Assistant Engineer receives an additional annual income from bribes of about 3.5 times his official annual wage. Each year, an Executive Engineer earns about 9 times his official annual salary from bribes. Senior officers and politicians appropriate part of the engineers' additional income by demanding an entry fee for assigning them to a particular position. The entry fee that an engineer has to pay depends on the productivity of the area where his position is located. In the uplands, it costs an Executive Engineer about three times his official annual wage to get a position with a two-year tenure. In contrast, on the fertile deltas, the entry fee can be up to about 14 times his annual salary.

In many developing countries, firms resort to the informal credit market and finance new investments by borrowing from family and friends (Safavian, Fleisig, and Steinbuks, 2006). This implies that access to bank loans is even more difficult for individuals. Often their only source of finance is borrowing from relatives. As a result, corrupt officials may also borrow from their

[6]This is reflected in Georgia's position in the Transparency International ranking of the CPI. It lists countries according to their CPI scores where the country with the lowest perceived corruption level has the highest score. In 2006 (2002), Georgia was ranked 99 (85) of 163 (102), showing that the anti-corruption reform after the elections in 2003 had a bite.

[7]Entry fees are widespread in the health sector as well. In Ghana about 25 per cent of jobs are bought in government hospitals (Lewis, 2006). Similar figures are provided for Uganda (Azfar, Kahkonen and Meagher, 2001)

relatives (Togonidze, 2003).

We base our model on these observations, i.e., we take for granted that an entry fee for lucrative positions has to be paid. We show that the entry fees may be the link between the level of financial development and the corruption level in a country. Access to bank loans determines the possibilities of financing the entry fee. Thus, the quality of the financial system shapes the political preferences of different groups of voters and affects the political support for anti-corruption campaigns.

3 Financing the Entry Fee

For the basic setup of the model, we describe the economy, the financial institutions, and their impact on the financing of the entry fees. We compare different cases: first, we look at an economic system without functioning financial institutions. Second, we introduce functioning financial institutions. In the second case, we focus on the role of banks. On the one hand, banks take interest-bearing deposits. On the other hand, they grant loans. For the credit market, we set up two different scenarios, depending on whether banks finance entry fees or not (which will be called pooling and screening, respectively).

3.1 The Model

The economy with population size n consists of four groups of citizens: The depositors D, the corrupt officials K, the relatives R of the corrupt officials, and the superiors S of the corrupt officials. Each group has $\alpha_J n$ identical individuals, where α_J, $J = \{D, K, R, S\}$, denotes the share of a particular group. Each citizen has the same initial endowment A, $A > 0$. There is no depreciation.

All groups of citizens suffer equally from corruption. The disutility from corruption is given by $-u(c)$, where $u(c) > 0$. It does not only capture the costs of the bribe but also other negative aspects of corruption such as time lags in getting services, the non-enforceability of services for which bribes have been paid and the psychological costs involved. We assume that these costs grow with the level of corruption c, such that $\frac{\partial u(c)}{\partial c} > 0$ and $\frac{\partial^2 u(c)}{(\partial c)^2} > 0$. Note that the corrupt officials suffer under corruption like all the others, as they also need other services except for the one which they themselves are providing.[8]

[8]Our results would be qualitatively unaffected by the alternative assumption that corrupt officials do not suffer

Depositors. The depositors want to invest their endowment in order to earn returns on their assets. They can do this only on the formal credit market. On the informal credit market, there exist high transaction costs, which can only be overcome by family ties.[9] However, the depositors do not have relatives whom they could lend to.

Corrupt Officials. All citizens have to pay a bribe if they use any of the public services offered by the officials. Each corrupt official can collect a bribe c, $c \geq 0$, from everyone who demands that certain public service that he is providing. This fraction of the population is denoted by $\sigma \in [0;1]$. We assume σ to be exogenously given. The total amount of bribes each corrupt official can collect thus amounts to $\sigma(n-1)c$.

In order to focus on how the mode of financing the entry fee influences the political choice of the corruption level c, we take the number of positions in the bureaucracy as given. The group of citizens who have obtained these positions is called the group of corrupt officials K. Due to the corruption rent, these positions are so attractive that the superiors can demand an entry fee for each of them.[10] The size of the entry fee $T(c) > 0$ depends on the amount of rents that public servants can extract from the other citizens. We choose a linear specification, $T(c) = tc$, with $t > 0$. In this paper, we do not endogenize the superiors' choice of the size of the entry fee.[11] We assume that the entry fee is set in such a way that the corrupt officials get at least some positive payoff from corruption, i.e. that the surplus from corruption is positive.

We require that $A < T \leq 2A$. This implies that each corrupt official has to borrow some amount from his relative or ask for a loan at the bank in order to finance the entry fee. Our assumption ensures that one relative has enough funds to pay the whole missing amount for the

from corruption, i.e., $u(c) = 0$ for group K.

[9] In our model, transaction costs among relatives are set to zero. Yet, our results would be preserved as long as transaction costs are low enough to allow interaction on the informal intra-family credit market.

[10] By demanding an entry fee, the superiors ensure that only persons with the appropriate skills and preferences apply for positions as public officials: Those who are non-corruptible or are unable to extract bribes from their clientele will find the job in the bureaucracy unprofitable (Shleifer and Vishny, 1993). With this selection mechanism, the bureaucracy is composed solely of corrupt officials. For the purpose of the model, the presence of additional non-corrupt officials would not alter the results even though this group of voters would not have a positive stake in corruption.

[11] In an earlier version of this paper, we endogenize the superiors' choice of the size of the entry fee. We show that they actually have an incentive to leave a positive rent from corruption to the corrupt officials, if they are able to coordinate in any way. The reason is that they want to reduce the corrupt officials' support for anti-corruption policies. Therefore, we can exclude the case where competition for positions drives the entry fees up and the rents of the corrupt officials down to zero.

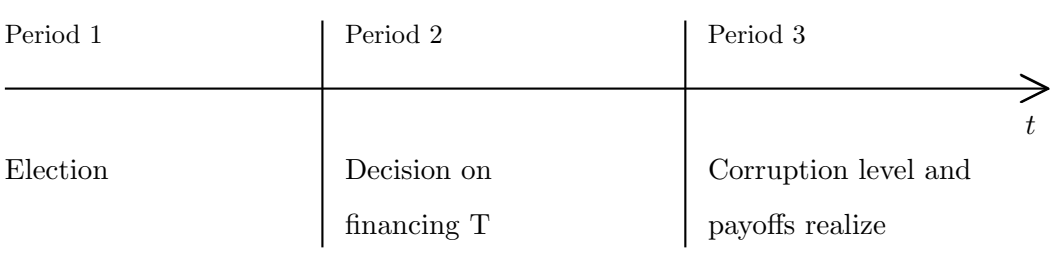
entry fee. We allow each corrupt official to borrow from one relative only. If this informal credit market is to be cleared, the group sizes of corrupt officials and relatives have to be equal, i.e., $\alpha_K = \alpha_R$. For our model, this is the most restrictive case; the group of voters that potentially have a positive stake in corruption is minimized. If each corrupt official could borrow from several relatives, more voters would receive a positive, albeit smaller, revenue from corruption. The results of our analysis would qualitatively remain the same.[12] Note that the superiors could always get at least a payment of A from the corrupt officials. In this case, the corrupt officials would not need external sources of financing. However, as the focus of this model is the effect of the different modes of financing the entry fee on the level of corruption, we exclude this case.

Relatives. Relatives differ from the depositors in that they have a corrupt official in their close family. This is an advantage for them insofar as they have the opportunity to invest on the informal credit market.

Superiors. The superiors collect the entry fees $T(c)$ and put them into their private pockets. As our focus does not lie on this group, we assume that they are of mass 0, i.e., $\alpha_S = 0$. Note further that the superiors cannot lend to the corrupt officials as the transaction costs on the informal credit market can only be overcome by family ties. We assume that they spend their revenues on consumption.

The time structure of the model is as follows: In *period 1*, the level of corruption c is determined in the elections (for the time structure of the election subgame see section 4.1). In *period 2*, the corrupt officials decide on the financing of the entry fee $T(c)$. In *period 3*, the corruption level is realized, the bribes are collected and individuals receive their payoffs. The time structure is depicted in figure 2. Since the game is solved by backward induction, we start with the decision of how to finance the entry fee.

Figure 2: Time Structure



[12] Only in the extreme case of perfect competition among the relatives would their rent from corruption be reduced to zero.

3.2 The Economy without Financial Institutions

In this section, we study the case where no financial institutions exists.

Depositors. When there are no financial institutions, the depositors have no possibility to invest their initial endowment. They do not have access to the informal credit market as they are not relatives of a corrupt official. Thus, the utility function of each depositor is composed of his initial endowment and of his losses from corruption. His utility is given by $U_D^N(c) = A - u(c)$, where the superscripts N denote the utility levels in the case with *no* financial institutions.

Corrupt Officials. The corrupt officials receive bribes of the amount of $\sigma(n-1)c$.[13] In order to get access to their jobs, the corrupt officials have to pay the entry fee $T(c) = tc$ to their superiors. To finance this fee, the corrupt officials need some funds in addition to their initial endowment A. The corrupt officials borrow the amount $(tc - A)$ from the relatives and repay $(1 + b^N)(tc - A)$. The term b^N is equivalent to the interest rate on the informal credit market and is determined in a Nash bargaining game among the pairs of corrupt officials and relatives. We assume equal bargaining power of corrupt officials and relatives. The utility of the corrupt officials when there are no financial institutions is:

$$U_K^N(c) = \sigma(n-1)c - (1 + b^N)(tc - A) - u(c) \tag{1}$$

Relatives. The relatives receive the interest rate b^N on the amount of capital which they lend to their corrupt family members. Their utility is thus:

$$U_R^N(c) = A + b^N(tc - A) - u(c) \tag{2}$$

When bargaining over b^N, the corrupt official and the relative have the same disagreement payoff $A - u(c)$. If negotiations break down, the relative has no possibility to invest his endowment. Neither does the corrupt official have the possibility to obtain the job. As a result, both parties become depositors. We can state the following result for the bargaining game in the case without financial institutions:

[13] Note that certain restrictions have to be imposed on σ to ensure that the revenues from corruption equal the sum of bribes paid in the economy. The revenues from corruption depend on σ, i.e., on how *many* individuals use each particular service. The sum of bribes paid, in turn, depends on how many services *each* individual uses. Assume each citizen uses ϕ services. The total revenues from corruption are $\sigma(n-1)c\alpha_K n$. These have to equal the sum of bribes paid by all citizens, i.e., $cn\phi$. Thus, we need $\sigma = \frac{\phi}{(n-1)\alpha_K}$. This model uses the disutility function $-u(c)$ to capture the costs from corruption for each individual. Here, ϕ is implicitly included.

Proposition 1 *Without functioning financial institutions, the relatives lend to the corrupt officials on the informal credit market and receive the interest rate* b^N *on their loan, where*

$$b^N = \frac{[\sigma(n-1)-t]c}{2(tc-A)}. \tag{3}$$

Proof. In the Nash bargaining solution with symmetric bargaining power, b^N maximizes the surplus that is then split evenly among the two parties. Formally, the solution is given by:

$$b^N = \arg\max \left[\left(U_K^N(c) - U_D^N(c) \right) \left(U_R^N(c) - U_D^N(c) \right) \right]$$

This yields the following first-order condition:

$$\frac{\partial U_R^N}{\partial b^N} \left(U_K^N(c) - U_D^N(c) \right) + \frac{\partial U_K^N}{\partial b^N} \left(U_R^N(c) - U_D^N(c) \right) = 0$$

Inserting the utility functions and simplifying, we get:

$$\sigma(n-1)c - (1+b^N)(tc-A) - u(c) = A + b^N(tc-A) - u(c)$$

Solving for b^N, this yields $b^N = \frac{[\sigma(n-1)-t]c}{2(tc-A)}$. ■

In the case without functioning financial institutions, corrupt officials and relatives have the same disagreement payoff and share the net surplus from corruption equally. Their utility levels after the bargaining are thus equal:

$$U_K^N(c) = U_R^N(c) = \frac{1}{2}[\sigma(n-1)-t]c + A - u(c) \tag{4}$$

As discussed above, there must be a net surplus of corruption that can be split in the bargaining game. The surplus from corruption is given by $[\sigma(n-1)-t]c$. Each party gets its disagreement payoff and a positive revenue on top of that. Otherwise, the positions in the bureaucracy would cease to be attractive.

3.3 The Economy with Financial Institutions

Next, we introduce financial institutions in the economy. To keep the analysis of the financial sector tractable, we study a small open economy. Therefore, the interest rate r is determined by the world market and is identical for deposits and loans. In the following, we distinguish two different scenarios for the credit market. In the first case, banks are able to screen the borrowers. This allows them to deny credit to any borrower who intends to finance an entry fee for a position in the bureaucracy. In the second case, banks do not differentiate loans according

to their purpose and offer a pooling contract to all applicants, including corrupt officials, at the rate r.[14] We do not distinguish whether banks are not able to detect corrupt borrowers or have no interest to do so, for example, because financing corruption is an activity with a comparably high payoff in a given country. For notational clarity, we denote utilities with the superscript S or P when the citizens use the formal credit market and banks offer screening or pooling contracts, respectively. When citizens decide to use the informal credit market although a banking sector is present and functioning, we use the superscripts IS or IP.

Depositors. The depositors can save their endowment on the formal credit market. They still suffer under corruption. Their utility with a functioning financial system is:

$$U_D^S(c) = U_D^P(c) = (1+r)A - u(c) \tag{5}$$

3.3.1 Screening

We start with the scenario in which banks screen all applicants and grant credit only to borrowers who do not finance entry fees. Therefore, we assume that banks receive perfect signals about their creditors without incurring any costs. As a result, they offer credit only to non-corrupt investors at the world market interest rate r. In practice, the screening process could, for example, involve that banks demand a business plan from potential borrowers in order to evaluate their investment projects. Corrupt officials have no possibility to get credit as they are unable to provide a business plan.

Corrupt Officials. If the corrupt officials do not borrow from their relatives, they are not able to pay the entry fee and remain depositors. Consequently, their outside option amounts to $U_K^S(c) = (1+r)A - u(c)$. For the corrupt officials, the only way to finance the entry fee is still to borrow from their relatives. In this case, we denote the bargaining outcome by b^S. The relatives, just like the corrupt officials, now have the outside option to save at the bank at the rate r. The utility of the corrupt officials when they borrow from their relatives is:

$$U_K^{IS}(c) = \sigma(n-1)c - \left(1+b^S\right)(tc - A) - u(c) \tag{6}$$

Relatives. The relatives have the choice to save at the bank or to lend to the corrupt officials. If the relatives save their whole initial endowment at the bank, their utility is $U_R^S(c) =$

[14] In our model, banks act only in the economic sphere and do not have any direct political influence. Moreover, there is no reason why banks in this model should have any pronounced political interest, as by assumption, they make zero profits for all corruption levels.

$(1+r)\,A - u(c)$. If they decide to lend to the corrupt officials, they earn the rate b^S on the amount that they lend. For the rest of their endowment, i.e., $2A - tc$, they receive the rate r from the bank. Their utility is:

$$U_R^{IS}(c) = A + b^S(tc - A) + r(2A - tc) - u(c) \tag{7}$$

In the case with screening, we can state the following result for the bargaining game:

Proposition 2 *If banks screen, the relatives lend to the corrupt officials on the informal credit market and receive the interest rate b^S on their loan, where*

$$b^S = \frac{(n-1)\,\sigma c - tc\,(1-r) - 2rA}{2\,(tc - A)}. \tag{8}$$

Proof. See the Appendix. ■

After the bargaining, the utility functions in the situation where banks screen are identical for corrupt officials and relatives:

$$U_K^S(c) = U_R^S(c) = \frac{1}{2}\left[\sigma\,(n-1) - (1+r)\,t\right]c + (1+r)\,A - u(c) \tag{9}$$

In the case with screening, the surplus from corruption is given by $[\sigma(n-1) - (1+r)t]c$. As the surplus from corruption must be positive, we get as a result that $b_S > r$.

How does a functioning financial sector alter the result of the bargaining game? Given our assumption $tc < 2A$, we can show that the equivalent of the interest rate on the informal credit market decreases with respect to the case without banks, i.e., $b^S < b^N$:

$$(n-1)\sigma c - tc(1-r) - 2rA < [\sigma(n-1) - t]c \Leftrightarrow r(tc - 2A) < 0 \tag{10}$$

Here, we can see two effects: First, the existence of a functioning banking sector when banks screen reduces the net surplus from corruption by $(1+r)tc$ as both relatives and corrupt officials have the outside option to save at the bank. Second, the interest rate on the informal credit market decreases. The relatives now have an additional opportunity to save whatever they do not lend to the corrupt officials, i.e., $2A - tc$, at the bank at the rate r. In symmetric Nash bargaining, the relatives have to compensate the corrupt officials for their additional gain of $r(2A - tc)$ from saving at the bank. Thus, the existence of financial institutions not only influences the surplus generated by corruption but also its distribution.

3.3.2 Pooling

If financial institutions exist, both corrupt officials and relatives can save at the bank - independent of the type of loan contract offered by the bank. In our scenario with pooling, banks serve all applicants for loans and make offers at the rate r. In reality, banks may offer consumer loans based on credit scoring models where the corrupt official can easily disguise the use of the loan or banks may even be interested in financing corruption, e.g. due to a lack of other profitable investment opportunities in a country.

Corrupt Officials. Now, the corrupt officials can borrow the amount $tc - A > 0$ from the bank. They have to pay the interest rate r on their loan. The utility of the corrupt officials when they borrow on the formal credit market is:

$$U_K^P(c) = \sigma(n-1)c - (1+r)(tc - A) - u(c) \tag{11}$$

When they use the informal credit market, the outside option to borrow from the bank affects the disagreement utilities of the corrupt officials. We denote the bargaining outcome in presence of a bank that offers a pooling contract with b^P. The utility of the corrupt officials if they borrow from their relatives is:

$$U_K^{IP}(c) = \sigma(n-1)c - (1+b^P)(tc - A) - u(c) \tag{12}$$

Relatives. The relatives can save at the bank or lend to the corrupt officials. When the relatives invest only in the formal credit market, they get $U_R^P(c) = (1+r)A - u(c)$. When the relatives decide to stay in the informal credit market, they receive the rate b^P for the amount $(tc - A)$ that they lend to the corrupt officials. They can save the rest of their endowment, $2A - tc$, at the bank at the rate r. When the relatives decide to stay in the informal credit market and lend to the corrupt officials, their utility is given by:

$$U_R^{IP}(c) = A + b^P(tc - A) + r(2A - tc) - u(c) \tag{13}$$

In the bargaining game, the disagreement payoffs of both corrupt officials and relatives are given by $U_K^P(c)$ and $U_R^P(c)$. Since the disagreement payoffs differ for the two parties, their incentives to make concessions in the bargaining game change, too. In the case where banks offer pooling contracts, we can state the following result:

Proposition 3 *If banks offer pooling contracts, the Nash bargaining solution yields* $b^P = r$.

Proof. See the Appendix. ■

The surplus from corruption is the same as in the case of screening, but it is divided differently. When bargaining on the informal credit market, both groups receive exactly the same utility level as when they save at or borrow from the bank. The only interest rate in this economy is the world market rate r. The corrupt officials have the outside option to take a bank loan to finance the entry fee. Individually, each corrupt official is indifferent between borrowing from his relative or from the bank. Bargaining does not create any additional surplus. We will discuss the effects of this on the political equilibrium in section 4. Note that it is irrelevant whether or not the corrupt officials actually use the bank. The relatives always get the same utility level. Thus, their interest in the level of corruption is identical to that of the depositors. Both groups only experience costs from corruption.

4 Financial Institutions and Anti-Corruption Policies

We are interested in how the different modes of financing the entry fee affect the corruption level in our economy. The political market creates the connection between financial institutions and the corruption level: voters' preferences for a higher or lower corruption level are shaped by the distribution of rents from corruption which is in turn influenced by the means of financing of the entry fee. When voters prefer low corruption levels, they will demand anti-corruption policies and politicians will run on anti-corruption platforms.

In this section, we first set out our probabilistic voting model of political decision-making. Then, we derive the political equilibrium and compare the equilibrium corruption levels in different scenarios with and without financial institutions.

4.1 Voting on Anti-Corruption Policies

In this section, we describe how the level of corruption is determined in the political process. We use a probabilistic voting model. There are two candidates, X and Y, running for election. The policy platform on which the candidates run for office is the corruption level in the economy. Each of the two candidates strives to get the majority of votes in the population.[15] The candidate who

[15]Similarly, we could assume that the candidates maximize their probabilities of winning the elections, that is, the probabilities of getting the majority of votes. As shown in Lindbeck and Weibull (1987), under fairly general conditions, the maximization problem for the candidates is then similar to the problem of maximizing the vote shares. These conditions are fulfilled by the assumptions in this model.

wins the majority of votes implements his proposed policy. We abstract from possible difficulties and costs of implementing the politically desired corruption level.[16] Moreover, we assume, as is standard in this literature, that politicians are able to commit perfectly to their announced policy platforms. A probabilistic voting approach allows us to capture the uncertainty present in real-world elections. Politicians do not have perfect information about the preferences of individual voters. In the model, the politicians design their policy platforms on the basis of their expectations about the political responsiveness of the different groups of the electorate. In addition, the model has the advantage of incorporating the voters' political responsiveness to marginal policy changes. In contrast to a median voter model, it does not only consider the individual votes but also takes into account *how much* this policy matters for the different groups of voters. The politicians cater most to those groups of the electorate whom they perceive to be most responsive to a change in their policy platforms, i.e., the corruption level. Thus, the model does not preclude high corruption levels even when the majority of voters suffers from corruption.

As we assume that the superiors are a very small group, i.e., $\alpha_S = 0$, they do not have any political influence. Thus, we have to consider three groups of voters: depositors, corrupt officials and relatives. Each group of voters is a fraction α_J of the total population with $J = \{D, K, R\}$ and $\sum_J \alpha_J = 1$.[17] Individuals base their voting decision on two elements: first, they consider their utility from the candidates' announced platform, in particular the corruption policy $U_J(c)$. Second, their voting decision is also influenced by their ideology or fixed preferences for other policy issues, which candidates do not include in their policy platform. In group J, voter i's ideological preference for candidate Y is given by the individual-specific parameter s_{iJ}. The individual ideology parameters are uniformly distributed in each group according to $s_{iJ} \sim [-\frac{1}{2S_J}; \frac{1}{2S_J}]$. Generally, the more s_{iJ} differs from 0, the stronger the ideology component in the citizen's voting decision is. A citizen with a strong ideological bias is less responsive to changes in the policy platforms c_X and c_Y announced by the candidates.

The time structure for the elections is as follows: in the first time period, the two candidates

[16] Introducing costs of reducing corruption for the politicians would preserve our results as long as these costs are similar in all our scenarios.

[17] We do not consider that the superiors might be able to exert pressure on political decision makers in favor of corruption. It can be shown that all results of this paper still hold when the superiors are an active political group.

announce their policy platforms c_X and c_Y. The candidates know the voters' policy preferences $U_J(c)$ and the distributions for s_{iJ}. They do not know the realizations of s_{iJ}. After announcing the policy platforms, candidates observe the realizations of s_{iJ}. In the following time period, elections are held. The candidate with the majority of votes wins the elections. He implements the policy platform that he has announced.

Taking into account all the components which influence the election decision of voter i in group J, voter i prefers candidate X if and only if $U_J(c_X) > U_J(c_Y) + s_{iJ}$. Candidates are interested in identifying how easily voters of a group will switch to vote for them in response to a marginal policy change. For each group, the "swing voter", i.e., the voter who is exactly indifferent between voting for candidate X or Y, is identified by the condition:

$$s_J = U_J(c_X) - U_J(c_Y) \tag{14}$$

Integrating over the ideological biases within groups and summing over all groups gives us the vote share for candidate X as a function of the policy platforms c_X and c_Y:[18]

$$v_X = \sum_J \alpha_J S_J \left(s_J + \frac{1}{2S_J} \right) = \sum_J \alpha_J S_J \left(U_J(c_X) - U_J(c_Y) + \frac{1}{2S_J} \right) \tag{15}$$

Each candidate chooses his policy platform c in order to maximize his vote share v. We can state the following general result.

Proposition 4 *For each parameter constellation, both candidates choose the same uniquely defined policy platform c^*. It is determined by the condition*

$$\frac{\partial v}{\partial c} = 0 \iff \sum_J \alpha_J S_J \frac{\partial U_J(c)}{\partial c} = 0. \tag{16}$$

Proof. For each parameter constellation, we have a unique equilibrium if the vote shares of candidates X and Y are strictly concave functions of the policy platforms c_X and c_Y (see e.g. Coughlin and Nitzan, 1981). In our setup, this is straightforward as the utility functions of all groups are linearly additive and comprised of terms which are linear in c, and the disutility from corruption $-u(c)$ where $-\frac{\partial^2 u(c)}{(\partial c)}(c) < 0$. Therefore, $\frac{\partial^2 v}{(\partial c)^2} < 0$. ■

In order to derive the equilibrium corruption levels, we insert the utility functions of all groups. We do this in section 4.2. and 4.3. We then compare the equilibrium corruption levels in order to derive conditions under which functioning financial institutions reduce corruption.

[18] For candidate Y, the vote share is derived similarly by integrating over all voters with a s_{iJ} higher than s_J and summing over all groups: $v_Y = \sum_J \alpha_J S_J \left(\frac{1}{2S_J} - s_J \right) = \sum_J \alpha_J S_J \left(U_J(c_Y) - U_J(c_X) + \frac{1}{2S_J} \right)$.

4.2 Corruption Level without Financial Institutions

The following lemma describes the policy choice without financial institutions:

Lemma 1 *If no banks exist, the candidates propose a policy platform that determines an equilibrium corruption level c_N^*, implicitly defined by*

$$\frac{\partial u(c_N^*)}{\partial c} = \frac{(\alpha_R S_R + \alpha_K S_K)\left[\frac{\sigma(n-1)-t}{2}\right]}{\sum_J \alpha_J S_J} \tag{17}$$

with $J \in \{D, K, R\}$.

On the left hand side of equation (17), we see the marginal disutility from corruption. It is identical for all groups. In the denominator of the right hand side, we find the groups that suffer under corruption. As all citizens suffer equally under corruption, this is the sum over all groups, weighted with the political responsiveness of the group S_J and the group's size α_J. The components of the marginal utility in the numerator of the right hand side stem from those groups that have a positive interest in corruption: the relatives, whose earnings on the informal credit market depend positively on the corruption level, and the corrupt officials, who get a positive surplus from collecting bribes in their position. Comparative statics show that the equilibrium corruption level decreases as the entry fee increases. The more the corrupt officials have to pay for their jobs, the lower the net surplus of corruption is. Then, the relatives and the corrupt officials have a lower marginal benefit from an increasing corruption level and are more supportive of anti-corruption policies. Note that the depositors show up only in the denominator as they do not have any positive revenue from corruption.

4.3 Corruption Level with Financial Institutions

Next, we derive the equilibrium corruption levels with functioning financial institutions.

4.3.1 Screening

The following lemma describes the policy choice if banks screen their borrowers:

Lemma 2 *If banks screen, the candidates propose a policy platform that determines an equilibrium corruption level c_S^*, implicitly defined by*

$$\frac{\partial u(c_S^*)}{\partial c} = \frac{(\alpha_R S_R + \alpha_K S_K)\left[\frac{\sigma(n-1)-(1+r)t}{2}\right]}{\sum_J \alpha_J S_J}. \tag{18}$$

Proof. See the Appendix. ■

As before, corrupt officials and relatives use the informal credit market. Also, relatives save the part of their endowment that they do not lend to corrupt officials at the bank. Thus, the relatives have a positive stake in corruption because they lend to the corrupt officials on the informal credit market where they earn $b^S > r$. However, relatives face a coordination problem. If they could coordinate on saving at the bank, this would reduce the political support for corruption and would lead to a lower equilibrium corruption level. Individually, however, it is optimal for each relative to lend to a corrupt official at the rate $b^S > r$. If all other relatives also lend to corrupt officials, the corruption level is high anyway. Similarly, the corruption level remains low if all other relatives save at the bank, even if a single relative lends to a corrupt official. As the effect of a single voter on the election outcome is negligible, the individual decision to stay in the informal credit market does not alter the equilibrium corruption level.

4.3.2 Pooling

The following lemma describes the policy choice if banks offer loans to all citizens irrespective of the purpose of the loan:

Lemma 3 *If banks offer pooling contracts, the candidates propose a policy platform that determines an equilibrium corruption level c_P^*, implicitly defined by*

$$\frac{\partial u(c_P^*)}{\partial c} = \frac{\alpha_K S_K \left[\sigma\left(n-1\right) - \left(1+r\right)t\right]}{\sum_J \alpha_J S_J}. \tag{19}$$

Proof. See the Appendix. ■

Now, only the corrupt officials get a positive rent from corruption. Note again that for this result, it is irrelevant whether the corrupt officials use the bank or not. The relatives do not have a positive stake in corruption anymore. They receive the interest rate r on their total asset endowment independent of whether they invest on the formal or informal credit market. Therefore, they are missing from the numerator of the expression.

The corrupt officials are in a prisoners' dilemma-like situation. In the aggregate, they would prefer to use the informal credit market and borrow from their relatives while giving them a higher interest rate than the bank. They would then have allies in the elections: if relatives had a stake in corruption, they would vote against possible anti-corruption measures. Individually, however, the strategy to win over a relative by offering him a rate $b^P > r$ is not optimal for a corrupt official: Suppose that all corrupt officials borrow from the bank. Official k has no

incentive to switch to the informal credit market and offer a rate higher than r to his relative. The relative would agree to lend to the corrupt official when offered a higher rate than from the bank. Yet, the corrupt official would only win over one voter to the pro-corruption side. This one vote does not change the corruption level chosen by the politician. Next, suppose that all other corrupt officials borrow from their relatives at a rate $b^P > r$. Then, it pays for official k to switch to the formal credit market because he can then borrow at a lower rate. As all others stay in the informal credit market, the corruption level does not decrease. Thus, each corrupt official individually has the incentive to switch to the formal credit market or to lower the rate he offers to the relative to $b^P = r$. In this case, the relatives do not get any additional surplus from lending in the informal credit market. This means that the corrupt officials cannot coordinate to give the relatives a stake in corruption and remain the only group of voters with a positive interest in corruption.

4.4 The Impact of Introducing Financial Institutions on the Corruption Level

To evaluate the effect of financial institutions on corruption, we compare the corruption levels for the cases with and without banks.

Proposition 5 *If banks screen, the corruption level with functioning financial institutions is always lower than the corruption level without financial institutions,i.e.,* $c_N^* > c_S^*$.

Proof. See the Appendix. ■

In the case without banks as well as in the case with banks that screen, the entry fee is financed via the informal credit market. Corrupt officials and relatives share the revenues from corruption in both cases. How does the existence of a functioning banking sector then decrease the equilibrium corruption level? When there are banks, corrupt officials and relatives have the option to save at the bank. Thus, the relatives incur some opportunity costs if they decide to lend to the corrupt officials. When sharing the surplus from corruption, the corrupt officials and the relatives take these opportunity costs into account. Moreover, both groups now have better outside options as they can earn the interest rate r on their endowment when they become depositors. For both groups, this decreases the marginal net benefit from corruption. In the situation with banks and screening, both groups are less responsive to a change in the corruption level than in the situation without banks. As a consequence, the politicians cater less to these groups. The equilibrium corruption level is reduced.

In general, the existence of depositors decreases the level of corruption. Since they suffer under corruption, they support anti-corruption policies. As they only suffer under corruption, their utilities enter the first order condition for the optimal policy choice exactly in the same way in the cases with and without financial institutions. Hence, for the comparison of one situation to the other they do not play a role, regardless of their share in the population α_D or their political responsiveness S_D.

What happens if banks offer pooling contracts and therefore the corrupt officials have access to the formal credit market?

Proposition 6 *If banks offer a pooling contract, the corruption level with functioning financial institutions is lower than the corruption level without these institutions, i.e.,* $c_P^* < c_N^*$*, if and only if*

$$S_K \left[\frac{\sigma (n-1) - t}{2} - rt \right] < S_R \left[\frac{\sigma (n-1) - t}{2} \right]. \tag{20}$$

Proof. See the Appendix. ■

All costs and benefits from corruption are weighted with the political importance of the groups of voters, that is, the group size α_J and the group's political responsiveness S_J. This was demonstrated in lemmas 1 - 3. The higher S_J, the more swing voters a group has and the more politicians cater to this group. Due to our assumption that $\alpha_K = \alpha_R$, the group sizes cancel out in condition (20). Compare the terms in square brackets, i.e., the changes in marginal net benefits from corruption when the economy switches from a situation without financial institutions to a situation where banks offer pooling contracts. The left hand side of condition (20) shows the resulting change of marginal net benefits for the corrupt officials. If banks exists, all revenues from corruption are reaped by the corrupt officials: As they finance the entry fee by taking a bank loan, they do not have to share the revenues from corruption. Comparing the marginal utility to the case without financial institutions, they therefore receive an additional half of the surplus from corruption, $\frac{\sigma(n-1)-t}{2}$. Yet, they have to bear the marginal cost rt of financing the entry fee through a bank loan. The expression on the right hand side shows that in the presence of banks, the relatives lose their half of the marginal net return on corruption, i.e. $\frac{\sigma(n-1)-t}{2}$. It is obvious that with banks, the relatives' marginal utility from corruption decreases more than the corrupt officials' marginal utility increases.

Consider first the case where both groups have the same responsiveness to a marginal policy change, that is $S_K = S_R$. It is then clear that financial institutions lead to a lower equilibrium

corruption level. In the presence of banks that offer pooling contracts, the relatives lose all their gains from corruption, and they become strict supporters of anti-corruption policies. The corrupt officials marginally gain less from a financial system than the relatives lose. If both groups have equal political power, this results in a lower corruption level. This effect is reinforced for $S_K < S_R$.[19]

Now consider $S_K > S_R$. We can rewrite condition (20) as $S_R > S_K \left(1 - \frac{2rt}{\sigma(n-1)-t}\right)$. We know from the corrupt officials' participation constraint that $\sigma(n-1) - t > 0$. Therefore, $1 - \frac{2rt}{\sigma(n-1)-t} \leq 1$. For $t < \frac{\sigma(n-1)}{1+2r}$, the expression $\left(1 - \frac{2rt}{\sigma(n-1)-t}\right)$ is positive. Then, the entry fee is low enough to give the corrupt officials a significant rent. This also implies that the marginal revenue of the relatives is limited as the amount of the loans to the corrupt official is low. Only then - and if corrupt officials are more responsive to announced changes in the corruption level than relatives - could financial institutions exacerbate the situation and increase the equilibrium corruption level. For $t > \frac{\sigma(n-1)}{1+2r}$, which implies $(1 - \frac{2rt}{\sigma(n-1)-t}) < 0$, a banking sector which offers pooling contracts always decreases the equilibrium corruption level, irrespective of the relative political influence of the groups of voters.

Our analysis shows that a financial sector where banks screen unambiguously reduces the equilibrium corruption level. If banks offer pooling contracts, whether the corruption level in the economy is reduced or not depends on the political power of the different groups of voters: In most cases, the presence of functioning financial institutions decreases corruption. Banks that do not screen and offer credit irrespective of the purpose of the loan reduce the political support for anti-corruption policies only if the political influence of the corrupt officials compared to that of the relatives is very high, and the entry fee is low.

4.5 Comparing Corruption Levels under Different Financial Institutions

Does a banking sector reduce corruption more when a screening contract is offered or when a pooling contract is offered? The difference between a banking sector with screening and with pooling is the degree of information produced and used by the banks. In the case of pooling,

[19] In this case, the relatives are more responsive to marginal changes in the policy variable than the corrupt officials. The political responsiveness, or the importance that voters attach to anti-corruption policies, can be increased when the issue receives a lot of public attention, for example, when the news media publishes investigations on corrupt government officials. Brunetti and Weder (2003) empirically show that an independent press significantly decreases corruption levels. The reason they give is that corrupt behavior by government officials is more likely to be discovered and criticized by a free press.

banks either do not have access to information about the purpose of the loans or have no interest in acquiring such information. Do banks that commit against financing corruption and screen their applicants always lead to lower corruption levels? We can state

Proposition 7 *The corruption level with functioning financial institutions is higher when banks offer a screening contract than when banks offer a pooling contract, i.e.,* $c_S^* > c_P^*$*, if and only if* $S_R > S_K$*.*

Proof. See the Appendix. ■

At first sight, this result is surprising because we would expect that if banks possess more information and commit against financing corruption, the corruption level is always reduced more strongly. However, we find that if the political weight of the corrupt officials is lower than that of the relatives, a banking sector with screening is less effective in reducing corruption. The reason is that with screening, both corrupt officials and relatives benefit from the corruption revenues whereas with pooling, the corrupt officials reap all the benefits. A banking system that generates more information through screening induces individuals to resort to the informal capital market and helps the corrupt officials to overcome their coordination problem to use the informal credit market in order to give their relatives a stake in corruption. Then the gain in marginal utility from the informal capital market that accrues to the relatives is equal to the reduction in marginal utility the corrupt officials face as they have to share the revenue from bribes with the relatives. Thus, if the relatives have a larger political weight, the corruption level is higher in the case of screening.

5 Conclusion

The literature has studied corruption on the low levels of the administration and on the high levels of government separately. However, both types of corruption are linked by corruption on the intermediate levels of the bureaucracy. There, corruption takes the form of superiors demanding entry fees in exchange for positions on lower levels of the hierarchy. We have shown that this link between corruption on different levels of the bureaucratic hierarchy and the necessity to externally finance part of the entry fee results in high corruption levels if financial institutions are missing. When corrupt officials finance the entry fee on the informal credit market, they give their relatives a stake in corruption. Consequently, these groups of voters do not support anti-corruption campaigns.

Our analysis has demonstrated that institutions matter in the fight against corruption. The political preferences of agents depend on their economic opportunities that, in turn, depend on the institutional environment. In the absence of financial institutions that provide productive investment opportunities, citizens may rationally invest in (unproductive) activities linked to corruption by financing entry fees. Petty corruption and political decisions are linked because savers then oppose socially beneficial political measures that aim at abolishing these unproductive activities. Financial institutions could thus contribute to the political success of anti-corruption policies. If functioning financial institutions exist, investors do not depend on corruption and the incentives of politicians to run on anti-corruption platforms increase.

For a country that strives to reduce corruption, one policy measure should be to establish a functioning banking system. Moreover, banks should be given an incentive to fight against corruption by committing themselves not to finance corrupt ventures. Our model has demonstrated that if banks screen, financial institutions always reduce the equilibrium corruption level. However, even if banks do not screen, the presence of a functioning banking sector provides the relatives with an additional option to invest and neutralizes their positive stake in corruption. In some cases, the corruption level is lowered even more with pooling than with screening as screening by banks drives corrupt officials to the informal credit market, thus giving more citizens a positive stake in corruption.

With this paper, we hope also to stimulate more empirical research on the practice of demanding entry fees for lucrative positions and on the ways these entry fees are financed. As we have shown, these practices can weaken the political preferences for anti-corruption measures. Therefore, a more profound knowledge about these mechanisms would be important.

6 Appendix

6.1 Proof of Proposition 2

The Nash bargaining solution obtains when b^S maximizes the surplus that can be split among the two parties:

$$b^S = \arg\max[(U_K^{IS}(c) - U_K^S(c))(U_R^{IS}(c) - U_R^S(c))]$$

Both relatives and corrupt officials have the outside option to become depositors. Therefore, the Nash bargaining solution has to fulfill $U_K^{IS}(c) = U_R^{IS}(c)$ or:

$$[(n-1) + \alpha_E NR\gamma]\sigma c - (1 + b^S)(tc - A) - u(c) = A + b^S(tc - A) + r(2A - tc) - u(c)$$

Solving for b^S, this condition yields $b^S = \frac{[(n-1)]\sigma c - tc(1-r) - 2rA}{2(tc-A)}$. ■

6.2 Proof of Proposition 3

The Nash bargaining solution obtains when b^P maximizes the surplus that can be split among the two parties:

$$b^P = \arg\max[(U_K^{IP}(c) - U_K^P(c))(U_R^{IP}(c) - U_R^P(c))]$$

Explicitly writing out the utility levels and simplifying yields:

$$-(1 + b^P)(tc - A) + (1 + r)tc = A + b^P(tc - A) + r(2A - tc) \Leftrightarrow b^P = r$$

Therefore, we derive $U_K^{IP}(c) = U_K^P(c)$ and $U_R^{IP}(c) = U_R^P(c)$. ■

6.3 Proof of Lemma 1

To obtain the equilibrium corruption level for the situation without financial institutions, we use the utility functions defined in section 3.2 and insert them into the first order condition for the equilibrium corruption level.

$$\frac{\partial v}{\partial c} = \sum_J \alpha_J S_J \left(-\frac{\partial u(c)}{\partial c}\right) + (\alpha_R S_R + \alpha_K S_K)\frac{\sigma(n-1) - t}{2} = 0$$

Rearranging yields the above condition.

6.4 Proof of Lemma 2

To obtain the equilibrium corruption level for the situation with financial institutions and screening, we use the utility functions defined in section 3.3 for the case with screening and plug them

into the first order condition for the equilibrium corruption level:

$$\frac{\partial v}{\partial c} = 0 \Leftrightarrow \sum_J \alpha_J S_J \left(-\frac{\partial u(c)}{\partial c}\right) + (\alpha_K S_K + \alpha_R S_R)\frac{\sigma\,(n-1) - (1+r)t}{2} = 0$$

Rearranging yields the result. ■

6.5 Proof of Lemma 3

To obtain the equilibrium corruption level for the situation with financial institutions and pooling, we use the utility functions defined in section 3.3 for the case where no screening is possible and plug them into the first order condition for the equilibrium corruption level:

$$\frac{\partial v}{\partial c} = 0 \Leftrightarrow \sum_J \alpha_J S_J \left(-\frac{\partial u(c)}{\partial c}\right) + \alpha_K S_K[\sigma\,(n-1) - (1+r)t] = 0$$

Rearranging yields the result. ■

6.6 Proof of Proposition 5

Comparing the first order conditions for the equilibrium corruption levels in the case without a bank, as derived in lemma 1, and with banks offering screening contracts, as derived in lemma 2, yields:

$$\frac{\partial u(c_N^*)}{\partial c} - \frac{\partial u(c_S^*)}{\partial c} = \frac{(\alpha_K S_K + \alpha_R S_R)\frac{\sigma(n-1)-t}{2}}{\sum_J \alpha_J S_J} - \frac{(\alpha_K S_K + \alpha_R S_R)\frac{\sigma(n-1)-(1+r)t}{2}}{\sum_J \alpha_J S_J}$$

This difference is positive if and only if $\frac{-rt(S_K+S_R)}{2} < 0$, using our assumption that $\alpha_K = \alpha_R$. This is always true. As $\frac{\partial u(c)}{\partial c} > 0$ and $\frac{\partial^2 u(c)}{(\partial c)} > 0$, this means that then, $c_N^* > c_S^*$. ■

6.7 Proof of Proposition 6

Comparing the first order conditions for the equilibrium corruption levels in the case without a bank, as derived in lemma 1, and with banks offering pooling contracts, as derived in lemma 3, yields:

$$\frac{\partial u(c_N^*)}{\partial c} - \frac{\partial u(c_P^*)}{\partial c} = \frac{(\alpha_K S_K + \alpha_R S_R)\frac{\sigma(n-1)-t}{2}}{\sum_J \alpha_J S_J} - \frac{\alpha_K S_K\,[\sigma\,(n-1) - (1+r)t]}{\sum_J \alpha_J S_J}$$

This difference is positive if and only if $S_K\left(\frac{\sigma(n-1)-t}{2} - rt\right) < S_R\frac{\sigma(n-1)-t}{2}$, using our assumption that $\alpha_K = \alpha_R$.

As $\frac{\partial u(c)}{\partial c} > 0$ and $\frac{\partial^2 u(c)}{(\partial c)} > 0$, this means that then, $c_N^* > c_P^*$. ■

6.8 Proof of Proposition 7

Comparing the first order conditions for the equilibrium corruption levels in the case with banks offering pooling contracts, as derived in lemma 3 and in the case with banks offering screening contracts, as derived in lemma 2, yields:

$$\frac{\partial u(c_P^*)}{\partial c} - \frac{\partial u(c_S^*)}{\partial c} = \frac{\alpha_K S_K \left[\sigma\left(n-1\right) - (1+r)t\right]}{\sum_J \alpha_J S_J} - \frac{(\alpha_K S_K + \alpha_R S_R)[\frac{\sigma(n-1)-(1+r)t}{2}]}{\sum_J \alpha_J S_J}$$

This difference is negative if and only if $2\alpha_K S_K < \alpha_R S_R + \alpha_K S_K$, i.e., $S_K < S_R$, using our assumption that $\alpha_K = \alpha_R$.

As $\frac{\partial u(c)}{\partial c} > 0$ and $\frac{\partial^2 u(c)}{(\partial c)} > 0$, this means that then, $c_S^* > c_P^*$. ■

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