Bribe-Taking by Bureaucrats: Personal and Circumstantial Determinants

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Abstract: We argue that personal (e.g., age, gender and education) and circumstantial (e.g., bureaucratic rank and sector of employment) factors affect the cost and the benefit of bribe-taking by the bureaucrats. The bureaucrat's bribe-taking decision is modeled. A unique data set is used to test the predictions of the model. The empirical findings include that education reduces, but power (measured by rank and sector of work) increases, the magnitude of bribe-taking. Age affects bribe-taking in a more subtle way. Gender does not affect it in a statistically significant way. Our study of corruption at the individual level complements the literature studying corruption at country and industry levels.

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1. Introduction

Corruption is an old and worldwide phenomenon with a severe detrimental effect on social justice and economic development.[1] A large literature has been developed to study the phenomenon.

Much of the literature tries to identify factors correlated to aggregate severity of corruption at the country level. Among factors found negatively related to the degree of aggregate corruption are a country's per capita income level, income level of civil service employees, openness to foreign trade, protestant tradition, history of British rule, freedom of the press, fiscal decentralization, parliamentary system, and history of democratic institution.[2] Additionally, racial fractionalization and income inequality are found to be positively, but education negatively, related to the severity of corruption in a state, historically in the United States (Glaeser and Saks, 2005).

A smaller body of the literature has been devoted to identifying factors and mechanisms leading to corruption. In this literature, the prevailing view, e.g., Leff (1964), Becker (1968), Becker and Stigler (1974), Krueger (1974), Rose-Ackerman (1975, 1978), is that corruption in the form of rent seeking is primarily a product of politician's regulatory power. Supporting this view, Khwaja and Mian (2005) find that, when borrowing from government-controlled banks, politically-connected firms are likely to borrow more and later default. Svensson (2003) shows that the amount

[1] Studies by Bardhan (1997), Mauro (1995), Johnson et al. (1997, 2000), Kaufman et al. (2002), Wei (2000), Wei and Shleifer (2000), Li, Xu, and Zou (2000), Alam (1990) and Murphy et al. (1991, 1993) find that corruption hinders economic growth, lowers investment, increases inequality in income distribution, and causes the expansion of unofficial economy.

[2] See Ades and Di Tella (1999), Friedman et al. (2000), Fisman and Gatti (2002), Knack and Azfar (2000), Kunicova (2001), Lederman et al. (2001), Treisman (2000), Wei (2000), Van Rijckeghem and Weder (2001) and Serra (2006).

of bribe paid by a firm to politicians is related to its ability to pay and "refusal power". Also consistent with the rent-seeking theory, Clarke and Xu (2004) find that capacity constraint, market power and state ownership are factors contributing to accepting bribes by employees in the utility sector.

This paper is another effort to understand factors and mechanisms leading to corruption, specifically in the form of bribe-taking by the government bureaucrat (hereon referred to as "agent"). A unique feature of our study is that it focuses on individual level factors, i.e., personal (age, gender and education) and circumstantial (the rank and sector of employment) and analyze their effects on the rational agent's bribe-taking decisions. By studying the effects of these individual level factors, we aim to fill two gaps in the literature studying corruption.

The first gap in the literature which we fill is to build a rational model of the agent's bribe-taking decisions. In the model, bribe-taking is a two-step sequential decision problem. In the problem, the agent first decides if it is worthwhile to take bribes. If the answer is positive, the agent then proceeds to decide how much bribe to take. While taking bribes has obvious benefit, it also involves some potential costs. If caught taking a bribe, the agent will have to bear some direct (financial, legal and possibly other) cost and the opportunity cost of losing the career in the bureaucratic system.[3] Personal and circumstantial factors affect the bribe-taking decisions (i.e., the "whether or not" decision and the "how much" decision) because they affect the cost-benefit analyses involved in these decisions.

[3] Olken (2007) shows that, in village road construction projects, increased auditing by government and independent cost estimation by engineers help to reduce corruption.

So far, empirical studies of corruption have been mainly at country and industry levels. The reason for this bias in the literature is easy to understand: the nature of the research makes it difficult to obtain individual level data. By using this unique individual-level data set to study the agent's bribe-taking decisions, we fill another gap in the literature.

The data we use are from the website of the Ministry of Supervision, the People's Republic of China, which contains information of 130 corrupt government officials. The information is detailed on personal and work-related variables of these corrupt officials, such as age, gender, education, office, rank, and the geographic location of work. Three groups of major findings emerged from the study.

First, the study finds that, circumstantial factors do affect bribe-taking as predicted by our model. In particular, the magnitudes of bribes taken are found positively related to the ranks of the agents, to the resource-allocating power and to the personnel power of the offices in which the agents work. We see this as individual-level evidence supporting rent-seeking theory as in Leff (1964), Becker (1968), Becker and Stigler (1974), Krueger (1974), Rose-Ackerman (1975, 1978).

Second, the study finds that personal factors, e.g., age and education, do affect bribe-taking, again as predicted by our model. Specifically, education has the effect of alleviating bribe-taking. The effect of age also seems significant, although the way it affects bribe-taking is more subtle.

The third group of our findings is that general economic conditions, e.g., per capita income in an area, economic growth rate, degree of economic openness of a

province, also has a negative effect on corruption.[4]

The rest of the paper is organized as follows. Section 2 introduces a rational model of the government bureaucrat's bribe-taking decision. Section 3 explains the data and provides some descriptive statistics. Section 4 reports the main empirical findings. Section 5 concludes the paper.

2. The Model.

Bribe-taking is assumed to be a decision independently and rationally made by individual agents. The agent makes the decision based on a cost-benefit analysis in order to maximize his/her expected utility. Affecting the analysis are personal and circumstantial factors to be specified as follows.

On the benefit side, let m_i be the measure of the gain that agent i obtains from taking a bribe, $m_i>0$ and $i=1,2,...I$. It is believable that this gain is positively related to the significance of the favor that the agent does to the bribing party. Furthermore, the magnitude of the favor an agent can do to a bribing party is likely to have an upper limit determined by the power of the office in which the agent works. Factors determining the power of an office include financial and/or natural resources that the office controls, personnel decisions that the office makes, etc. Let $\bar{m}_i(x_j)$ be the upper limit of the benefit that agent i in office j can possibly obtain from taking a

[4] This group of factors is not considered in our theoretic model. However, they are considered in previous work of country- and industry-level empirical studies of corruption. We include them in our empirical study to control them. It is very interesting that, even though the data used in our study are at individual level and from another country in a different time of history than those in Glaeser and Saks (2005), the findings on these commonly included variables are quite consistent.

bribe, where x_j is the measure of power in an office and $j=1, 2...J$. Based on the above discussion, we assume $(d\bar{m}_i / d x_j) > 0$. For notational simplicity, in the rest of the paper, we will use m_{ij} in place of $\bar{m}_i(x_j)$, which means that m_i is in the range of $m_{ij} \geq m_i \geq 0$.

Bribe-taking also has its costs. Assume that, if an agent is caught taking a bribe, m_i is completely lost and an additional punishment of size c is inflicted on i. c could be a fine or confiscated property beyond m_i. c could also be interpreted as the monetary equivalence of all the mental and physical sufferings resulting from other forms of punishment, e.g., humiliation, a jail term, etc. It is reasonable to assume a non-negative relationship between c and m_i, i.e., an agent does not receive a lighter punishment for taking a larger bribe. When interpreting c as reflecting mental and physical sufferings, it is reasonable to believe that certain personal factors may matter. For example, an older agent expecting fewer years left in life may have a smaller c. The agent might also receive a more lenient legal treatment for age-related reasons, e.g., medical needs. Let y_i be the set of all personal factors affecting c. The above discussions imply $c(m_i, y_i)$. Assume $c(m_i, y_i) \geq 0$ and $\partial c(m_i, y_i) / \partial m_i > 0$. We also assume $\partial c(m_i, y_i) / \partial y_i < 0$ to indicate the impact of personal factors. If y_i is age, for example, $\partial^2 c(m_i, y_i) / \partial m_i \partial y_i < 0$ means that $\partial c(m_i, y_i) / \partial m_i$ is smaller for an older agent at any given value of m_i.

If caught, a bribe-taking agent also suffers the opportunity cost of losing the current position in government and the right to continue in the promotion tournament (as in Lazear and Rosen, 1981). Let u be the agent's discounted present value of

holding the government position and continuing the promotion tournament from there. The value of u is likely different across agents because of different preferences. Even if we assume identical preferences, still, discounted present values are likely to vary across agents due to personal factors affecting how far and how fast an agent is likely to be promoted, such as education, age, and gender. Under the assumption of identical preferences, which is made to facilitate this analysis, we can write $u(y_i)$ where y_i is a vector of personal factors affecting agent i's promotion prospect. For notational simplicity, from here on we will use u_i in place of $u(y_i)$. Keep in mind that the subscript in u_i stands for personal factors rather than preference of agent i.

Assume that the possibility of catching a corrupt agent is $0<p<1$. The value of p is likely dependent on circumstantial factors such as government's determination and effort to fight corruption and institutions facilitating the purpose. To keep the study manageable without compromising its main purpose, in this paper p is assumed to be exogenously given.

At probability $(1-p)$, a bribe-taking agent may not be caught. In such a case, the agent receives the gain m_i ($\leq m_{ij}$) and continues in the promotion tournament. The total value obtained by the agent is thus (m_i+u_i). If caught, which happens at probability p, the agent loses m_i and u_i and suffers punishment $c(m_i, y_i)$. The weighted average of these two possibilities is the expected value to an agent who chooses to be corrupt,

$$v(m_i) = (1-p)(m_i + u_i) - pc(m_i, y_i)\,. \qquad (1)$$

The agent can also choose to be completely clean refusing to take any bribe.

In such a case, the agent expects to receive u_i. Thus, the agent makes the decision whether to take bribery or not to maximize his/her utility:

$$\max\left\{u_i, \max_{m_i} v(m_i)\right\} = \max\left\{u_i, v\left(m_i^*\right)\right\}, \text{ where } \quad m_i^* = \arg\max v\left(m_i\right).$$

It is incentive compatible for a risk-neutral agent to be corrupt when

$$u_i \le (1-p)(m_i^* + u_i) - pc(m_i^*, y_i).$$

Otherwise, the agent stays clean.

This inequality can be rewritten as

$$u_i \le ((1-p)/p)m_i^* - c(m_i^*, y_i) \qquad (2)$$

Obviously, for the study to be meaningful, we need to assume that c and p are sufficiently small, i.e., $c < C < \infty$ and $p < P < 1$, where C and P are two scalars. Otherwise, there would never be corruption because Inequality (2) is never satisfied since we have assumed $u_i > 0$.

The agent's optimization problem is to choose between

$$m_i = \begin{cases} 0, & \text{if Inequality (2) is satisfied;} \\ m_i^*, & \text{if Inequality (2) is not satisfied.} \end{cases}$$

Note that, in this optimization problem, the agent has two decisions to make. One of them is a qualitative "yes or no" decision, i.e., whether or not to take bribes. The other is a quantitative "how much" decision, i.e., if it is worthwhile to be corrupt, what is the optimal amount of bribe to take.

From Inequality (2), we can see that the agent will say "no" to corruption if the current position brings the agent a very high discounted present value u_i relative to expected gain from corruption $(1-p)m_i$, or if expected cost of corruption pc is very

high. Under these conditions, Inequality (2) is not satisfied for any value of m_i. This suggests that an agent with favorable personal factors, e.g., good education and right age, for future promotions (a large u_i) and little power (a small m_{ij}) will not be corrupt.

Another situation in which the agent will say "no" to corruption is when the value of $\partial c(m_i, y_i)/\partial m_i$ is high for all m_i relative to that of *(1-p)*. When this is true, $v'(m_i) = (1-p) - p\partial c(m_i, y_i)/\partial m_i < 0$ for all m_i. Then v is maximal at m_i=0. This suggests that, through their modifying effect on $\partial c(m_i, y_i)/\partial m_i$, personal factors contained in y_i again affects the agent's corruption decision.

When it is worthwhile to be corrupt, i.e., when there is value of m_i at which Inequality (2) is satisfied, the agent proceeds to makes a quantitative decision on how much bribe to take. The agent makes this decision by solving the problem described by Equation (1).

Without further restrictions on the values of p and $\partial c(m_i, y_i)/\partial m_i$ except that $\partial c(m_i, y_i)/\partial m_i$ exists and its value is continuous, corner and interior solutions are both possible. In case $v'(m_i) > 0$ for all m_i, v is the largest at $m_i = m_{ij}$. The solution is $m_i^* = m_{ij}$. $v'(m_i) > 0$ for all m_i would be true if *(1-p)* is sufficiently large and $\partial c(m_i, y_i)/\partial m_i$ sufficiently small for all m_i. Recall our earlier discussion of possible reasons leading to the assumption of $\partial^2 c(m_i, y_i)/\partial m_i \partial y_i$, e.g., marginal cost $\partial c(m_i, y_i)/\partial m_i$ is smaller for an older agent at any given value of m_i. This means that personal factors can lead to the result of $m_i^* = m_{ij}$. Note also that, when the agent does choose $m_i^* = m_{ij}$, the amount of bribe the agent takes is a direct function of the

circumstantial factors determining the power of the agent's office (in terms of resources controlled or personnel decisions made by the office), such as the agent's rank in the bureaucratic system and the branch of government.

If p is not too close to unit or zero, $\partial c(m_i, y_i)/\partial m_i$ is monotonic, sufficiently small at $m_i=0$ and sufficiently large at $m_i=m_{ij}$, an interior solution is found where

$$v'(m_i^*) = (1-p) - p\partial c(m_i^*, y_i)/\partial m_i = 0, \quad 0<m_i^*<m_{ij}.$$

Note that the same conditions leading to this result would also assure the satisfaction of the second-order condition for the existence of m_i^*. In this case, personal factors affect the (quantitative) decision of bribe taking through their impact on the marginal cost of corruption to the agent.

To summarize, our model has the following predictions on how personal and circumstantial factors affects the agent's qualitative and quantitative decisions on bribe taking. Predictions 1 and 2 concern the occurrence of corruption, while predictions 3 and 4 the amount of bribe taken if corruption.

Prediction 1: With everything else given, the agent decides to take bribes when personal factors are such that they sufficiently reduce the agent's opportunity cost u_i. Therefore, statistically, we should observe more corruption in agents with less favorable personal conditions for promotion.

This prediction is from Inequality (2). When u_i is sufficiently small, Inequality (2) is satisfied. Examples of potentially unfavorable personal factors, i.e., factors reducing an agent's odd of future promotions and thus the value of u_i, include less education, age close to retirement and sex in the discriminated category.

Prediction 2: With everything else given and $\partial c(m_i, y_i)/\partial m_i$ not too large, the agent become corrupt when circumstantial factors provide the agent sufficient power. Therefore, statistically, we should observe more corruption among agents in higher ranks and in more important offices.

The prediction is made on the first-order condition for m_i^* from Equation (1) and Inequality (2). Greater power means a higher upper limit m_{ij}. When $c(m_i, y_i)$ does not increase too fast in m_i, this means that the right-hand side of Inequality (1) has a larger value when circumstantial factors grant the agent greater power.

Prediction 3: Among those who take bribes, agents with personal factors leading to lower values of $\partial c(m_i, y_i)/\partial m_i$ are more corrupt. Therefore, statistically, we should observe a correlation between the degree of corruption and factors leading to lower marginal cost of corruption.

This prediction is made on the first-order condition from Equation (1). Suppose that an agent finds it worthwhile to take bribes and has an interior solution with regard to how much bribe to take. When the value of y_i is such that it lowers $\partial c(m_i, y_i)/\partial m_i$ for all m_i, a large m_i^* is needed to satisfy the first-order condition. The statistic prediction is obviously true if all corrupt agents have interior m_i^*s. It remains true if at least some of the corrupt agents have interior solutions, although we can expect a weaker statistic relationship between m_i^* and personal factors leading to lower values of $\partial c(m_i, y_i)/\partial m_i$.

How personal factors affect the value of $\partial c(m_i, y_i)/\partial m_i$ is mostly an empirical question. We mentioned before that a personal factor reducing the value of

$\partial c(m_i, y_i)/\partial m_i$ is old age which means fewer years left to suffer the consequences of being caught corrupt and likely more lenient sentences. However, one could counter argue, for example, that younger age means that the agent is less fearful so that the subjective $\partial c(m_i, y_i)/\partial m_i$ is smaller in the cost calculation. In the end, it is an empirical question as to how age affects the degree of corruption among the corrupt agents.

Another factor that can potentially affect the value of $\partial c(m_i, y_i)/\partial m_i$ is the agent's education. While official rules do not consider education when inflicting a penalty on a corrupt agent, psychologically, the cost of the same punishment may be different across agents of different educational levels due to the effect of education on an individual's values and belief.[5]

Prediction 4: Among those who take bribes, agents with greater power are more corrupt. Therefore, statistically, we should observe a positive correlation of the degree of corruption with more favorable circumstantial factors affecting power, e.g., agents working in more powerful branches and/or in higher ranks are more corrupt.

This prediction is obviously true if all corrupt agents have corner solutions, i.e., personal and circumstantial factors are such that $v'(m_i) > 0$ is true for all of them. If, among the agents who are corrupt, some of them have corner but others interior solutions, the overall correlation between power and the degree of corruption is

[5] This point is due to Brian Viard, who further suggested a possible way to test the effect of education on a person's value and belief. Suppose that data allow us to separate agents who earned their diplomas, e.g., those had had good education before they became government bureaucrats, and those who purchased their diplomas, e.g., those who entered educational programs after they have become powerful and never showed up in classes. If education does affect an agent's value and belief, everything else equal, among all corrupt agents, we should observe more severe corruption among the latter group of agents. Otherwise, education affects corruption only through its impact on an agent's promotion opportunity.

weakened, but it will not disappear. So we should still statistically observe it.

It is worthwhile to note that Predictions 1 and 2 above are about the agents' qualitative decisions, i.e., to say "yes" or "no" to corruption, while Predictions 3 and 4 are quantitative about corrupt agents' quantitative decisions, i.e., how much bribes to take.

In the empirical effort that we will next make to test the effects of personal and circumstantial factors on bribe taking, data do not allow us to test how either set of factors affects the agent's qualitative decision of saying "yes" or "no" to corruption. To test the "yes" or "no" prediction, we would need data of all bureaucrats, corrupt or clean, in different age, education and gender groups, as well as in different offices (ranks, government branches and locations). Without data of such information, we have no choice but to leave the task to future research. The data we have, however, do allow us to test the effect of personal and circumstantial factors on the quantitative decision of corruption, i.e., how much bribe to take, among agents who are corrupt. We thus will focus on testing Predictions 3 and 4 in the remainder of the paper.

3. Data

We collected data of 130 corrupt government officials published on the website of the Ministry of Supervision, People of Republic of China. The chief function of the Ministry of Supervision is to monitor government employees and investigate their misconducts. Taking bribery is a severe misconduct. Other severe misconducts include embezzlement and misuse of government funds, and dereliction of duty

leading to significant consequences. Severe misconducts that consist of crimes will be further prosecuted and sentenced.

We focus on bribery cases as taking bribes is a primary indicator of rent seeking. From this website, we found the total of 130 cases where agents were prosecuted for taking bribes. These cases were prosecuted in 2003 through 2006. The website contains information of an agent's age, gender, education, rank, the government division, and the province and city in which the agent worked and the amount of bribery accepted. We also searched other newspapers and media reports to supplement missing data for some agents. The data on provincial per capital GDP and GDP growth, imports and exports and foreign direct investment (FDI) are from Chinese Statistics Yearbooks of various years. These provincial data are merged with the data obtained from the Ministry of Supervision's website.

In Tables 1, 2 and 4, we divide these agents into different groups by their personal and circumstantial characteristics, e.g., age, gender, education, bureaucratic ranks. We then provide descriptive statistics of the average amounts of bribery accepted by the agents in each group. As shown in Table 1, as predicted by our model, the oldest age group (55 and up) is the most corrupt measured by the average amount of bribery accepted. Somewhat surprising is the fact that the youngest group (age 36 and below) is also very corrupt, with a larger average amount of bribery than those taken by other age groups. This would be consistent with our model if at the beginning of a bureaucratic career the opportunity cost of losing a government position is not as large as in mid-careers. Also consistent with the model is the fact that the average

bribery amount declines with education. Males had a higher amount than that taken by females. In general, descriptive statistics in Table 1 show clearly that personal factors are important determinants of an individual agent's corruption decisions.

Statistics in Table 2 describe the connection between bureaucratic rank and corruption. In ascending order, the bureaucratic ranks are *Ke (section head)*; *Chu* minus (*Fu-Chu, i.e., deputy division or department head*); *Chu (i.e., division or department head)*; *Ting* (or *Ju*) Minus (*Fu-Ting* or *Fu-Ju, i.e., deputy bureau head*); *Ting* (or *Ju, i.e., bureau head*); *Sheng* (or *Bu*) Minus (*Fu-Sheng* or *Fu-Bu, i.e., deputy governor or minister*); and *Sheng* (or *Bu, i.e., governor or minister*). Bureaucrats holding the rank of *Sheng* or *Bu* are either the governor of a province or head of a ministry in the central government. Mayors of major cities in a province (excluding Beijing, Shanghai, Chongqin and Tianjin), a head of a ministry in the provincial government, and a department head in the central government would have the rank of *Ting* or *Ju*. Li and Zhou (2005) had a detailed explanation of the cadre rank system in the Chinese government. As shown in Table 2, consistent with the prediction of the model, agents at the *Ting* (or *Ju*) and above levels take significantly higher average amounts of bribery. However, the relationship between rank and average amount of bribery is not linear. On average, a deputy head at a higher rank would take a much smaller amount of bribery than a head at the rank below. This is not inconsistent with our model, if we realize that being a deputy head usually means significantly diminished power in an office.

To show rent seeking in different government divisions, we first introduce the

organization of government in China. Main government ministries and departments are listed in Table 3 along with their major functions and regulatory authority. This information is obtained from the website of various ministries. The organizational structure of government at the provincial or city level is similar to that at the central level. Because of small number of observations in certain ministries, we group ministries by their functions and authority.

Lu (2000) has vividly described corruption in different areas of government administration in China. For example, highway constructions are very lucrative programs. As government does not have sufficient funds to build highways, it allows private capital in the industry. Once a highway is constructed, the private investor can charge a toll on the users. The toll collection not only covers the cost but also gains a large amount of profit for the investor. Thus, government officials in the transportation department who hold the authority to assign and approve highway construction projects are usually main targets of rent-seeking investors.

As Table 4 shows, the transportation and commerce divisions had a larger amount of bribery taking than other ministries and divisions. The planning and auditing department in charge of economic planning and internal auditing had taken the lowest average amount of bribery. Overall, the results show that the average amount of bribery taken is quite different in different government divisions, suggesting different degrees of power and rent to be sought.

4. Regression Results

The main regression results are reported in Table 5 where the group of individual

characteristics, bureaucratic rank, government divisions, and provincial economic development variables are added into the regression in the stepwise fashion. The first group of variables consists of age, education, and gender dummies. These results are reported in specification (1) of Table 5. These results show that, overall, the differences in the average bribery amounts across age groups are not statistically significant. The gender difference is not significant either. On the other hand, the differences among education groups are evident. The average amount of bribery declined with the level of educational attainment.

In the next step, dummy variables of bureaucratic ranks are added to the regression. The results are shown in column 2 of Table 5. One concern is that age and education may be correlated with rank, as would be true if seniority is a factor affecting promotion. We undertake several measures to investigate how serious the multicollinearity problem is and to what extent the regression estimates are affected by it. First, we estimate an ordered logit model of bureaucratic rank determination (Please see Appendix Table). The dependent variable is the categorical variable that takes the value from 1 to 6, which indicate the rank in the ascending order, *Ke*; *Chu* minus; *Chu*; *Ting*(or *Ju*) Minus*; Ting* (or *Ju*); *Sheng* (or *Bu*) Minus and above. Explanatory variables are age, gender, and education dummies. Age and education are significant predictors of bureaucratic ranks, whereas gender is not. Nevertheless, pseudo R^2 of the ordered logit regression is 0.11, suggesting that there is still large variation in bureaucratic ranks that cannot be explained by age and education. Secondly, we compare R^2 of the restricted and unrestricted models, i.e. model (1) and

(2) in Table 5. Model (1) has a very small R^2 (0.015). When the dummies of bureaucratic ranks are added in, R^2 increases to 0.22. If age and education are highly correlated with rank, we would not have seen such a large increase in R^2. Finally, we calculated Variance Inflation factors (VIF) for model (2). On average, VIF equals 2.34 for age, education, and rank dummies. Typically, when VIF is above 10, it is considered strong evidence of multicollinearity. All above three pieces of evidence suggest that multicollinearity may not be a serious problem. Thus, the inference based on the estimates of model (2) is largely valid and informative. The estimates show that the average amount of bribery increases significantly with bureaucratic ranks. Also, we see changes in the estimates of age and education variables from model (1) to (2). The estimate of the youngest age group (Age 35 and below) increases from model (1) to (2) and becomes significantly positive. This suggests that the lower bribery amount of young bureaucrats, as shown in column (1), is mostly due to their low political rank. When rank is controlled, they have a significantly higher bribery amount. Similarly, bureaucrats with a higher education level tend to have a higher rank. When rank is controlled, the average amount of bribery of those with a higher education level becomes lower.

In the third step, we add in the group of government division dummies. F-test results cannot reject that the estimates of different government departments are the same. However, we do see that the coefficient estimates of transportation, finance, and core departments are significantly higher than the base group (i.e. the planning and auditing department).

Finally, provincial economic variables are included in the estimation. In addition to per capita GDP and growth rate, we also included variables of percentages of private sector, foreign direct investment and import and export in a provincial economy. The percentage of private sector is measured by the number of workers working in the private sector as percentage of total employment in a province. This variable is considered as a proxy of degree of economic freedom. FDI and import/export are the proxies of the degree of openness of a provincial economy. They turned out to be highly correlated with the provincial growth rate. Therefore, in Table 5, we exclude them. However, separate regressions are estimated with FDI and import/export included in place of the growth rate. The results show that the share of the private sector is significantly associated with corruption, with a larger share of private economy associated with less corruption.

5. Conclusion

We have theoretically and empirically studied the determinants of rent seeking by individual government officials, with rent measured by the amount of bribery taken by a bureaucrat.

In the study, we used two groups of explanatory variables. In the first group are personal factors, i.e., age, gender and education. In the second group are institutional factors, i.e., bureaucratic rank, government division and provincial economic variables. The linkage between these variables and rent seeking was first discussed in the theoretic model.

The empirical findings may be summarized as follows. First and foremost,

bureaucratic rank is the most important predictor of corruption, with corruption more severe among higher-ranking government officials. Second, some government divisions such as transportation and finance are more corrupt. Third, rent seeking is found to be negatively associated with education. Fourth, the more market-based economy with a large share of private sector may help curb rent seeking.

These empirical results are generally consistent with the predictions of our theoretic model. The theoretic model predicts that government officials with greater regulatory power are more corrupt because they have more to gain to be corrupt. This is verified by findings 1 and 2 mentioned above. The theoretic model also predicts that government officials with higher opportunity costs should be less corrupt. This is supported by finding 3 above. Somehow, the prediction that age affects punishment cost and thereby the corruption decision is not clearly supported. While descriptive statistics suggest that bureaucrats approaching retirement age do take greater amounts of bribery, the age effect is not significant in the regression. The fact that those in the youngest age group also take very high amounts of bribery is a surprising phenomenon that needs to be further studied and explained.

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Table 1: Age, Gender, and Education and Corruption

	Proportion in the sample (%)	Average Amount in RMB'000	(in US$'000)
Age 35 & below	6.15	9032.8	(1158.1)
35-40	13.08	4691.3	(601.4)
40-45	23.85	2554.3	(327.5)
45-50	28.46	5591.1	(716.8)
50-55	20.00	8208.9	(1052.4)
55 & up	8.46	10605.1	(1359.6)
	100%		
Female	8.46	4335.2	(555.8)
Male	91.54	6054.4	(776.28)
	100%		
High School & Below	13.08	10258.9	(1315.2)
Two-year College	24.24	5640.4	(723.1)
Four-year College	45.45	5740.5	(736.0)
Graduate	17.69	3487.6	(447.1)
	100%		

Table 2: Bureaucratic Rank and Corruption

	Proportion in the sample (%)	Average Amount in RMB'000	(in US$'000)
Ke	2.31	4064.0	(521.0)
Chu Minus	10.00	1806.3	(231.6)
Chu	26.15	4533.6	(581.2)
Ting(*Ju*) Minus	30.00	3526.1	(452.1)
Ting(*Ju*)	18.46	10370.9	(1329.6)
Sheng(*Bu*) Minus, *Sheng*(*Bu*) & above	13.77	11289.4	(1447.4)
	100%		

Table 3: Major Government Divisions and their Regulatory Power

	Ministries	Power
Core	Governor or Mayors, or Vice governors and mayors	The highest authority; Oversee jobs; Determine personnel appointment of other officials
Commerce	Ministry of Commerce, Customs	In charge of international trade, rebate, custom, approve joint ventures, and the enterprise licensing
Finance	Ministry of Finance	Internal revenue, government budget, budget appropriation, and expenditure
Tax	General Administration of Tax	Collecting individual and corporate tax
Construction	Ministry of Construction	Approval of construction programs
Transportation	Ministry of Transportation	Approval of road construction, high way programs, and highway tolls
Jurisdiction & prosecution	The Police Department, Persecutors, Judges, Ministry of Supervision and Internal Discipline	The power of investigating, policing, prosecuting, and sentencing criminals; the internal monitoring of misconducts and corruptions
Education, Science, Cultural, & Health	Ministry of Education; Ministry of Science; Ministry of Culture; Ministry of Health; General Administration of Sports (GAS), State Administration of Ratio Film and Television (SARTT); General Administration of Press and Publications (GAPP); State Food and Drug Administration (SFDA)	Overall: Set the policy and provide the service in the corresponding areas. Specifically, Ministry of education has the power to determine and check the fee and tuition collection in public schools; SARTT and GAPP have power to monitor media and inspect press, publications, movies and TV programs; SFDA approves new drug and inspect food safety.
Agricultural, Forestry, Water & Electricity	Ministry of Agriculture, Ministry of Water Resources; State Forestry Administration;	Set policy, Survey natural resources; Supervise work in the corresponding areas;
Planning and Auditing	Committee of Economic Development and Planning; Ministry of Auditing	Plan and Guide the policy of national and local economic development; Audit the finance of other ministries.

Table 4: Government Divisions and Corruption

	Proportion in the sample (%)	Average Amount in RMB'000	(in US$'000)
Transportation	6.92	15336.1	(1966.2)
Commerce	3.08	12666.3	(1623.9)
Tax	3.85	10822.0	(1387.4)
Core	53.31	6064.1	(777.4)
Finance	6.15	4688.3	(601.1)
Education, Science, Cultural, & Health	6.15	2930.7	(375.7)
Jurisdiction & prosecution	9.23	2662.3	(341.3)
Construction	5.38	1507.7	(193.3)
Agricultural, Forestry, water &Electricity	4.61	1365.8	(175.1)
Planning and Auditing	2.31	448.7	(57.5)
	100%		

Table 5: Determinants of Bribery Amount

Dep. Var. Log(Amount of Accepted Bribery)	(1)	(2)	(3)	(4)
Age				
Age 35 & below	0.495	1.315**	1.889***	2.003***
	(0.641)	(0.675)	(0.721)	(0.713)
Age 35-45	-	-	-	-
Age 45- 55	0.428	-0.152	-0.084	0.026
	(0.328)	(0.324)	(0.330)	(0.328)
Age>55	0.619	-0.603	-0.255	-0.450
	(0.558)	(0.567)	(0.564)	(0.577)
Male	-0.490	-0.565	-0.312	-0.301
	(0.533)	(0.506)	(0.562)	(0.594)
Education				
High School and Below	-	-	-	-
Two Year College	-0.673	-1.051**	-0.974*	-0.985*
	(0.500)	(0.506)	(0.536)	(0.527)
Four-year College	-1.046**	-1.560***	-1.467***	-1.455**
	(0.463)	(0.475)	(0.538)	(0.531)
Graduate	-1.327**	-2.295***	-2.219***	-2.113***
	(0.534)	(0.542)	(0.610)	(0.611)
Rank				
Chu Minus and *Ke*	-	-	-	-
Chu		1.107**	1.114**	1.016*
		(0.560)	(0.567)	(0.557)
Ting(*Ju*) Minus		1.494***	1.343**	1.317**
		(0.557)	(0.582)	(0.576)
Ting(*Ju*)		2.379***	2.077***	1.867***
		(0.583)	(0.630)	(0.639)
Sheng(*Bu*) Minus,		3.275***	2.918***	2.568***
Sheng(*Bu*) & Above		(0.680)	(0.715)	(0.752)
Department				
Transportation			2.496**	2.219**
			(1.031)	(1.076)
Construction			0.710	0.352
			(1.067)	(1.113)
Core			1.572*	1.379
			(0.916)	(1.011)
Education, Science,			0.675	0.465
Cultural, & Health			(1.043)	(1.052)
Agricultural, Forestry,			0.901	0.841
water &Electricity			(1.062)	(1.095)

Jurisdiction & prosecution			0.663 (0.991)	0.373 (1.069)
Tax			0.814 (1.341)	0.356 (1.405)
Commerce			1.274 (1.210)	1.292 (1.256)
Finance			2.070* (1.106)	1.690 (1.221)
Planning and Auditing			-	-
Provincial Factors				
Per capital GDP				0.001 (0.429)
Percentage of Private Sector				-1.755** (0.785)
GDP growth rate				1.154 (1.356)
Constant	6.190*** (0.645)	5.484*** (0.752)	3.870*** (1.248)	4.603*** (1.465)
Adjusted R^2	0.015	0.216	0.257	0.287

Note: Standard errors in parentheses; *,**, and ***, indicates the significance level at 10%, 5%, and 1% based on the two tailed tests.

Appendix Table: Determinants of Bureaucratic Rank (Ordered Logit Estimates)

Dep. Var.	Bureaucratic Rank
Age	
Age 35 & below	-2.785***
	(0.923)
Age 35-45	-
Age 45- 55	1.183***
	(0.360)
Age>55	2.730***
	(0.673)
Male	0.351
	(0.557)
Education	
High School and Below	-
Two Year College	0.200
	(0.544)
Four-year College	0.864*
	(0.505)
Graduate	1.756***
	(0.590)
constant	6.190***
	(0.645)
Pseudo R^2	0.11

Note: Standard errors in parentheses; *,**, and ***, indicates the significance level at 10%, 5%, and 1% based on the two tailed tests.