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## How Does Corruption in Developing Countries Affect Corporate Investment and Tax Compliance?

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**Abstract**

Using a rich panel data base for firms in Asian countries, we assess the effect of public sector corruption on corporate assets investment and tax payments. Our findings suggest that public sector corruption does not deter investment activities of national firms while asset investment of multinational corporations is significantly reduced in corrupt environments. Moreover, the findings indicate that corruption exerts a quantitatively large negative effect on corporate tax payments, especially for the group of small and medium-sized national firms. The results appear across a large range of specifications and robustness tests and suggest that even modest reductions in public sector corruption may induce significant increases in a country's tax capacity.

**Keywords:** corruption, developing countries, multinational firm, tax payments

**JEL Classification:** D73, F23, H25, H32, O16

# 1 Introduction

The public sectors of many developing countries are plagued by corruption, and crowding back corruption is widely seen as an important element of strategies for economic development.[1] However, views on the economic consequences of corruption are divided. While several authors have argued that corruption is bad for economic growth and development (see e.g. Shleifer and Vishny (1993)), others challenge this view and argue that corruption may facilitate economic activity and ultimately enhance economic growth and development. For instance, corruption may allow agents to get around harmful regulations, excessive taxes or delays due to inefficient bureaucratic procedures (Leff (1964), Lui (1985)).

Empirical work on the economic consequences of corruption has led to mixed results. There is a number of macro studies which compare corruption levels and economic growth across countries. This literature starts with Mauro (1995), who investigates the correlation between corruption and growth in a large cross section of countries and finds a negative correlation between indices of corruption and growth. However, Svensson (2005) updates Mauro's analysis and argues that this relationship is not robust. Meon and Weill (2009) consider a cross section of countries for the period 2000-2003 and find a positive correlation between corruption and a macroeconomic productivity measure, in particular in countries with weak institutions. Egger and Winner (2005) analyse the relationship between corruption and aggregate inward foreign direct investment (FDI) for a sample of developed and developing countries between 1995 and 1999 and find a positive relationship between corruption and inward FDI. Fisman and Svensson (2007) exploit a dataset on bribe payments by Ugandan firms and find that bribes are negatively correlated with firm growth.

This paper investigates the impact of public sector corruption on the behaviour of firms operating in a group of low and middle income countries in East Asia. Precisely, we exploit rich micro data on national and multinational firms in these countries which is available in panel format for the years 1999 to 2008. The paper focusses on two questions: Firstly, we ask whether a corrupt environment (as measured by an annual index for the perceived public sector corruption) deters or encourages investment. Secondly, we investigate the impact of corruption on taxes collected from firms.

While we find no significant correlation between corruption and the asset investment of national firms in our data, public sector corruption appears to significantly deter the

[1] For a survey of the literature on corruption and economic development see Bardhan (1997).

investment activity of multinational entities. Moreover, we find a negative correlation between corruption and corporate tax payments. Precisely, our results indicate that a less corrupt environment tends to increase both the marginal and the average tax payments of corporations. The quantitative estimates suggest that even modest reductions in public sector corruption may induce quantitatively relevant increases in corporate tax payments per asset investment and unit of profit respectively and therefore in the country's state capacity. Interestingly, we also find that corruption tends to dampen the tax payments (conditional on assets and profitability) of large and multinational firms by less than the tax payments of small and medium firms.

Thus, although public sector corruption exerts no significant impact on national firm investment, our results indicate that it comes at the costs of deterring multinational investment and corporate tax revenues. Moreover, the findings suggest that especially small and medium national firms which manage to reduce their corporate tax burden in corrupt environments while large multinational firms tend to react to increased public sector corruption by moving their investment activity to other countries.

All our empirical results turn out to be robust against the use of different model specifications, against controlling for unobserved firm heterogeneity and against the inclusion of a large set of control variables for the political, economic and social situation in the host countries.

The rest of this paper is set up as follows. Section 2 presents a simple theoretical model to motivate our empirical analysis. Sections 3 and 4 describe the data set used and our estimation strategy. The empirical results are presented in Section 5. Section 6 concludes.

# 2 Corruption and Tax Payments by Firms: Theoretical background

How should we expect corruption to affect corporate investment, profitability and tax payments? There is a small theoretical literature analysing the interaction between corruption and various aspects of entrepreneurial and corporate behaviour. Choi and Thum (2005) consider a model where entrepreneurs may choose between operating either in the formal sector, where corrupt officials have to be bribed, or in the informal sector, where firms do not have to be bribed but may be detected and fined. In this model, the existence of the shadow economy reduces the burden of bribe payments. In equilibrium the least productive firms operate in the shadow economy. The model thus

points to the fact that firms may react to increasing corruption in the formal economy by moving to the shadow economy. Of course, this result depends on the assumption that corruption plays no (or a smaller) role in the shadow economy.

Aidt (2003) develops a model where a non-corrupt government delegates tax collection to an agent who has the job to check whether firms make profits and are therefore liable for taxation. An exogenous fraction of all tax collectors is corrupt and willing to misinform the government in exchange for a bribe. As long as the bribe does not exceed the tax, the firm has an incentive to bribe the tax collector. With some probability, corruption is detected and both the tax collector and the firm are punished. This model allows to discuss the effect of various instruments which may be employed to fight corruption, including fines, monitoring mechanisms and efficiency wages for tax collectors.

While these models do point to various incentives and decision margins which are important for our analysis, some additional theoretical issues are relevant for our empirical analysis. To fix ideas, it is helpful to briefly consider a highly stylized model of corporate investment and corruption. We assume that corruption may reduce tax payments of firms, but at the same time firms have to pay bribes.

Consider a firm $j$ operating in country $i$,[2] with revenue $R_j(I_j)$, where $I_j$ is the firm's capital stock, deductible capital costs are denoted by $D_j(I_j)$, non-deductible capital costs (like e.g. the opportinity cost of equity invested in the firm) are denoted by $ND_j(I_j)$. The firm's after tax profit can be written as

$$\Pi_j = R_j(I_j) - D_j(I_j) - ND_j(I_j) - T_j - B_j(c, I_j)$$

$B_j$ stands for bribes paid to corrupt officials, $c$ is the level of corruption in the economy and $T_j$ is the tax payment. It is plausible to assume that bribe payments are increasing in the level of corruption and with firm size, i.e. $\frac{\partial B_j(c,I_j)}{\partial c}, \frac{\partial B_j(c,I_j)}{\partial I_j} > 0$. $T_j$ is given by

$$T_j = t\left[R_j(I_j) - D_j(I_j)\right] - \alpha_j(c, I_j))$$

where $\alpha_j(c, I_j))$ is the reduction in the tax payment due to corruption. This general specification leaves open how exactly the tax payment is reduced due to corruption. What we have in mind is a model where the tax collected by the administration deviates from the tax as defined by the law. We would expect that the tax collected is lower as corruption increases, i.e. $\frac{\partial \alpha_j(c,I_j)}{\partial c} > 0$. Technically, this could happen in at least

[2]To ease notation, we drop the country index unless misunderstandings may arise.

two ways. Firstly, the corrupt tax administrator may allow the firm to understate its taxable profits by allowing, for instance, for additional deductions. Secondly, for a given taxable income, the administrator may collect less than the tax the firm would owe if the normal statutory tax rate $t$ was applied, i.e. the administrator may effectively reduce the tax rate. This distinction is relevant for our analysis because it is not clear whether profits observed in the data are profits before or after potential manipulation through corruption. We will return to this issue below. In addition, tax savings due to corruption are likely to increase in absolute terms with firm size, i.e. $\frac{\partial \alpha_j(c,I_j)}{\partial I_j} > 0$.

Another important issue is how taxes are related to bribes. If corruption can be seen as collusion between firms and tax administrators, the 'tax savings' will be divided between the firm and the corrupt officials. In this case, one would expect the tax savings to exceed the bribes, i.e. $\alpha_j(c, I_j)) > B_j(c, I_j)$ because the firm would always have the option to have its tax reported truthfully to the government. But a corrupt environment may also imply that government officials may engage in extortion, so that bribes exceed cost reductions due to favors

Given this, the firm's optimal investment level $I_j^*$ is given by

$$R_j'(I_j^*) - D_j'(I_j^*) = \frac{1}{1-t}\left[ND_j'(I_j^*) + \frac{\partial B_j(c, I_j^*)}{\partial I_j} - \frac{\partial \alpha_j(c, I_j^*)}{\partial I_j}\right] \tag{1}$$

The right hand side of (1) may be interpreted as a corruption-adjusted cost of capital. The impact of corruption is captured by the expression $\frac{\partial B_j(c,I_j^*)}{\partial I_j} - \frac{\partial \alpha_j(c,I_j^*)}{\partial I_j}$. It reflects that bribes to be paid as well as tax savings increase as $I_j$ increases. How does a change in the corruption level affect $I_j^*$? A positive (negative) effect of corruption on $I_j$ requires $\frac{\partial^2 B_j(c,I_j^*)}{\partial I_j \partial c} - \frac{\partial \alpha_j^2(c,I_j^*)}{\partial I_j \partial c} < 0$ ($\frac{\partial^2 B_j(c,I_j^*)}{\partial I_j \partial c} - \frac{\partial \alpha_j^2(c,I_j^*)}{\partial I_j \partial c} > 0$). If an increase in corruption increases the marginal cost of bribes, $\frac{\partial B_j(c,I_j^*)}{\partial I_j}$, by more than the marginal tax savings, $\frac{\partial \alpha_j(c,I_j^*)}{\partial I_j}$, more corruption reduces the firm's scale of activity, and vice versa.

How should we expect the firm's profitability to be affected by corruption? If we define the firm's profitability as the ratio of profits over assets, one issue is whether we observe profits before or after manipulation of reported profits through corruption and before or after bribes. In addition, some types of capital costs like e.g. the opportunity cost of equity will not enter profits. Assume that book profits observed in the data are given by $\Pi_j^B = R_j(I_j^*) - D_j(I_j^*) - t\left[R_j(I_j) - D_j(I_j)\right] + \gamma\left[\alpha_j(c, I_j) - B_j(c, I_j^*)\right]$, where the parameter $\gamma \in (0, 1)$ captures the extent to which activities related to corruption are reflected in the accounting data.[3] The firm's profitability, denoted by $\rho_j^B$ is given by $\rho_j^B = \Pi_j^B(I_j^*, c)/I_j^*$. The impact of a change in corruption on profitability can be

[3]If exclude the non-deductible cost of capital $ND_j(I_j)$ is the opportunity cost of providing equity

expressed as

$$\frac{d\rho_j^B}{dc} = \frac{1}{I_j^{*2}} \left[ \left( \frac{\partial \Pi_j^B}{\partial I_j} I_j^* - \Pi_j^B \right) \frac{dI_j^*}{dc} + \gamma \frac{\partial \Pi_j^B}{\partial c} I_j^* \right] \tag{2}$$

The right hand side of (2) shows that the impact of corruption on profitability depends on two factors. Firstly, a change in corruption may trigger a change in asset investment. Depending on whether investment increases or decreases, profitability may change. Secondly, there is a more direct effect on profitability as corruption changes costs of taxes and bribes. If corruption has a positive impact on corporate activity, one would expect profitability to fall as investment increases whereas costs of taxes and bribes decline. As a result, it may be the case that we observe no increase in profitability although, for given asset levels, profitability does increase. For the empirical analysis, this suggests that an observed correlation between profitability and corruption level has to be interpreted with caution. The less the direct impact of corruption on profits appears in the accounting data, the more likely it is that the correlation between profitability and corruption is driven by the effect of corruption on asset investment.

Consider next the impact of corruption on the taxes paid by firms. In the empirical analysis, we will include before tax profits as well as corrption levels as explanatory variables. Again, it has to be taken into account that corruption affects pre-tax profits through changes in investment as well as through changes in $\alpha_j(c, I_j)$. Finally, it is also likely that corruption affects entry and exit decision of firms. Assume that firm $j$ has some given reservation profit below which it leaves the market or switches to the shadow economy. In this case, differences in corruption across countries may have a selection effect, which has to be taken into account. We will come back to this issue when we discuss our empirical results.

# 3 Data

Our empirical analysis relies on the commercial database ORBIS which is compiled by Bureau van Dijk. It contains accounting information derived from the firm's profit and loss (P&L) accounts and from the balance sheet items. It also provides detailed information on the ownership structure of national and multinational corporations worldwide. Our sample includes incorporated firms in Asian developing countries. After restricting the data to countries with a sufficiently high firm coverage, we are left with

to the firm it would not be included in book profits. Effectively, whether or not we include this term here is of minor importance for the results.

information on firms in China, India, Indonesia, Malaysia, Pakistan, Philippines, and Vietnam. Table 1A indicates that the majority of firms in our sample are located in China and India. This reflects both, the respective country size and a more intense data collection effort of Bureau van Dijk in these countries. The time period covered in the data is 1999 to 2008.

- Table 1A about here -

The observational unit in our analysis is the corporate firm per year. The sample statistics are presented in Table 1B. In total, the dataset includes 358, 145 observations for 123, 655 firms. Thus, the firm information is available for 2.9 years on average.

The average firm in our sample has a total asset stock of 21.70 million US dollars and employs 510 workers, whereas both variables strongly vary across observations. The average corporate profit/loss before taxation and the average corporate tax payment are around 1.14 million US dollars and 0.18 million US respectively. The firms in the data thus display an average pre-tax profitability (=profit/loss before taxation / total assets) of 0.07 and an average tax to assets ratio (= corporate tax payments / total assets) of 0.01. Both variables exhibit a considerable cross-sectional and longitudinal variation as indicated by large standard errors. To avoid our results be driven by outliers, we drop the top and bottom percentiles of the distribution of the pre-tax profitability and of the tax to assets ratio.

One advantage of the ORBIS data is that it allows to discriminate between national and multinational firms as information on ownership connections to both, parents and subsidiary firms is available in the data. Following previous studies, we define a corporation to be part of a multinational group if it either has a parent or a subsidiary firm in a foreign country and the direct or indirect ownership connections comprises more than 50% of the ownership shares. According to this definition, 2.2% of the firms in our sample belong to a multinational group.[4]

- Table 1B about here -

[4]Note that we classify firms as national corporations if information on ownership linkages to parents and subsidiaries is missing. This implies that we may misclassify corporations belonging to multinational groups as national firms if information on all their ownership connections to foreign countries is missing. We are, however, not too concerned about this assumption, as it implies that we potentially introduce additional noise to our estimation. Thus, if we find significant effects of the multinational dummy on our outcome variables, we should consider it as a lower bound to the true effect.

The variable of central interest in our analysis is a corruption perception index (CPI) which is retrieved from Transparency International and measures the perceived level of public-sector corruption in a considered country. The index is constructed as a "survey of surveys" since it is based on 13 different surveys of expert and businessmen in the country itself and abroad (see Transparency International's homepage http://www.transparency.org for details). The index is thus very well suited for our purposes as it largely reflects the corruption perception of the corporate sector, the subject of our analysis. Tax collection authorities are one of the major interaction points between businesses and the public sector. Hence, the corruption index is expected to largely reflect also the level of perceived corruption of the tax authorities. The index varies between 0 and 10 whereas 0 indicates extreme levels of corruption and 10 indicates a public sector free of corruption. In our sample, the CPI varies from a minimum value of 3.2 to a maximum of 5.2.

Our analysis also includes a set of host country controls. First, we account for the host country's statutory corporate tax rate.[5] The average statutory corporate tax rate of the firms in our sample is around 33.1% varying between 25% and 39.55%. Second, we control for the country economic cycle including the GDP growth rate and the inflation rate (obtained from the World Bank World Development Indicator database). The average growth rate is around 10.2% and the average inflation rate is 2.4%. Third, we control for the GDP per capita[6] and the revenues from trade taxes (as a percentage of total revenues). The former variable is a proxy for the level of development of a country. The latter is a measure of a country's taxing capacity as it is widely known that trade taxes are easier to collect than other taxes.

Moreover, we control for the characteristics of the country political system as political instability could have an impact on tax payments and at the same time, it is likely to be highly correlated with corruption. Specifically, we include measures obtained from the Polity IV Project of the Center for Systemic Peace (see Marshall and Jaggers (2009) for details) which capture the institutionalized democracy and institutionalized autocracy in a country. The democracy measure accounts for the presence of institutions and procedures through which citizens can express effective preferences about alternative policies and leaders, the existence of institutionalized constraints on the exercise of power by the executive and the guarantee of civil liberties to all citizens in their daily lives and in acts of political participation. The autocracy measure in a

[5]The tax data is retrieved from KPMG's corporate tax guide (KPMG (2009)).

[6]The GDP per capita is reported on a purchasing power parity basis.

complementary way takes into account the competitiveness of political participation, the regulation of participation, a country's openness and competitiveness of executive recruitment, and constraints on the chief executive. Both measures vary between 0 and 10 with 0 indicating no institutionalized democracy/autocracy and 10 indicating a fully institutionalized democracy/autocracy. The host countries of our sample firms are strongly characterized by autocratic regimes with an average autocracy index of 6.5 and an average democracy index of 0.7. Last, we include a variable which measures the duration of the current political system, precisely the number of years since the last regime change. The firms in our sample are hosted in regimes with an average duration of 54.7.[7]

# 4 Estimation Strategy

Following our theoretical motivation, we estimate three sets of regressions to determine the effects of public-sector corruption on corporate investment, the corporate pre-tax profitability, and the firm's corporate tax payments.

To assess the first relationship, we estimate a regression model of the following form

$$\log t_{it} = \beta_0 + \beta_1 c_{it} + \beta_3 X_{it} + \rho_t + \phi_i + \epsilon_{it} \tag{3}$$

with $t_{it}$ depicting the total assets of firm $i$ at time $t$. As the variable exhibits a skewed distribution, we use a logarithmic transformation.

The total asset measure is regressed on the corruption perception index $c_{it}$ and a set of control variables which are subsumed in the vector $X_{it}$. They comprise a set of country controls to avoid that the CPI takes up other country characteristics. Specifically, we include the country's corporate tax rate to account for tax effects on asset investment, the GDP growth rate and the inflation rate to control for potential effects of the general economic situation, the level of GDP per capita to absorb the country's income and development level as well as various policy measure to account for the democratic/autocratic orientation and stability of the regime in a specific year. Moreover, we include a full set of year fixed effects to absorb common shocks to all firms in our sample. An example for such common shocks are the global economic cycle and the average statutory corporate income tax rate in the rest of the region. Additionally, we account for 2-digit sector year effects which pick up shocks to specific

[7]Note that as most of our sample firms are located in China, the policy measures described in this paragraph strongly reflect the political situation in China.

sectors over time. Additionally, the fixed asset stock of corporations is expected to be largely driven by a set of factors which are unobservable to the researcher. To account for this possibility, we include a set of firm-fixed effects which absorb time-invariant heterogeneity between the firms in our sample. Last, $\epsilon_{it}$ depicts the error term.

Following our argumentation in Section 2, the sign of $\beta_1$ is ambiguous as public sector corruption may on the one hand side levy an additional burden on corporations but might on the other hand side also enhance the corporate flexibility to avoid public bureaucracy and tax payments and hence reduce their costs. Which effect prevails, is an empirical question. Moreover, to account for the possibility that the effect of corruption on investment activity differs between multinational and national firms (as only the former are internationally mobile), we add specifications which interact the corruption index with a dummy variable that indicates multinational firms.

As the corporate investment decision is characterized by a dynamic nature and positive adjustment costs, we moreover run dynamic specifications which include a lagged dependent variable in the model. To avoid the well-known Nickell bias, we employ a first-difference GMM model as proposed by Arellano and Bond (1991) and instrument for the first difference in the lagged dependent variable by deeper lags of the level of the dependent variable. The estimation model has the following form

$$\Delta \log t_{it} = \beta_1 \Delta c_{it} + \beta_2 \Delta (c_{it} \times MNE_i) + \beta_3 \Delta X_{it} + \Delta \rho_t + \Delta \phi_i + \Delta \epsilon_{it} \tag{4}$$

The variable definitions correspond to the ones in equation (3). Because the model is estimated in first-differences, the equation will be characterized by the presence of first-order serial correlation. However, the validity of the GMM estimator relies on the absence of second-order serial correlation. The Arellano/Bond-Test for second-order serial correlation will be reported at the bottom of the result table. We check for the exogeneity of the instrument set by employing a Sargan/Hansen-Test.

Apart from the investment effects, our empirical analysis in a second step determines how changes in public sector corruption affect the firms' reported pre-tax profitability $p_{it}$. Profitability is measured as the balance sheet's profit/loss before taxation over the book value of total assets. Precisely, we estimate the following model

$$p_{it} = \alpha_0 + \alpha_1 c_{it} + \alpha_2 (c_{it} \times \log t_{it}) + \alpha_3 (c_{it} \times MNE_i) + \alpha_4 \log t_{it} + \alpha_5 X_{it} + \rho_t + \phi_i + \mu_{it} \tag{5}$$

with $c_{it}$ again depicting the corruption index and $\log t_{it}$ indicating the logarithm of the total asset variable. Following the previous equations, $X_{it}$ depicts the set of time-varying country characteristics described above. Moreover, we account for year and

firm fixed effects. The latter control for time constant heterogeneity across firms. The former control for common shocks over time to all firms in the sample. In robustness checks, we also account for sector-year effects.

The effect of corruption on firm profitability and hence the sign of $\alpha_1$ is a priori ambiguous. A higher corruption may create additional costs which reduce the pre-tax profitability (e.g. the cost of bribes). On the other hand, firms may also profit from corruption as it allows to escape burocracy and taxation. Moreover, if some firms leave the market due to an additional burden of corruption, the market power and hence the profitability of the remaining firms may increase. As the degree to which firms are exposed to corruption may well vary with firm mobility and size, we again interact the corruption index with a dummy for multinational firms and with the total asset variable.

Note moreover that we add specifications in which we account for potential endogeneity problems and instrument for the total assets measure (and the interaction term between total assets and the multinational dummy) using lagged values of the variable as instruments. Precisely, we follow the Arellano and Bond (1991) GMM approach described above and take the first difference of equation (5) to control for firm specific time-constant effects and then instrument for the difference in the total asset measure with deeper lags of its value.

Finally, in a third step, our analysis investigates the effect of public sector corruption on the corporate tax payments as measured by the tax payments reported in the P&L account over the book value of total assets ($\tau_{it}$). We estimate

$$\tau_{it} = \gamma_0 + \gamma_1 c_{it} + \gamma_2(p_{it} \times c_{it}) + \gamma_3(t_{it} \times c_{it}) + \gamma_4(p_{it} \times MNE_i) + \gamma_5 p_{it} + \gamma_6 t_{it} + \quad (6)$$

$$+\gamma_7 X_{it} + \rho_t + \phi_i + \nu_{it} \quad (7)$$

where $c_{it}$ depicts the host country's CPI. As we mentioned in Section 2, we presume that corruption exerts a negative effect on the corporate tax payments per assets. Since the Transparency International's corruption index declines in the country's level of perceived corruption, we expect $\gamma_1 > 0$.

One major determinant of corporate tax payments per asset is the firm's pre-tax profit per asset $p_{it}$ which is included as a control variable. The coefficient $\gamma_2$ thus captures the marginal effective tax rate (ETR)[8] for a company where the corruption index is equal to zero. $\gamma_3$ measures the additional effect on the marginal ETR for a

[8]In fact, $\gamma_2 = \frac{\partial(\frac{tax\ bill}{tot.\ assets})}{\partial(\frac{P\&L}{tot.assets})} = \frac{\partial(tax\ bill)}{\partial(P\&L)}$ for a group without tax haven operations.

firm resident in a country with a positive value of the corruption index; $\gamma_3$ is expected to be positive, as the marginal ETR should increase when the perceived corruption decreases and therefore CPI increases.

Moreover, we include the size of the total asset stock as a control variable. Since corruption may affect large and small firms differently, we additionally add an interaction term between the corruption index and affiliate size (= total assets)/an MNE dummy. Our presumption is that it may be especially small and medium firms which (can) take advantage from corrupt environments. Thus, if only a fraction of tax officials engages in corrupt behaviour, it may be difficult for large (multinational) firms to reduce their tax payments through bribes as most developing countries focus their tax effort on large firms through the creation of large tax payer units, the allocation of a high percentage of the tax authority's human capital to the tax collection from these firms and monitoring mechanisms for the tax officials in charge. Apart from that, multinationals and large national firms may in general have less incentive to engage in corrupt behaviour as they commonly tend to have better internal monitoring mechanisms which restricts corrupt behaviour and may fear reputational costs if corrupt activities become public. This would imply $\gamma_4 < 0$.

In terms of control variables, equation 7 moreover includes a full set of firm fixed effects and year(-sector) fixed effects. Additionally, we again control for time-varying country characterisitcs to avoid that the corruption effect takes up other political and social developments in the country. Most importantly, we also include a variable which captures the fraction of the country's tax revenue which is raised through trade taxes as those are known to be easy to administer and thus should enhance the tax capacity of the state and hence the tax payment per assets of the firms in our sample. Moreover, we account for basic economic indicators and variables which capture the political situation in the country.

Analogously to the profitability regressions, we also consider potential endogeneity problems and instrument for the firms' total asset stock and profitability measure which are included as control variables. Precisely, we again use the Arellano and Bond (1991) first difference GMM and instrument for the first difference in the variables with deeper lags of their level.

# 5 Results

The results are presented in Tables 2 to 5. All specifications include a full set of year fixed effects. Heteroscedasticity robust standard errors which account for clustering at the firm level are presented in brackets below the coefficient estimates.

Table 2 depicts the results for the investment equations. In Specification (1), we regress the logarithm of the firms' total asset stock on the corruption index and a set of basic country controls for the economic and social situation as well as a full set of year and firm fixed effects respectively. The coefficient estimate for the corruption index is positive but does not gain statistical significance which suggests that the investment decision of the firms in our sample is not affected by the level of public sector corruption in their host country. This result is confirmed by Specification (2) which additionally includes country control variables for the political situation (by including a variable for the degree of autocracy of the political system and the regime durability[9]), foreign aid flows and the percentage of tax revenues in the country which are raised by trade taxes. Again, we find no significant effect of public sector corruption on the corporate investment decision.

In Specification (3), we account for the possibility that multinational and national firms are to a different degree exposed to corruption. While multinational firms are by their very definition mobile across countries and may hence avoid corrupt regimes if they impose additional costs by moving to other locations, national firms are considerably more restricted in their opportunities. To test for a potentially heterogeneous effect, we add an interaction term of the corruption index with a dummy variable which indicates multinational firms. The results are presented in Column (3) and suggest that changes in the public sector corruption do not affect corporate investment stocks of national firms, it does lower corporate investment activity of multinational firms. Thus, while the majority of firms which operate on a national basis only neither lower not enhance their investment stocks in response to increased levels of public sector corruption, multinational firms tend to lower their activity.

In Specifications (4) and (5), we run additional robustness checks on our specification. Specification (4) uses data for the years 2001 onwards only as the coverage of firms is low for the first two sample years. Specification (5) moreover drops firms in China to assess the robustness of our results to drop the largest country in the sample. Both regressions confirm the previous findings and suggest that for the majority of national

[9] An index for the level of democratic institutions is dropped due to collinearity

firms, changes in the corruption level do not exert a significant effect on investment activity.

Furthermore, as discussed in the previous section, adjustments in the corporate asset stock are expected to involve positive costs and hence a dynamic model may fit the data well. The regressions for a dynamic GMM framework are presented in Specifications (6)-(9) and confirm the dynamic nature of corporate asset investments, as the coefficient estimated for the lagged dependent variable is large and statistically significant. Moreover, the coefficient estimate for the corruption index again turns out to be statistically indistinguishable from zero suggesting that changes in the perceived public sector corruption do not alter the investment decision of corporations. Nevertheless, in Specification (9), we again discriminate between effects of national and multinational firms and find that the insignificant effect is driven through the national firms in our sample while multinational firms in fact tend to react negatively to a corrupt environment. Quantitatively, the estimates suggest that an increase in the corruption index by 1 would enhance the corporate asset stock of multinational firms by 9%. Evaluated at the sample average of a corruption index of 3.3, this would imply that an increase in the corruption index by 10% would induce an multinational asset increase of 3%.

In a second step, we assess the effect of public sector corruption on the firms' reported pre-tax profitability. As sketched in the previous section, the effect is a priori ambiguous as corruption may impose an additional costs on firms and hence lower their profitability but may also give rise to better cost-saving opporunities and less burocratic burden and hence enhance their profitability. Specification (1) in Table 3 regresses the firms' reported pre-tax profitability (= profit/loss before taxation over total assets) on the corruption index and a full set of year and firm fixed effects and economic country control variables. The regressions indicate no significant effect of corruption on the reported pre-tax profitability. This result prevails if we add additional country control variables and a size control (= logarithm of total assets) in Specifications (2) and (3).

Column (4) moreover accounts for the possibility that changes in the level of corruption may exert an heterogeneous effect on firms of different size. Thus, we add an interaction term between the corruption index and firm size as measured by the logarithm of the total asset stock. Adding the interaction term renders the coefficient estimate for the corruption index negative and statistically significant while the coefficient estimate for the interaction term has a positive sign and is equally statistically significant at the 1% level. This suggests that for very small firms, the effect of corruption on pre-tax profitability tends to be positive (i.e. if the Transparency International index increases and hence the perceived public sector corruption in a country declines,

they tend to become *less* profitable). This effect vanishes though with increasing firm size and switches its sign for large firms. Thus, the reported pre-tax profitability of large firms tends to decrease in the level of corruption (i.e. if the Transparency International index increases and hence the perceived public sector corruption in a country declines, they tend to become *more* profitable). This would imply that it is mainly the smaller firms which might benefit from the enhanced flexibility of operating in a corrupt environment while for large firms the negative effects tends to prevail and they tend to report lower pre-tax profits with larger corruption levels.

This effect is confirmed if we add an interaction term between the corruption measure and a multinational dummy in Specification (5). Again the coefficient estimate for the interaction term turns out to be positive, indicating that profitability of multinational firms (of a considerable size) tends to respond negatively to increase in the level of public sector corruption. This may partly reflect the multinational incentive and ability to use international channels to transfer profits out of a country with a corrupt environment (for example through the distortion of intra-firm transfer prices or the debt-equity structure).

Moreover, we again check whether the results are driven by specifics of our sample. Thus, we exclude the years 1999 and 2000 from the sample in Specification (6) which leaves the results largely unaltered. In Specification (7), we drop firms which are located in China which constitutes the vast majority of firms in our sample. The coefficient estimate for the corruption index turns positive in the latter specification but still fails to become significant at conventional significance levels. Last, in Specification (8), we account for potential endogeneity problems and estimate a first-difference GMM model which instruments for the first difference in the total asset variable by using deeper lags of its level. The results turn out to show a comparable picture to the fixed effects specifications although one has to admit that the overidentification test fails to reject endogeneity in the instrument set (i.e. correlation between the instruments and the error term).

Table 3 presents results for the basic specification of equation (7) where the dependent variable is the ratio of tax charges to the book value of total assets. The direct effect of the CPI on the tax bill over total assets ($\gamma_1$) is not significant in the first two specifications (column (1) and (2)) but it becomes so when we control for other country characteristics such as GDP per capita and revenues from trade taxes (columns (4) to (7)). To determine the effect of CPI on the ETR, the specifications moreover include an interaction term of CPI and pre-tax profitability as described in the previous section.

The marginal ETR estimated by the coefficient of profitability $\gamma_2$ is highly statistically significant. It remains so across all specifications of Table 4, except for the sample where we exclude China (column (8)).[10] Its negative value is due to the presence of many companies with negative tax payments booked to their P&L account. This is why the coefficient $\gamma_2$ turns positive when we include only observations with positive values for their tax payments (see column (3)). We interpret negative tax payments reported in the accounts as reflecting loss carryforwards. This implies that, in fact, the company will not pay any taxes in the period analysed. It is important to include observations with negative tax payments because corruption may affect the tax burden in different ways, including reducing tax payments to zero and producing loss carryforwards or increasing their magnitude. The negative value of the marginal ETR is valid only for companies located in a country with a very high level of corruption and therefore a very low value for the CPI. This indicates that in very corrupt environments, the marginal ETR can be negative: an additional unit of profit can reduce tax payments if additional pre-tax profit is used for paying corrupted tax officials.

As expected, the coefficient $\gamma_3$ on the interaction term between profitability and CPI is positive and highly significant throughout Table 3, with the exception of column (3). The result is robust to a set of different specifications: to the inclusion of various country-year controls (see column (4)), of sector-year dummies (column (5)), to the exclusion of Indonesia, Pakistan and Vietnam (column (6)), to the exclusion of year 1999 and 2000 (column (7)), and to the exclusion of China (column (8)).

Quantitatively, the results suggest a large and economically relevant effect of corruption on tax payments. Column (2) for example indicates that evaluated at the mean profitability of 7% (see Table 1B), an increase in the corruption index by 1 would increase the tax to asset ratio by 1.4%. Other specifications suggest even larger effects. Also note in this context that the estimated marginal ETR is small. Evaluated at the mean value of CPI, Column (2) depicts a marginal ETR of around 6.3 per cent. This means that for companies in a country with CPI equal to 3.3, a one US dollar increase in the accounting profit leads to a 6.3 cents increase in the tax liabilities. This falls considerably short from ETR estimates for the developed world which are in the range of 30 per cent (see Maffini, 2009).

[10]Profitability could be endogenous as it may be determined at the same time as taxes. The same could be said for the Log of total assets. To control for this, we should instrument both variables and use a difference GMM estimator (Arellano, Bond (1991)). Unfortunately, we were unable to find instruments which would pass the Hansen test for the exogeneity of the instruments and their right exclusion from the regression.

With respect to the control variables, the effect of GDP growth on tax payments is ambiguous as a prevalent positive sign of its coefficient is not robust across all specifications. Inflation seems to exert a positive effect probably affecting prices of goods sold more than the value of total assets which may reflect historical costs. The variables democracy, autocracy, and durable which describe the political institutions of a specific country are not significant.

Moreover, as discussed above, it is likely that firms respond differently to corruption. In column (1) of Table 4, we control for the size of the company as measued by the logarithm of total assets. $\gamma_1$ remains positive and highly significant, implying that corruption decreases tax payments over total assets. This effect is however smaller for larger firms as shown by the negative coefficient of the interacted variable *log Total Assets*Corruption Index*. The coefficient on the interacted variable *Profitability*log Total Assets*Corruption Index* is also negative which implies that the detrimental effect of corruption on the marginal ETR is smaller for larger companies. The same results hold when we control for the size of the company using the logarithm of the number of employees (column (2)).[11]

Results are less straightforward for multinational companies as described in columns (3) to (5). The sign of the coefficient attached to the variable *Profitability*MNE*Corruption Index* is negative with opposite sign and same size as the coefficient of the variable *Profitability*Corruption Index*. The sum of the two coefficients shows the additional effect that an increase in CPI exerts on the marginal ETR of multinational companies. Therefore, for MNEs, the total effect of CPI on the marginal ETR is close to zero. It seems that CPI has no effect on the marginal ETR of multinationals. This is consistent with two explanations. First, multinational corporations are well known for preferring a stable marginal ETR across years. Having much more resources than small domestic firms, large and international companies can smooth fluctuations of their tax burden, irrespective of changes in the environment where they operate. Second, it might be more difficult for these firms to evade taxes and pay bribes as they are more intensely scrutinised, for example through the large tax payer units set up by many national tax authorities. Contrary to large firms, the CPI seems to exert a bigger positive direct effect on the ratio of tax payments to total assets, as shown by the coefficient on the variable *MNE dummy*Corruption Index*. This effect holds also in column (4) where we control for a differential effect of the economic cycle for multinational companies by interacting GDP growth and the inflation rate with multinational

[11]We prefer not to use this specification because many companies do not report the number of employees and therefore the sample would be reduced substantially.

dummies. In column (5), we control for both size and multinational status as MNEs are normally larger. The variables keep the same pattern displayed in column (1) and column (3): with the exception of the positive direct effect of CPI on tax payments over total assets for multinationals, large domestic firms and multinationals seem to respond less to changes in the corruption of the environment with respect to small domestic firms. In particular, multinationals do not seem to change the marginal ETR when CPI changes.

Our evidence is partially consistent with multinationals and large domestic firms being influenced less by corruption. This can be explained by the fact that it may be more difficult for those firms to evade taxes and pay bribes as they are intensely controlled both internally and externally. Additionally, given the larger amount of tax payments submitted by these companies, it may be difficult to evade even a small part of them. In other words, to evade 10% of a million US$ is more difficult than to evade 10% of 1,000 US$. It is also known that large and multinational corporations prefer a stable marginal ETR across years. Large and international companies own enough resources (that is, a large tax department) to be able smooth fluctuations of their tax burden, irrespective of changes in the environment where they operate.

Table 4 also contains some interesting results for the tax burden of large and multinational companies. As shown by the positive coefficient of the variable *Profitability*log Employees* in columns (1) and (5), larger firms display a higher marginal ETR. The same can be said for multinational firms (see the positive coefficient of the variable *Profitability*MNE*). This is consistent with the results on the effects of corruption: multinationals and larger firms seem to be able to reduce their tax burden less than small domestic companies. probably, small domestic firms are frequently running losses and therefore they frequently do not pay taxes.

# 6 Summary and Conclusions

Although public sector corruption is wide-spread especially in countries of the developing world, empirical evidence for corruption effects on the behaviour of firms (and individuals) is still limited. Existing studies moreover show mixed results, essentially suggesting that corporate investment may decline or increase in response to enhanced public sector corruption (see e.g. Svensson, 2005; Egger and Winner, 2005). Our paper contributes to this literature by using a new and rich panel data set on firms in Asian low and middle income countries in order to test for effects of public sector corruption

on corporate activities.

In a first step, we re-assess the response of corporate asset investment to the level of public sector corruption. The results show no significant impact on the investment activity of national firms while the asset stock of multinational corporations is found to significantly decline in the level of corruption. In a second step, we moreover determine the effect of corruption on the corporate tax payments (conditional on investment and profitability). The results indicate a strong and stable negative impact of corruption on both, the marginal and average tax payments of firms which appears across a wide range of specifications and robustness checks.

Interestingly, the effect is heterogeneous across firms though. Precisely, corruption is found to reduce the tax payments of large (multinational) firms significantly less than the tax payments of small and medium-sized firms. This finding may reflect both, a lower ability and a lower willingness of large (multinational) firms to take up opportunities for corruption-related reductions in tax payments. We discuss a set of potential explanations in the paper. Among others, the room for corrupt activities may be smaller for large firms as tax authorities in developing countries strongly focus on tax collection from large tax payers, e.g. through special large tax payer units within the authorities and special monitoring mechanisms which may leave little opportunities for corrupt officials to provide undetected tax reductions to large firms.

From a policy perspective, our paper suggests that even modest reductions in public sector corruption induce a significant and large increase in corporate tax payments per assets and thus, may give rise to significant increases in the tax capacity of the state. This is especially relevant for countries in the developing world whose economic and social problems are partly assigned to their small state and tax capacity (with tax-to-GDP ratios not seldomly below 15%). Our findings thus strongly support recent efforts of governments and development agencies to implement various tax administration reforms (e.g. incentive pay schemes and enhanced monitoring mechanims) in developing economies which aim at lowering corrupt activities within tax offices (see e.g. programs of the UK Department of International Development, German Federal Ministry for Economic Cooperation and Development, the Association of German Technical Cooperation or the Danish International Development Agency).

# 7 References


Bardhan, P. (1997), Corruption and development: a review of the issues, Journal of Economic Literature 35, 1320-1346.

Besley, T. and T. Persson (2009), The Origins of State Capacity: Property Rights, Taxation and Politics, American Economic Review 99, 1218-1244.

Choi, J.P. and M. Thum (2005), Corruption and the Shadow Economy, International Economic Review 46, 817-836.

KPMG (2009), KPMGs Corporate and Indirect Tax Rate Survey 2009, KPMG International.

Leff, N. (1964), Economic development through bureaucratic corruption, American Behavioral Scientist 82(2), 337–341.

Lui, F.T.(1985), An equilibrium queuing model of bribery, Journal of Political Economy 93, 760-781.

Marshall, M.G. and J. Jaggers (2009), POLITY IV PROJECT. Political Regime Characteristics and Transitions, 1800-2007. Dataset Users Manual, Transparency International.

Meon, P.G. and L. Weill (2009), Is corruption an efficient grease?, forthcoming, World Development.

Shleifer, A. and R.W. Vishny (1993), Corruption, Quarterly Journal of Economics 108, 599-617.

Svensson, J. (2005), Eight questions about corruption, Journal of Economic Perspectives, 19-42.


# 8 Appendix

**Table 1A: Country Statistics**

| Variable | Number of Firms |
|---|---|
| China | 114,998 |
| India | 4,408 |
| Indonesia | 270 |
| Malaysia | 817 |
| Pakistan | 292 |
| Philippines | 1,868 |
| Thailand | 611 |
| Vietnam | 391 |
| **Sum** | **123,655** |

| Table 1B: Descriptive Statistics | | | | | |
|---|---|---|---|---|---|
| **Variable** | **Obs.** | **Mean** | **Std. Dev.** | **Min.** | **Max.** |
| Total Assets* | 358,145 | 21,704.3 | 63,983.67 | 315 | 906,432 |
| Number of Employees* | 203,209 | 510.130 | 1,472.898 | 1 | 119,978 |
| Profit & Loss before Taxation* | 358,145 | 1,137.489 | 7,443.194 | -313,692 | 776,411 |
| Corporate Tax Payment* | 358,145 | 188.936 | 1,444.222 | -82,895 | 157,279 |
| Multinational Corporation | 358,145 | .022 | .147 | 0 | 1 |
| Profit & Loss before Taxation/Total Assets | 358,145 | .071 | .156 | -1 | 1 |
| Tax Payment/Total Assets | 358,145 | .009 | .026 | -.464 | .970 |
| Corruption Perception Index$^{\triangle}$ | 358,145 | 3.290 | .188 | 2.1 | 5.2 |
| Stat. Corporate Tax Rate$^{\square}$ | 358,145 | 33.101 | 1.153 | 25 | 39.55 |
| Avg. Stat. Corporate Tax Rate Asia | 358,145 | 29.712 | .696 | 28.43 | 31.67 |
| GDP Growth Rate$^{\square}$ | 358,145 | 10.235 | 1.334 | .518 | 13 |
| Inflation Rate$^{\square}$ | 358,145 | 2.426 | 1.597 | -1.408 | 23.118 |

Notes:

*: in thousands of US dollars; $^{\square}$: in percent; $^{\triangle}$: Transparency International's corruption perception index ranging from 0 (high corruption) to 10 (no corruption).

| **Table 2: Corruption and Corporate Asset Investment** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Dep. Variable: Log Total Assets, Panel 1999–2008 | | | | | | | | |
| | Fixed Effects | | | | | GMM Model | | |
| *Explanatory Variables:* | *(1)* | *(2)* | *(3)* | *(4)* | *(5)* | *(6)* | *(7)* | *(8)* |
| Lag Log Total Assets | | | | | | .668*** | .670*** | .678*** |
| | | | | | | (.025) | (.024) | (.025) |
| Corruption Index | .049 | .000 | -.015 | -.101 | .034 | .004 | -.062 | -.070 |
| | (.045) | (.050) | (.050) | (.116) | (.182) | (.058) | (.058) | (.059) |
| Corruption Index×MNE | | | .261*** | | | | | .091* |
| | | | (.071) | | | | | (.048) |
| Stat. Corporate Tax Rate | -.019*** | -.020*** | -.019*** | -.030*** | -.004 | -.012*** | -.012*** | -.012*** |
| | (.004) | (.004) | (.004) | (.009) | (.017) | (0.26) | (.026) | (.026) |
| Log GDP pC | .139 | .196 | .196 | -.060 | 2.323 | -.136 | -1.014 | -.980 |
| | (.164) | (.216) | (.213) | (.436) | (2.170) | (.466) | (.988) | (.995) |
| GDP Growth Rate | .012* | .031*** | .031*** | .052*** | .021 | .034*** | .030* | .029* |
| | (.007) | (.008) | (.008) | (.017) | (.020) | (.009) | (.017) | (.017) |
| Inflation | -.016 | -.012 | -.012*** | -.007* | .012 | -.002 | .000 | .001 |
| | (.003) | (.003) | (.003) | (.004) | (.026) | (.008) | (.011) | (.011) |
| Autocracy | | .495*** | .490*** | .282 | .290 | | -.036 | -.041 |
| | | (.186) | (.185) | (.239) | (.260) | | (.107) | (.111) |
| Duration of Political System | | .146*** | .145*** | .166*** | .037 | | .122 | .120 |
| | | (.017) | (.017) | (.032) | (.105) | | (.097) | (.098) |
| Foreign Aid | | -.032 | -.032 | .000 | -.060 | | .025 | -.001 |
| | | (.055) | (.054) | (.092) | (.064) | | (.072) | (.002) |
| Trade Tax Revenue Share | | -.002*** | -.002*** | -.002*** | .030 | | -.001 | .026 |
| | | (.000) | (.000) | (.001) | (.045) | | (.002) | (.072) |
| AR(2) (p-value) | | | | | | 0.100 | 0.082 | 0.087 |
| Sargan-Hansen (p-value) | | | | | | 0.782 | 0.401 | 0.715 |
| # Observations | 358,145 | 353,190 | 353,190 | 349,410 | 24,795 | 130,315 | 129,998 | 129,998 |
| # Subsidiary Firms | 123,655 | 119,235 | 119,235 | 119,224 | 5,541 | 77,638 | 77,607 | 77,607 |
| Within $R^2$ | 0.2801 | 0.2802 | 0.2804 | 0.2794 | 0.3292 | – | – | – |

Notes: Heteroscedasticity robust standard errors adjusted for firm clusters in parentheses.

*, **, *** indicates significance at the 10%, 5%, 1% level. Observational units is the firm per year. All specifications include a full set of year fixed effects.

| **Table 3: Corruption and Pre-Tax Profitability** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Dep. Variable: Log Total Assets, Panel 1999–2008 | | | | | | | | |
| | Fixed Effects | | | | | | | GMM Model |
| *Explanatory Variables:* | *(1)* | *(2)* | *(3)* | *(4)* | *(5)* | *(6)* | *(7)* | *(8)* |
| Corruption Index | -.008 | .005 | .005 | -.250*** | -.248*** | -.003 | .044 | .013 |
| | (.008) | (.010) | (.010) | (.019) | (.019) | (.024) | (.032) | (.009) |
| Corruption Index× Log Total Assets | | | | .027*** | .027*** | | | |
| | | | | (.002) | (.002) | | | |
| Corruption Index×MNE | | | | | .015*** | | | |
| | | | | | (.010) | | | |
| Stat. Corporate Tax Rate | -.004*** | -.004*** | -.004*** | -.004*** | -.004*** | -.005*** | -.004 | -.001 |
| | (.001) | (.001) | (.001) | (.001) | (.001) | (.002) | (.003) | (.001) |
| Log GDP pC | -.022 | -.019 | -.018 | -.103 | 2.323 | -.001 | -.148 | .142*** |
| | (.031) | (.046) | (.046) | (.047) | (2.170) | (.094) | (.295) | (.049) |
| GDP Growth Rate | .008*** | .004*** | .004** | .005*** | -.102** | .006* | .004 | -.000 |
| | (.002) | (.002) | (.002) | (.002) | (.047) | (.004) | (.003) | (.002) |
| Inflation | -.003*** | -.003*** | -.003*** | -.003*** | -.003*** | -.002** | -.005 | -.002 |
| | (.001) | (.001) | (.001) | (.001) | (.001) | (.001) | (.005) | (.001) |
| Autocracy | | -.011 | -.009*** | .006 | .006 | -.036 | .003 | -.131*** |
| | | (.036) | (.037) | (.040) | (.040) | (.024) | (.037) | (.024) |
| Duration of Political System | | .008*** | .009** | .013*** | .013*** | .003 | .011 | -.016*** |
| | | (.004) | (.004) | (.004) | (.004) | (.008) | (.015) | (.004) |
| Foreign Aid | | .011 | .010 | .023 | .023 | -.001 | -.003 | -.014 |
| | | (.015) | (.015) | (.016) | (.016) | (.024) | (.022) | (.024) |
| Trade Tax Revenue Share | | .001*** | .001*** | .001*** | .001*** | .001*** | .001 | .001*** |
| | | (.000) | (.000) | (.000) | (.000) | (.000) | (.005) | (.000) |
| Log Total Assets | | | -.004*** | -.004*** | -.092*** | -.005*** | .008*** | .071*** |
| | | | (.001) | (.001) | (.006) | (.001) | (.003) | (.007) |
| # Observations | 358,145 | 353,190 | 353,190 | 353,190 | 353,190 | 349,410 | 24,795 | 228,018 |
| # Subsidiary Firms | 123,655 | 119,235 | 119,235 | 119,235 | 119,235 | 119,224 | 5,541 | 97,304 |
| Within $R^2$ | 0.0196 | 0.0197 | 0.0199 | 0.0218 | 0.0218 | 0.0200 | 0.0267 | – |

Notes: Heteroscedasticity robust standard errors adjusted for firm clusters in parentheses.

*, **, *** indicates significance at the 10%, 5%, 1% level. Observational units is the firm per year. All specifications include a full set of year fixed effects.

| Table 4. Corruption and Corporate Tax Payments | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Dependent Variable: Tax Payments/Total Assets | | | | | | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Corruption Index | .001 | .001 | .004*** | .008*** | .006** | .008*** | .018*** | -.015 |
| | (.001) | (.001) | (.002) | (.002) | (.003) | (.003) | (.005) | (.017) |
| Profitability*Corruption | | .205*** | -.005 | .206*** | .203*** | .206*** | .229*** | .027** |
| | | (.008) | (.008) | (.011) | (.008) | (.008) | (.008) | (.012) |
| Profitability | -.613*** | -.613*** | .164*** | -.618*** | -.608*** | -.616*** | -.695*** | -.012 |
| | (.025) | (.025) | (.037) | (.025) | (.025) | (.025) | (.028) | (.035) |
| Log Total Assets | -.001*** | -.001*** | -.003*** | -.001*** | -.001*** | -.001*** | -.001*** | .001 |
| | (.000) | (.000) | (.000) | (.000) | (.000) | (.000) | (.000) | (.000) |
| Corporate tax rate | .001*** | .001*** | .001*** | .001*** | .001*** | .001*** | .002*** | .002 |
| | (.000) | (.000) | (.000) | (.000) | (.000) | (.000) | (.000) | (.001) |
| GDP growth | .005*** | .005*** | -.001* | .001* | .001* | .000 | -.001 | .001 |
| | (.000) | (.000) | (.000) | (.000) | (.000) | (.000) | (.001) | (.001) |
| Inflation | .001*** | .001*** | .0004** | .001*** | .001*** | .001*** | .000 | .002 |
| | (.000) | (.000) | (.000) | (.000) | (.000) | (.000) | (.000) | (.001) |
| GDP per capita | | | | -.000** | -.000** | -.000** | .000 | -.000 |
| | | | | (.000) | (.000) | (.000) | (.000) | (.000) |
| Trade Tax Revenue Share | | | | .001*** | .001*** | .001*** | .001*** | -.005 |
| | | | | (.000) | (.000) | (.000) | (.000) | (.004) |
| Autocracy | | | | .006 | | | | |
| | | | | (.006) | | | | |
| Democracy | | | | .003 | | | | |
| | | | | (.007) | | | | |
| Duration of Political System | | | | .000 | | | | |
| | | | | (.000) | | | | |
| Year dummies | √ | √ | √ | √ | | √ | √ | √ |
| Sector*year dummies | | | | | √ | | | |
| # Observations | 358,145 | 358,145 | 154,861 | 353,475 | 342,280 | 353,151 | 349,695 | 25,080 |
| # Subsidiary Firms | 123,655 | 123,655 | 83,161 | 119,515 | 113,918 | 119,223 | 119,504 | 5,821 |
| Within $R^2$ | 0.186 | 0.186 | 0.468 | 0.189 | 0.204 | 0.189 | 0.194 | 0.151 |

Notes: Within-group estimator used. Standard errors in parentheses. Errors robust to heteroskedasticity and clustered at the firm level. Column 3 excludes observations with negative tax payments, column 6 firms in Indonesia, Pakistan, and Vietnam. Column 7 excludes observation in 1999 and 2000 and column 8 firms in China. All other columns include all firms. Numbers might vary according to the availability of some country-year variables. *, **, *** significant at the 10%, 5%, 1% level.

**Table 5. Corruption and Corporate Tax Payments - Heterogeneous Firms**

| Dependent Variable: Tax Payments/Total Assets | | | | | |
|---|---|---|---|---|---|
| *Explanatory variables:* | (1) | (2) | (3) | (4) | (5) |
| Profitability | -2.504*** | -4.995*** | -.661*** | -.661*** | -2.446*** |
| | (.151) | (.328) | (.027) | (.027) | (.151) |
| Profitability*Corruption Index | .761*** | 1.549*** | .219*** | .219*** | .743*** |
| | (.046) | (.101) | (.008) | (.008) | (.046) |
| Profitability*log Total Assets | .216*** | | | | .206*** |
| | (.016) | | | | (.017) |
| Profitability*log Total Assets*Corruption Index | -.063*** | | | | -.060*** |
| | (.005) | | | | (.000) |
| Profitability*log Employees | | .514*** | | | |
| | | (.056) | | | |
| Profitability*log Employees*Corruption Index | | -.158*** | | | |
| | | (.017) | | | |
| Profitability*MNE | | | .731*** | .732*** | .569*** |
| | | | (.070) | (.071) | (.070) |
| Profitability*MNE*Corruption Index | | | -.220*** | -.221*** | -.234*** |
| | | | (.021) | (.022) | (.021) |
| log Total Assets | .006*** | | -.001*** | -.001*** | .016*** |
| | (.001) | | (.000) | (.000) | (.001) |
| log Total Assets*Corruption Index | -.002*** | | | | -.002*** |
| | (.000) | | | | (.000) |
| log Employees | | -.009 | | | |
| | | (.006) | | | |
| log Employees*Corruption Index | | .003 | | | |
| | | (.002) | | | |
| MNE dummy*Corruption Index | | | .009*** | .008*** | .015*** |
| | | | (.002) | (.003) | (.002) |
| Corruption Index | .033*** | -.013 | .008*** | .008*** | .060*** |
| | (.005) | (.019) | (.002) | (.002) | (.004) |
| Corporate tax rate | .001*** | .000 | .001*** | .001*** | .001*** |
| | (.000) | (.002) | (.000) | (.000) | (.000) |
| GDP growth | .000 | .001 | .001* | .001* | .000 |
| | (.000) | (.002) | (.000) | (.000) | (.000) |
| Inflation | .001*** | .002** | .001*** | .001*** | .001*** |
| | (.000) | (.001) | (.000) | (.000) | (.000) |
| GDP per capita | .000 | .000 | -.000** | -.000** | -.000 |
| | (.000) | (.000) | (.000) | (.000) | (.000) |
| Trade tax revenues | .001*** | .001*** | .001*** | .001*** | .001*** |
| | (.000) | (.000) | (.000) | (.000) | (.000) |
| Inflation*MNE dummy | | | | .0001** | |
| | | | | (.000) | |
| GDP growth*MNE dummy | | | | -.000 | |
| | | | | (.000) | |
| # Observations | 353,475 | 201,048 | 353,475 | 353,475 | 353,475 |
| # Subsidiary Firms | 119,515 | 111,225 | 119,515 | 119,515 | 119,515 |
| Within $R^2$ | 0.203 | 0.309 | 0.192 | 0.192 | 0.197 |

Notes: Within-group estimator used. Standard errors in parentheses. Errors robust to heteroskedasticity and clustered at the firm level. Year dummies used. *, **, *** indicates significance at the 10%, 5%, 1% level.