What determines corporate tax payments in developing countries? Evidence from firm panel data*

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Abstract

This paper explores the factors determining corporate tax payments in developing and emerging economies. Using accounting and ownership data on approximately 183,000 firms in 18 countries for 1999-2008, we find that large firms face higher tax burdens than smaller firms, as described in Kleven et al. (2009). The tax burden is measured in three ways, using average effective tax rates, marginal effective tax rates (METRs) and marginal effective tax bases (METBs). Belonging to a multinational group in turn does not play a significant role in determining effective tax payments, at least when controlling for endogeneity. The results also suggest that public sector corruption exerts a negative impact on observed average effective tax rates. Finally, a comparison between firms located in developed countries and firms located in developing and emerging economies reveals that the former display a higher METR and a higher METB.

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1 Introduction

Developing countries face difficulties in raising tax revenues and therefore often lack resources to relieve poverty and provide public goods. According to the United Nations (2005) middle and low income countries should increase their tax to GDP ratios by about four percentage points in order to achieve the Millennium Development Goals of reduction of poverty, diseases, and underdevelopment.[1] However, achieving this is no easy task. Personal income taxation, which is a major source of revenue in developed countries, plays a much smaller role in the developing world. Many low and middle income economies are dominated by subsistence farming and low income self-employment. These activities mostly take place in the informal sector. Corporate taxation, in turn, is more important as a source of revenue. On average, in low and middle income economies corporate income taxes raise about 17 per cent of total tax revenues, compared to around 10 per cent in high income countries (IMF (2011)).

In recent years, the role of corporate taxation as a source of tax revenue for developing countries has played an important role in the policy debate. A popular view[2] suggests that corporations, in particular large corporations and multinational firms, fail to pay appropriate taxes on profits they make in developing countries. According to this critique, firms use transfer prices and debt financing to shift income out of developing countries and into tax havens. An additional concern is that corruption within the tax administration allows firms to evade taxation.

Is there empirical evidence to support these claims? While there is anecdotal evidence about corporate tax avoidance and evasion in the developing world, systematic empirical work on the determinants of corporate tax payments in developing countries and emerging economies is scarce. It is the purpose of this paper to explore empirically the factors determining corporate tax payments in developing and emerging economies.

What would we expect from a theoretical perspective? Firstly, there is indeed a large theoretical literature on corporate taxation in open economies. This literature suggests that, indeed, tax competition for real investment as well as accounting profits makes it difficult to tax corporate income, and taxing multinational firms will be particularly difficult. At least, this applies to mobile firms. Clearly, immobile activities, in partic-

[1] A few contributions in the literature argue it would be beneficial for some developing countries to restraint their ability to collect revenues as this would curb inefficient spending of corrupt and self-interested elites. For a brief discussion, see footnote 2 in Mansur and Keen (2009).

[2] See for example, Christian Aid (2009).

ular resource extraction, which is important for developing countries, raises different issues.Whether it is more or less difficult to tax large firms compared to smaller ones is less clear, though. Desai et al (2007) argue that there is a complementarity between tax enforcement and corporate governance. If firms evade taxes it will also be more difficult for their external owners or creditors to control their activities and prevent theft and corruption. This implies that larger firms, with separation between ownership and control are likely to implement formal reporting and control systems which make tax evasion more difficult. Kleven et al. (2009) argue that large and complex firms need to keep detailed business records to run their activities efficiently. These records are typically known to various people within the firm. manipulating these records in order to evade taxes requires 'collusion' between those who have access to the firm's records. For various reasons this collusion can break down easily in large firms. These reason may include employee-employer conflicts, ethical unease of a newly hired employee, an employee erroneously revealing the real accounts to tax authorities or the presence of whistleblowers. Therefore tax evasion is less likely to occur in large firms. Gordon and Li (2009) develop a model where the government can only collect tax revenue from firms in the formal sector, where the formal sector is defined as including all firms with links to the financial sector, through bank loans or other financial contracts. Finally, Dharmapala et al. (2011) start from the observation that most corporate income tax revenue is collected from a small number of very large firms while few medium sized firms exist and most small firms operate in the informal economy. They argue that this may be a result of optimal tax policies in an environment where fixed tax administration costs play an important role, so that medium sized firms cannot operate in the formal sector.

In this paper we investigate empirically the role of various firm and country characteristics for the corporate taxes paid by firms in developing countries.We exploit ORBIS, a unique data base which provides accounting and ownership information on firms in various developing and emerging economies between 1999 and 2008. In a first step, we determine the tax burden of firms in our data set measured by the tax payments charged to the profit and loss account over total assets, the marginal effective tax rate (METR) and, using a new approach, the marginal effective tax base (METB). The METR captures the increase in tax liabilities when accounting profits increase by one US dollar, the METB captures the increase in the tax base for an additional dollar of accounting profit. Our estimation model controls for time constant heterogeneity between firms and includes a large set of country and firm specific control variables. To account for potential reverse causality problems, we employ an instrumental vari-

able strategy. Following the theoretical considerations above, we furthermore assess the impact of firm size and affiliation with a multinational group on the respective tax measures and test for potential effects of public sector corruption.

Our results suggest that the METR for firms in developing countries is around 10%. To compare the findings to METRs for firms in the developed world, we merge our data with a sample of firms located in 8 developed European economies between 1999 and 2004.[3] Despite similar statutory tax provisions in developing and developed economies, the METR on corporate profits in our data set is significantly lower than what we find for firms located in developed economies. Quantitatively, the latter display a METR that is about 10 percentage points higher. Our results thus confirm the widespread view that developing and emerging countries offer more special tax regimes and (or) are less effective in enforcing their tax rules than developed economies which leads to a lower effective tax burden on firms. [4]

Moreover, we find that the average effective tax rate, the METR and the METB on companies in developing countries increase in firm size, suggesting that the tax burden in the developing world falls overproportionally on large firms. This is in stark contrast to our findings in the developed country sample where firm size does not exert a statistically significant impact on any of the tax burden measures. Following our above discussion, the findings may reflect reduced opportunities and incentives for underreporting of taxes through collusion in the developing world as firm size grows. In addition, developing countries may systematically channel their limited tax administration effort to large companies.

[3]The sample for developing countries is derived from AMADEUS, the European subset of ORBIS. At the moment, we are unable to have data for developed countries until 2008. Countries covered in this sample are Belgium, Finland, France, Great Britain, Italy, Norway, Spain and Sweden. Note that we ran robustness checks where we limit the developing countries sample to the same period as the developed country sample (1999 to 2004) which yields comparable results to the ones reported in this paper.

[4]Note that our estimates for the METR in developed economies is in line with previous estimates. Maffini (2009) for example reports METRs of around 21% and 36% for countries with an exemption system of taxation of foreign profits and a worldwide system respectively. Dyreng and Linsey (2009) find similar results for American companies, with a METR of around 36%. Markle and Shackelford (2011) find an average effective tax rate of around 30% for American companies and of around 25-26% for European companies. For regions such as Africa, Asia, Latin America, and the Middle East, they report higher estimates than what is derived in our study, with average effective tax rates of 26-28%, 21%, 23%, and 18-19% respectively. Note, however, that Markle and Shackelford (2011) calculate the average effective tax rate while we estimate it. Additionally, they use consolidated data while we employ unconsolidated accounting data.

Furthermore, we do not find a significant difference in the METR and the METB between multinational and national firms. Our results therefore question the widespread view that multinational firms are particularly successful in avoiding taxation in developing countries.[5]

We also investigate the role of a corrupt environment in the firm's tax payments. We find that corporate tax payments over total assets are higher, the lower the perceived level of public sector corruption in the firm's host country. This result turns out to be robust across various specifications and the use of different indices to capture public sector corruption. The effect of public sector corruption on the METR and METB measure is less robust across different model specifications though. Taken together, our findings nevertheless tend to support the view that the effectiveness of the tax system in raising revenue may be significantly harmed by public sector corruption.

Summarizing, our findings thus suggest that firms in developing countries face a lower marginal effective tax burden than firms in developed economies. This effect tends to be dampened for large firms and, in contrary to the public perception, is not worsened for multinational corporations. Note that the welfare effects of a low corporate tax burden are ambiguous though. Economic theory argues that high tax rates on income from capital reduce the return to capital, therefore depressing capital stock. A lower level of capital stock implies a lower level of real wages in equilibrium (Harberger (1990)). Developing countries may particularly benefit from low effective tax burdens on corporations as other factors such as poor infrastructure, political instability and a generally uncertain business environment reduce the attractiveness of the country for foreign and domestic investors.

Our analysis is related to several strands of the literature. Firstly, we contribute to a small literature which assesses the effective tax burden on firms. Existing papers have so far largely focused on corporations in developed economies though (see e.g. Maffini (2009), Dyreng and Linsey (2009) and Markle and Shackelford (2011)). As described above, our results suggest that the METR and METB significantly differ between the developed and the developing world, with smaller METRs and METBs in the latter

[5]Note that simple OLS regressions suggest that multinationals on average do observe a smaller effective tax rate than their national counterparts. However, this type of OLS analysis is prone to problems of reverse causality as a high effective tax burden may affect the location decision of multinational companies. This gives rise to a negative reverse causality correlation which implies that the coefficient estimate is biased downwards in a simple OLS analysis. We account for this problem using an instrumental variable strategy and find no significant difference in the marginal effective tax rate of multinational and national companies in developing countries.

despite similar statutory tax provisions. Furthermore, our study assesses the impact of multinational group affiliation on corporate tax payments and thus relates to the literature on international profit shifting through transfer pricing[6] and debt financing[7] which allows multinational groups to lower their effective corporate tax burden. Existing papers, however, again strongly focus on profit shifting between developed economies. Evidence for the developing world is scarce instead. Fuest and Riedel (2011) survey the existing literature on profit shifting out of developing countries and conclude that the results of existing studies are difficult to interpret due to problematic empirical identification strategies. To the best of our knowledge, we are furthermore the first paper to assess the impact of firm size on corporate tax payments in the developing world. Using ORBIS, Maffini (2009) investigates the effect of firm size on tax payments (over total assets) but focusses on developed economies economies only. In line with our results in the subsample of developed countries, she finds no systematic link between size and corporate effective tax burdens.

In addition, our paper is related to the literature on the impact of corruption on the firm's behaviour. The link between corruption and corporate investment has been studied at length for companies in low and middle income countries.[8] Among those studies, a few contributions investigate corruption and taxation jointly. Fisman and Svensson (2007) and Olken and Pande (2011) compare the investment effects of both bribe rates and tax rates. They observe that both distort the firm's behaviour and that the former may be more distortive than the latter. Along the same lines, Shleifer and Vishny (1993) and Wei (2000) argue that bribe rates could be more harmful because they involve more uncertainty. We contribute to this literature by explicitely stressing that public sector corruption does not only impact on a firm's investment behavior but may exert a direct impact on its tax payments to the government.

The rest of the paper is structured as follows: Sections 2 briefly discusses the theoretical basis of the hypotheses we explore in our empirical analysis. Section 3 describes the data. Section 4 presents the estimation strategy. The results are presented in Section 5. Section 6 concludes.

[6]See among others, Swenson (2001), Clausing (2003), Bernard et al. (2006), and Maffini and Mokkas (2011).

[7]See among others, Altshuler and Grubert (2002), Desai et al.(2004), Huizinga et al. (2008), Mintz and Weichenrieder (2005), Buettner et al. (2006), and Buettner and Wamser (2009).

[8]For a recent review of the literature on the magnitude, causes, and consequences of corruption in developing economies, see Olken and Pande (2010).

2 Theory: Which factors should be expected to determine corporate tax payments?

Which are the factors that determine the corporate tax payments of firms? In the theoretical and empirical literature on corporate taxation, various aspects have been identified which are likely to affect taxes paid by firms. It is helpful to address this issue by starting from some notion of true profits which could, in principle, be taxed. Clearly, a bunch of conceptual issues arises with respect to defining corporate profits, but putting those aside assume that there is a corporate profit for each firm i located in country j denoted by P_{ij}. In principle this could be the base for taxation, so that tax payments would be $\tau_{ij} = t_j P_{ij}$. But there are various factors likely to cause deviations from the hypothetical tax payment τ_{ij}. Firstly, there may be legal tax concessions, which include general tax concessions like for example tax holidays or tax incentives in special economic zones as well as firm specific concessions which include tax incentives granted in the context of particular investment projects. [9] We do not observe either of these concessions but it is likely that large and multinational firms will more easily qualify for general concessions or be able to negotiate firm specific concessions.

Secondly, international profit shifting through debt financing, transfer pricing or other arrangements will affect tax payments.[10] Clearly, this can only be imagined for firms belonging to a multinational group. We would expect that these firms pay lower taxes than other firms in particular in high tax countries.

A third determinant of tax payments is tax evasion through underreporting of income. Kleven et al. (2009) argue that tax evasion is less likely to occur, the larger a firm is. The reason is that, as the size and the complexity of a business grows, more rigorous records of the firm's activities have to be kept and the number of employees involved in reporting the firm's income to the tax administration increases. In large firms, tax evasion would require collusion among a large number of people, which is very difficult to achieve. This suggests that tax payments should increase with firm size.[11] Gordon and Li (2009) develop a model where the government can only collect tax revenue from firms in the formal sector, where the formal sector is defined as including all firms with

[9] Klemm and van Parys (2009) provide evidence that special tax incentives are widespread in the developing world.

[10] For a discussion of profit shifting in developing countries see also Fuest and Riedel (2011).

[11] Yaniv (1992) points out that tax evasion in firms requires at least cooperation between employers and employees.

links to the financial sector, through bank loans or other financial contracts.

A fourth factor which is likely to affect tax payments is the degree of corruption in the country where the firm is located. In general one would expect reported tax payments to be lower where corruption is high. This may happen for various reasons. Firstly, tax evasion may be more widespread because tax evaders who are detected might avoid being punished by paying a bribe. Secondly, firms and employees of the tax administration may collude and share the gains from tax evasion.

Overall, we may thus conclude that various firm and country specific factors are likely to drive tax payments by individual firms. These include firm size, whether or not a firm belongs to an international group, and the degree of corruption prevailing in the country where the firm is located.

3 Data

The empirical analysis relies on the commercial database ORBIS which is compiled by Bureau van Dijk and contains detailed accounting and ownership information on firms in a large number of countries worldwide. Beyond that, it provides detailed information on the ownership structure of national and multinational corporations. Our sample includes incorporated firms in 18 developing and emerging economies whereas the coverage for many countries is restricted to a rather small number of firms. Table 1 indicates that the majority of firms in our sample are located in China and Russia, which largely reflects the size of the two countries. The time period covered in the data is 1999 to 2008. The observational unit is the corporate firm per year.

The sample statistics are presented in Table 2. In total, the dataset includes $516,923$ observations for $177,335$ firms.[12]

Firm information is available for 3.0 years on average. The firms in the data display an average pre-tax profitability (profit (loss) before taxation/total assets) of 7.5% and

[12] see Tables 1B and 2B for descriptive statistics on the sample of developed countries we will analyse later on.

an average tax to assets ratio (corporate tax payments / total assets) of 1.4%.[13],[14]

The average firm in our sample has a total asset stock of around 39 million US dollars. The average corporate profit (loss) before taxation and the average corporate tax payment are 2.5 million US dollars and 528,000 US dollars respectively. The average number of employees is 519 and it varies from zero to 477,780. One advantage of the ORBIS data is that it allows to discriminate between national and multinational firms since information on ownership connections to both parents and subsidiaries is available in the data. Following previous studies (see among others, Huizinga and Laeven (2008), Weichenrieder (2009)), 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 connection comprises more than 50% of the ownership shares. According to this definition, 2% of the firms in our sample belong to a multinational group.[15]

We added country specific information to our data. First, we included information on the perceived level of corruption in the host country of the firm. To do so, we employ the World Bank governance data set and here we specifically use the Corruption Control Index (CCI). The index is designed to capture the perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as capture of the state by elites and private interests. The data sources which are used for the construction of the index are mainly surveys of individuals and firms in the country (for details on the index construction, see Kaufmann et al. (2010)). One advantage of the data is that the index is consistent over time. This allows us to exploit its cross-sectional and longitudinal variation. The index varies between -2.5 and +2.5, with a larger index indicating less corruption. In our data, we have increased the index by 1.5 so that all values are positive (see Table 2).

[13]Tax payments in the data correspond to the ORBIS variable *taxation* which records income tax charged to the financial accounts. This implies that deferred and current income taxes are included in the variable. The variable only includes income taxes and it does not include indirect taxes such as VAT, sales taxes, excise taxes.

[14]Both variables generally exhibit a considerable cross-sectional and longitudinal variation. To avoid that our results are driven by outliers, we have dropped the top and bottom percentile of the distribution of the pre-tax profitability and of the tax to assets ratio.

[15]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 not too concerned about this issue, 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 average firm is located in a country with a World Bank corruption index of 0.86, whereas the index varies between .37 and 3.

We complement the analysis with an index of the efficiency of the host country government equally drawn from the governance data of the World Bank. The governance efficiency index (GEI) captures the perception of the quality of public services, the quality of the civil service, and the degree of its independence from political pressures and hence also serves as a proxy for the functioning of administrative bodies, including the tax authorities, in the country. We have augmented the GEI by 2.5 to make it positive and in our sample, the index varies between 1.7 and 3.7, with an average value of 2.3.

As an alternative measure for corruption, we use the Corruption Perception Index (CPI) of Transparency International which, similarly to the baseline measure of the World Bank, captures the perceived level of public-sector corruption based on survey information.[16] As the index is known to lack comparability over time, we use an adjustment of the index as published in Lambsdorff (2005). We have augmented the original index by 1 so that in our dataset, the adjusted CPI varies between .5 and 4.2, with an average of 1.05.

Indexes of corruption constructed using surveys present some drawbacks: they may not measure corruption correctly as they are based on perceptions and the answers to the survey may depend on the respondents' characteristics such as for example education and age. Hence, the index may be affected by the composition of the group of the respondents (Olken and Pande (2011)). Despite these problems, we decide to use such indexes as they provide a good cross-country and time coverage.

Our study also includes a set of host country controls. First, we account for the host country's statutory corporate tax rate.[17] For developing countries, the average statutory corporate tax rate in our sample is 29% varying between 0% and 43%. Second, we control for the country's size and economic development by including information on GDP and GDP per capita measured in US dollars (and obtained from the World Bank World Development Indicator database). The average firm in our data set is located in a country with a GDP of 1.15 trillion US dollars and a GDP per capita of $1,876$ US dollars. Last, we account for the economic cycle and labor market conditions as measured by the country's unemployment rate which is 5.6% on average, although varying strongly between 1.4% and 37.3%.

[16]For more details, see Transparency International's homepage http://www.transparency.org

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

4 Estimation Strategy

Following our theoretical motivation, we estimate a regression model of the following form.

$$\tau_{it} = \gamma_0 + \gamma_1 p_{it} + \gamma_2 \log a_{it} + \gamma_3 (p_{it} \times \log a_{it}) + \gamma_4 (p_{it} \times MNE_i) + \gamma_5 c_{it} + \gamma_6 t_{it} + \gamma_7 X_{it} + \rho_t + \phi_i + \nu_{it} \quad (1)$$

whereas τ_{it} indicates the ratio of corporate tax payments to total asset as measured by the tax payments reported in the firm's profit and loss accounts over the book value of total assets. The tax variable is regressed on the firm's pre-tax profit/loss per asset p_{it} and a size measure log a_{it}.

The coefficient estimate γ_1 for the profitability variable reflects the METR on firms in our data[18]. The METR measures the increase in the tax liabilities for a unitary increase in accounting profit. We allow the METR to vary with firm size and include an interaction term between the profitability measure and the firm's total asset stock ($\log a_{it}$). Analogously, we allow the METR to differ between multinational and national firms and interact the profitability measure with a dummy variable indicating multinational firms. As described above, the sign of the coefficient estimates γ_3 and γ_4 is a priori undetermined, as is the sign of the coefficient estimate γ_2 which captures the effect of firm size on the firm's average tax payments relative to their total assets.

We also estimate the following regression,

$$\tau_{it} = \alpha_0 + \alpha_1 (p_{it} \times t_{it}) + \alpha_2 \log a_{it} + \alpha_3 (p_{it} \times t_{it} \times \log a_{it}) + \alpha_4 (p_{it} \times t_{it} \times MNE_i) + \alpha_5 c_{it} + \alpha_6 X_{it} + \rho_t + \phi_i + \nu_{it} \quad (2)$$

whereas t_{it} indicates the statutory corporate tax rate in the country of the firm and coefficient estimate α_1 reflects the METB.[19] The METB measures the increase in the tax base for a unitary increase in accounting profit.

The set of regressors in regression (1) and (2) includes an index for the perceived public sector corruption in the firm's host country, depicted by c_{it}. Following the theoretical considerations in section 2, we expect high levels of public sector corruption to deter a country's taxing potential. As the corruption indices are defined to be higher

[18] In fact, $\gamma_1 = \frac{\partial(\frac{tax\ bill}{tot.\ assets})}{\partial(\frac{P\&L}{tot.assets})} = \frac{\partial(tax\ bill)}{\partial(P\&L)}$.

[19] In fact, $\alpha_1 = \frac{\partial(\frac{tax\ bill}{tot.\ assets})}{\partial(\frac{P\&L*t}{tot.assets})} = \frac{\partial(t*tax\ base)}{\partial(P\&L*t)} = \frac{\partial(tax\ base)}{\partial(P\&L)}$.

the lower the perceived level of corruption in the public sector, we expect the coefficient estimate for the corruption index to be positive, $\gamma_5 > 0$ and $\alpha_5 > 0$.

In terms of control variables, equations (1) and (2) include a full set of firm fixed effects to absorb time constant heterogeneity across firms in our sample. Additionally, we include the firm's debt ratio as costs related to debt financing are deductible from the corporate tax base and hence reduce the firm's tax bill. All regressions account for a full set of year fixed effects which capture shocks that are common to all firms in our data. In some specifications, we include a full set of sector-year effects at the one-digit NACE level to account for potential sector specific shocks. Additionally, we control for the country's corporate tax rate[20] and, in the vector X_{it}, for a set of time-varying country characteristics such as GDP and GDP per capita to capture country size and the country's level of development. Finally, X_{it} includes the unemployment rate as a proxy for the country's general economic and labor market condition.

While equations (1) and (2) account for time-constant and time-varying heterogeneity across firms, the coefficient estimates for our firm specific regressors may potentially still be biased due to reverse causality. First and foremost, a high corporate tax burden on firms may exert a negative effect on corporate investment activity and thus reduce total assets (a_{it}). Analogously, a high corporate tax may reduce the country's attractiveness as a location for multinational corporations and may exert a dampening effect on the firm's reported pre-tax profitability p_{it}. To account for this possibility, we follow Arellano and Bond (1991) and estimate a first difference GMM where we instrument for the first difference in the firm specific regressors such as log total assets, profitability, debt ratio, and the interaction terms with deeper lags of their levels. Formally, the instrumental variable regressions take the following form

$$\Delta\tau_{it} = \beta_0 + \beta_1\Delta p_{it} + \beta_2\Delta \log a_{it} + \beta_3\Delta(p_{it} \times \log a_{it}) + \beta_4\Delta(p_{it} \times MNE_i) + \beta_5\Delta c_{it} + \beta_6\Delta t_{it} + \beta_7\Delta X_{it} + \Delta\rho_t + \Delta\epsilon_{it}$$

The variable definitions correspond to the ones in equation (1) and (2). Δ depicts the first difference operator. 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 Sargan and Hansen tests.

[20] Only in equation (1).

5 Results

The results are presented in Tables 3 to 8.[21]

Table 3 reports the results of our baseline specification. Precisely, in specification (1) we regress the firm's tax payment per total assets on firm profitability, firm size, the corporate debt ratio and a full set of year and firm fixed effects using a within group estimator. The coefficient estimate for the profitability variable captures the firm's METR which is found to be positive and statistically significant. Quantitatively, the coefficient estimate suggests a METR of 10.2%, implying that an increase in the firm's pre-tax accounting profit by US$ 1 raises its tax payments by US$ 0.10 on average. Moreover, the coefficient estimates for both firm size and the debt to asset ratio are negative and statistically significant. The former result suggests that large firms tend to pay less taxes per unit of total asset stock, while the latter indicates that highly leveraged firms observe lower tax to asset ratios.[22]

The firm's tax revenues may, however, not only be related to idiosyncratic characteristics of the firm but may be equally determined by the institutional features of the firm's host country. Specification (2) includes the World Bank corruption index (CCI) which captures the corruption and governance characteristics of a jurisdiction (whereas a higher index indicates less corruption). The coefficient estimate for the corruption index is positive and statistically significant, suggesting that a reduction in the level of corruption significantly increases the tax revenues per total assets collected from the resident firms. Quantitatively, the specification suggests that an increase in the corruption index by one standard deviation (=0.2129, see Table 2) raises the tax to asset ratio

[21] Heteroscedasticity robust standard errors which account for clustering at the firm level are presented in parentheses below the coefficient estimates.

[22] The negative effect of the debt ratio on the firm's effective tax rate may need some discussion. While capital costs for debt financing are, contrary to equity financing, deductible from the corporate tax base and may thus dampen corporate tax payments, this effect is expected to be absorbed by the pre-tax profitability regressor in the context of our analysis. Note, however, that one may also think of direct channels through which debt impacts on the firm's tax burden. External debt, for example, puts cash constraints on the corporation (and increases the risk of bankruptcy) which may raise the incentive to strategically structure operations in a way that tax payments and thus cash outflows in the current period are low, even conditional on the reported pre-tax profitability in the accounting books. Another possible explanation might be that high debt ratios are a result of past losses (as suggested by our data) and highly leveraged firms tend to have loss carryforwards.

by 0.6 percentage points. Evaluated at the sample mean (0.0138), this corresponds to a quantitatively large relative increase of 41.7%.Column (3) of Table 3 shows that the result is robust to controlling for other host country characteristics such as the local statutory corporate tax rate, GDP per capita, GDP, and the unemployment rate. Interestingly, the coefficient on the statutory tax rate is equal to the mean profit asset ratio, approximately 7 per cent. This suggests that accounting profits are on average equal to the tax base. If this is true, the fact that the EMTR we measure is lower than the statutory rate must be due to differences between the statutory tax rate and the true tax rate applied to profits, rather than being driven by differences between accounting profits and taxable profits.

While the specifications so far suggest that the average tax payments per assets are smaller for larger firms, specification (4) accounts for potential heterogeneity in the METR by interacting the profitability variable with the firm size measured by the logarithm of the firm's total asset stock. The coefficient estimate for the profitability variable as well as the coefficient estimate for the interaction term are positive and statistically significant suggesting that the METR increases in firm size, as predicted in Kleven et al. (2009). Precisely, the smallest firms in our data display a METR of around 8.8 percent, while for the average firm in our sample with a total asset stock of 39 million US dollars the METR is 11.4 percent.[23]

Analogously, specification (5) determines whether the METR systematically differs between multinational and national firms. While the coefficient estimate for the profitability variable again turns out to be positive and statistically significant, the coefficient estimate for the interaction term of the profitability measure with a dummy variable indicating multinational firms is significantly negative. Quantitatively, the estimation suggests that domestic firms face an average METR of 10.3 percentage points while the METR of multinational firms is on average 4.9 percentage points lower. Similar qualitative results are found if the interaction terms with the firm size indicator and the multinational dummy are included in the estimation model simultaneously. In specification (6), multinationals have a METR that is 5.8 percentage points lower than that of domestic firms.

The baseline specifications described so far account for correlations in the error term at the level of the individual firm. To allow for correlations at broader geographical units, we ran specifications which cluster standard errors at the country-year level and

[23]The calculation of the marginal tax rate reads $0.04 + 0.007 * ln(1000) = 0.088$ for the former and $0.04 + 0.007 * ln(39,000) = 0.114$ for the latter.

the country level respectively. Precisely, specifications (7) and (8) estimate specifications (3) and (6) with standard errors that are clustered at the country-year level while specifications (9) and (10) estimate the baseline specifications with clusters at the country level.[24] The significance of our results is hardly affected by this exercise.

Specifications (11) and (12) estimate the baseline specifications of columns (3) and (6) including a full set of industry-year fixed effects as additional control variables, which again leaves the results unaffected.

Table 4 displays further robustness checks. In columns (1) and (2), we employ a different measure of size, the logarithm of the number of employees. Although the sample drops substantially,[25] the results remain very similar to those derived for our baseline specifications in column (3) and (6) of Table 3. In column (3) and (4), we employ a different measure of the tax burden, the METB. In column (3), the METB is estimated to be around 32% indicating that an increase of 1 US$ in the accounting profit leads to a 32 cents increase in the tax base. As described for the METR, the METB increases for larger firms and decreases for multinationals (see column (4)). In particular, the METB for small domestic firms have a METB of 27.1 percent whilst larger domestic firms with an average total assets close to US$ 39 million have a METB of 39.5 percent.[26] On average, multinationals display a METB that is about 19.7 percentage points lower than that of domestic firms. Columns (5) to (12) account for the fact that a very large proportion of firms in our data are located in China, Russia, and Ukraine and that some countries only have a small number of firms. In columns (5) and (6) we estimate our baseline specifications excluding firms located in China from the analysis. In columns (7) and (8) we estimate our baseline specifications excluding firms located in Russia, in columns (9) and (10) we exclude Ukrainian firms and in columns (11) and (12) we exclude firms in countries with less than 500 observations.[27] The qualitative pattern of our results remains unchanged in all specifications. Quantitatively, the METR estimates are smaller if Chinese firms are included in the analysis, suggesting a smaller METR on firms located in China. The opposite is true for Russian firms. The

[24]In total, our data comprises firms in 18 countries whereas the firm coverage in many countries is poor though, with information being available for less than 10 firms only.

[25]The variable number of employees is less widely available than total assets. When using the number of employees, the sample drops from 516,923 observations to 352,976 and the importance of countries such as China, Russia and Ukraine becomes even larger.

[26]The effects calculate as $0.0357 + ln(1000) \cdot 0.034 = 0.271\%$ and $0.0357 + ln(1000) \cdot 0.034 = 0.395$ respectively.

[27]The countries dropped in columns (11) and (12) are Indonesia, Malaysia, Sri Lanka and Pakistan.

exclusion of Ukrainian firms and of firms located in countries with a smaller coverage do not affect the METR. The impact of the corruption index in turn is remarkably stable across specifications indicating a large and positive impact of corruption reduction on the tax payments of firms.

In Table 5, we test the robustness of the results by employing other corruption indices. Specifications (1) and (2) estimate the baseline specifications using the World Bank Governance Efficiency Index (GEI) instead of the Corruption Control Index (CCI). The coefficient estimate for the new index (GEI) turns out to be positive and statistically significant. The results suggest that reducing public sector corruption has a positive impact on tax payments per total assets. This effect is quantitatively smaller than in the previous estimations. In columns (3) and (4) we estimate the specifications using the Transparency International Corruption Perception Index (CPI) of Lambsdorff (2005). The coefficient estimate turns out positive as expected but does not gain statistical significance.

Specifications (5) to (7) account for the possibility that the METR may vary with specific country characteristics. Most obviously, the METR may be higher the higher the statutory corporate tax rate of the host country and (or) the lower the prevalence of corruption in the national tax administration. Specifications thus include interaction terms between the profitability measure and characteristics of the host country of the firm, such as the statutory corporate tax rate, GDP, GDP per capita and unemployment. While our baseline results remain unaffected by this modification, the interaction terms tend to support the hypothesis that the METR decreases with a rising level of public sector corruption. Using this technique, we are able to estimate the METR without corruption and the METR after corruption. Using the coefficients in column (5), the former would be estimated at around 30.8% (for a value of the CCI equal to 3 which corresponds to a very low level of perceived public sector corruption)whilst the latter would be about 10.1% for a theoretical value of the CCI equal to zero (which corresponds to very high level of public sector corruption). [28] The coefficient estimate for the corporate tax rate interaction shows a counterintuitive negative sign though. Specifications (6) and (7) estimate specification (5) and cluster standard errors at the country-year level and country level respectively. The effect of belonging to a multinational group is stable across specifications and always significant at 1%: subsidiaries of multinational groups display a METR that is on average 5.6 percent-

[28] In our sample, the lowest value for the World Bank CCI is .3726 for Indonesia in 2002. Using the estimates in column (5) of Table 5, the values of METR with and without corruption are calculated as follows: 0.101 + 0.069 * CCI.

age points lower than that of corporations not affiliated to a multinational group. The coefficient estimate for the corruption index (γ_5) turns out positive and significant in all specifications. In columns (6) and (7), however, the coefficient estimates for the interaction terms between the METR and country characteristics lose their statistical significance. Specification (8) accounts for the possibility that the METB may vary with specific country characteristics. The baseline results remain unaffected by this modification and the interaction terms tend to support the hypothesis that the METB decreases with a rising level of public sector corruption. Using our sample values, the METB is 11.7% for the average value of the CCI (0.8582) and 98.7% for a high corruption index value of 3 indicating low levels of public sector corruption. In columns (9) and (10), we use the logarithm of the number of employees as an alternative measure of size. The main results remain unaffected.

While our baseline specifications include a full set of firm fixed effects which account for any time-constant heterogeneity across entities in the sample, the estimations have not accounted for potential problems of reverse causality so far. This appears to be important since a high corporate tax burden may dampen investment and may also impact on the reported profitability, debt ratio and the location of multinational entities. Thus, we estimate our baseline specifications instrumenting for all explanatory variables related to firm characteristics (firm size as measured by total assets, pre-tax profitability, debt ratio, and the interaction terms with the profitability variable). We follow Arellano and Bond (1991) and use a specification in first differences where we instrument with deeper lags of the levels of the variables. The results are presented in Table 6. In specification (1), the tax to total asset ratio is regressed on the profitability variable, firm size as measured by the logarithm of total assets, the firm's debt to asset ratio and a set of country characteristics. Interestingly, the coefficient estimate for the size measure now turns positive suggesting that larger firms tend to pay more taxes per total assets. Quantitatively, the estimate suggests that doubling the firm size (that is, an increase by 100%) raises the tax to total asset ratio by 0.42 percentage points. Evaluated at the sample mean (0.0138), this corresponds to an increase by 30.4%.Moreover, the estimated METR is now somewhat smaller than in the previous specifications (5.88%). The coefficient estimate for the corruption variable is positive and significant suggesting that an increase in the corruption variable (and hence a decline in the perceived corruption level) by one standard deviation increases the tax to total asset ratio by 0.9 percentage pointsor - evaluated at the sample mean - by 65.7%.This again underpins that public sector corruption is related to substantial losses in the tax collection process. Specification (2) adds an interaction term between

the profitability variable and the firm size as measured by the logarithm of total assets. The coefficient estimate turns out positive and significant indicating that the METR on firms in developing countries increases in firm size. Specification (3) additionally includes an interaction term between the profitability variable and a dummy indicating firms that belong to multinational groups. While the coefficient estimates for all other variables remain unaffected by this inclusion, the coefficient estimate for the interaction term turns out statistically insignificant, indicating that once we control for endogeneity, there is no evidence that multinational firms have a lower METR than national firms. This contrasts the negative effect found employing a within-group estimator. Note furthermore that the diagnostic tests (Arellano-Bond test for second order correlation, Sargan test, and Hansen test) reported at the bottom of the table suggest the instrumental variables are valid. Columns (4) to (6) report results for a model where we estimate the METB instead of the METR. The results are similar to the previous specifications: larger firms have a higher METB and there is no evidence of a differential effect between multinational and domestic companies. The effect of corruption on the tax bill over total assets remains negative (that is, the coefficient on CCI is positive) and highly significant.

In Table 7, we augment our sample by firms in developed economies. Column (1) reestimates our baseline estimates, interacting the profitability variable with a dummy indicating developing countries. The findings suggest that on average the METR of firms located in developed countries is 10 percentage points higher than the METR of firms located in developing and emerging countries. The coefficient attached to the CCI remains positive and highly significant, signalling that average tax payments to total assets are negatively affected by corruption. Column (2) reports the results for a sample of observations between 1999 and 2004 only. The results remain very close to those of column (1), although the coefficient on the corruption index CCI turns insignificant.

Column (3) reports the results for the subsample of developed countries, suggesting an METR of 20% for firms located in a developed economy and this does not change with the firm size and the fact that the firm belongs to a multinational group. Column (4) reports that the METB is on average 66.2% for firms located in a developed economy. In developed countries, the METB is not influenced by the size of the firm: the coefficient attached to the interaction between the METB and the logarithm of total assets is not statistically significant. On the contrary, the coefficient attached to the interaction between the METB and the dummy indicating the multinational status is negative and statistically significant, suggesting that the METB for multinational

firms is 3.8 percentage points lower than the METB for domestic firms. In column (3) and (4), the estimated coefficient of the corruption index is positive and statistically significant, indicating that a lower level of corruption is correlated with a higher ratio of tax payment to total assets. The size of the firm seems to exert a negative effect on tax payments. In column (5) and (6), we estimate the models of column (3) and (4) using a GMM estimator as described in Arellano and Bond (1991). Column (5) reports an a higher METR than in column (3): on average, the METR for firms located in a developed economy is 33.8% and again, this does not change with the firm size. On average, firms belonging to a multinational group show a METR that is 5.8 percentage points lower than domestic firms in this specification. Column (6) reports that the METB is on average 100% for firms located in a developed economy. In developed countries, the METB is not influenced by the size of the firm but belonging to a multinational group again reduces the METB by 16.5 percentage points. In column (5) and (6), the estimated coefficient of the corruption index is again positive and statistically significant, indicating that a lower level of corruption is correlated with a higher ratio of tax payment to total assets. The effect of the size of the firm on tax payments over total assets disappears in these specifications.

6 Conclusions

Developing countries are well known to experience difficulties in raising adequate amounts of tax revenues to finance their spending needs. In particular, revenues from direct taxation tend to be low compared to the developed world. A notable exception are revenues from corporate taxation which play a much more prominent role in developed economies than in industrialized countries. The purpose of this paper was to assess the determinants of corporate tax payments in developing and emerging economies using panel data on firms in 18 developing countries.

The analysis derives a set of results.

First, we find that the METR and the METB on firms in low and middle income economies increases in firm size. This confirms theoretical considerations which suggest that larger firms are more visible to tax authorities and have less options to engage in tax evasion strategies than smaller firms (Kleven et al. (2009)). Many tax authorities in developing countries strongly focus their resources on the administration of large corporations, for example through large tax payer units, which may equally contribute to the result. There is also evidence that tax payments over total assets are positively

affected by firm size.

Second, when controlling for endogeneity, our results do not suggest that multinational entities display a systematically lower METR and METB than national firms. Hence, recent claims that multinational firms reduce their effective corporate tax rates in the developing world below rates faced by national firms cannot be supported. It is claimed that the reduction of the tax burden is achieved through international profit shifting strategies and other forms of tax avoidance.

Third, the analysis also suggests that corporate tax payments are not only related to idiosyncratic characteristics of the firm but may also be related to institutional features of the host country. Interestingly, changes in the statutory tax rate translate into changes in tax payments which suggest that, on average, accounting profits do not differ from taxable profits. This suggests that accounting profits are on average equal to the tax base. If this is true, the fact that the EMTR we measure is lower than the statutory rate must be due to differences between the statutory tax rate and the true tax rate applied to profits, rather than being driven by differences between accounting profits and taxable profits.

Moreover, we find that a corrupt environment exerts a significantly negative impact on corporate tax payments. Using our sample values, the METR is 9% for the median value of the Corruption Index (-0.66) and 4% for the lowest value of the Corruption Index in our sample (-1.28 indicating poor performance).

Finally, conditional on the statutory tax law, the METR and the METB on firms in developing and emerging economies is significantly smaller than the effective tax burden in developed economies.

Overall, these results suggest that corproate taxation in developed countries faces important challenges in that corrpuption (and other weaknesses in the institutional framework which are likely to correlate with measures of corruption) matter for the effectiveness of the tax system in collecting revenue. At the same time, we find no evidence to support the view that mutlinational firms or more generally large firms engage more in tax avoidance or evasion, so that targeting these firms in particular may add little to improving corporate tax systems in developing countries.

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Tables

Table 1: Developing Countries Statistics

Country	Observations	Percent	No. of firms	Percent
Bosnia and Herzegovina	898	0.17	476	0.27
Brazil	572	0.11	179	0.32
Chile	784	0.15	200	0.11
China	282,898	54.73	103,088	58.13
Colombia	593	0.11	141	0.08
Croatia	7,339	1.42	1,954	1.1
India	4,158	0.80	2,869	1.62
Indonesia	283	0.05	277	0.16
Macedonia	550	0.11	238	0.13
Malaysia	15	0.00	4	0.00
Moldova	931	0.18	250	0.14
Pakistan	10	0.00	7	0.00
Peru	1,627	0.31	603	0.34
Philippines	3,540	0.68	1,756	0.99
Russia	173,301	33.53	54,020	30.46
Sri Lanka	115	0.02	114	0.06
Thailand	627	0.12	627	0.35
Ukraine	38,682	7.48	10,532	5.94
Total	516,923	100	177,335	100

Table 1B: Developed Countries Statistics

Country	No. of firms	Percent
Belgium	765	5.20
Finland	229	1.56
France	2,773	18.85
Great Britain	4,002	27.20
Italy	2,086	14.18
Norway	491	3.34
Spain	2,819	19.16
Sweden	1,546	10.51
Total	14,711	100.00

Table 2: Descriptive Statistics, Developing Countries					
Variable	*Obs.*	*Mean*	*Std. Dev*	*Min*	*Max*
Taxes over Total Assets	516,923	.0138	.0302	-.9239	.9385
Profitability	516,923	.0748	.1474	-.9974	.9999
Profitability * Corporate Tax Rate	516,923	.0215	.0430	-.3575	.3479
Taxation★	516,923	528.0229	12,238.85	-1,344,651	5,147,046
Profit before Taxation★	516,923	2,539.995	51,797.72	-2,164,184	2.37e+07
Total Assets★	516,923	39,125.63	568,857.4	1,001	1.75e+08
No. of employees	362,584	519.4805	2,362.452	0	477,780
Log(total assets)	516,923	8.9566	1.3849	6.9088	18.9787
Log (no. employees)	361,382	5.5072	1.1701	0	13.0769
Debt Ratio	516,923	.5962	.2771	0	1
Multinational	516,923	.0159	.1249	0	1
WB Corruption Index (CCI)	516,923	.8582	.2129	.3726	3.0075
WB Government Efficiency Index (GEI)	516,923	2.3154	.2127	1.6702	3.7452
TPI Corruption Perception Index (CPI)	182,691	1.0538	.1235	.5	4.2
Corporate Statutory Tax Rate	516,923	.2897	.0503	0	.43
GDP▲	516,923	1.15e+12	7.98e+11	1.69e+09	2.69e+12
GDP per Capita▲	516,923	1875.757	850.3116	453	6,630
Unemployment Rate	516,923	5.5905	2.2084	1.4	37.3

Table 2B: Descriptive Statistics, Developed Countries					
Variable	*Obs.*	*Mean*	*Std. Dev*	*Min*	*Max*
Taxes over Total Assets	65,484	.0233	.0323	-.4682	.6284
Profitability	65,484	.0701	.1084	-.9678	.9352
Profitability * Corporate Tax Rate	65,484	.0232	.0356	-.3661	.3493
Taxation★	65,484	249.51	456.18	-1,403	9,908
Profit before Taxation★	65,484	737.55	1,482.25	-22,586	25,708
Total Assets★	65,484	10,608.18	7,755.46	1,823	41,157
No. of employees	65,484	77	72.14	1	1,136
Log(total assets)	65,484	9.021	.7043	7.508	10.625
Log (no. employees)	65,484	4.007	.8501	0	7.035
Debt Ratio	65,484	.6234	.2115	0	1
Multinational	65,484	.3359	.4723	0	1
WB Corruption Index (CCI)	65,484	3	.5032	1.9	4
WB Government Efficiency Index (GEI)	65,484	4	.376	3.29	4.73
TPI Corruption Perception Index (CPI)	45,343	1.5283	.399	0	2.3
Corporate Statutory Tax Rate	65,484	.3368	.0426	.28	.412
GDP▲	65,484	9.66e+11	5.05e+11	1.16e+11	1.64e+12
GDP per Capita▲	65,484	22,541	5,432	13,800	39,800
Unemployment Rate	65,484	8.2	2.9	3.2	15.6

Notes:

★ In thousand US dollars, current prices. ▲ In US dollars, current prices.

Table 3: Baseline Estimations

Dependent Variable: Tax Payments over Total Assets)

Variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*
Profitability	0.102***	0.103***	0.103***	0.040***	0.103***	0.037***	0.103***	0.037	0.103***	0.037	0.103***	0.040***
	(0.001)	(0.001)	(0.001)	(0.007)	(0.001)	(0.007)	(0.017)	(0.026)	(0.034)	(0.038)	(0.001)	(0.007)
Profitability×				0.007***		0.008***		0.008***		0.008***		0.008***
Log Total Assets				(0.001)		(0.001)		(0.002)		(0.001)		(0.001)
Profitability×MNEs					-0.049***	-0.058***		-0.058***		-0.058**		-0.059***
					(0.006)	(0.006)		(0.011)		(0.022)		(0.006)
Log Total Assets	-0.002***	-0.002***	-0.002***	-0.003***	-0.002***	-0.003***	-0.002***	-0.003***	-0.002***	-0.003***	-0.002***	-0.003***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0004)	(0.0003)	(0.0002)	(0.0001)	(0.0001)	(0.0001)
Debt Ratio	-0.005***	-0.006***	-0.006***	-0.005***	-0.006***	-0.005***	-0.006***	-0.005***	-0.006	-0.005	-0.006***	-0.005***
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.002)	(0.002)	(0.003)	(0.003)	(0.0004)	(0.0004)
Corrupt Control (CCI)		0.028***	0.034***	0.033***	0.034***	0.033***	0.034***	0.033***	0.034***	0.033***	0.026***	0.026***
		(0.0005)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.007)	(0.007)	(0.004)	(0.004)	(0.001)	(0.001)
Corporate Tax Rate			0.071***	0.070***	0.071***	0.071***	0.071**	0.071**	0.071***	0.071***	0.059***	0.059***
			(0.004)	(0.004)	(0.004)	(0.004)	(0.029)	(0.028)	(0.022)	(0.021)	(0.004)	(0.004)
GDP/10^{12}			0.020***	0.023***	0.020***	0.023***	0.020	0.023	0.020	0.023	-0.002	0.002
			(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)	(0.026)	(0.025)	(0.007)	(0.007)
GDP pC/10^4			0.127***	0.123***	0.127***	0.122***	0.127***	0.122***	0.127***	0.122***	0.103***	0.099***
			(0.006)	(0.006)	(0.006)	(0.006)	(0.045)	(0.044)	(0.043)	(0.042)	(0.007)	(0.007)
Unemployment Rate			-0.002***	-0.002***	-0.002***	-0.002***	-0.002*	-0.002*	-0.002	-0.002	-0.001***	-0.001***
			(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0009)	(0.0009)	(0.0014)	(0.0014)	(0.0001)	(0.0001)
# Observations	516,923	516,923	516,923	516,923	516,923	516,923	516,923	516,923	516,923	516,923	504,150	504,150
R Squared Within	0.2352	0.2415	0.2429	0.2447	0.2434	0.2453	0.2429	0.2453	0.2429	0.2453	0.2492	0.2515

Notes: Heteroscedasticity robust standard errors adjusted for firm clusters in parentheses. *, **, *** indicates significance at the 10%, 5%, 1% level. The observational units are firms per year. The dependent variable is the firm's tax payment per total assets. Profitability indicates the firm profitability as measured by pre-tax profits over total assets. Log Total assets depicts the logarithm of the firm's total assets and MNE indicates multinational entities with either a foreign parent or a foreign subsidiary. Debt ratio is the firm's debt over total assets. Corruption indicates the World Bank corruption index, corporate tax rate the country's statutory corporate tax rate. GDP stands for the host country's GDP in 10 trillions of dollars and GDP per capita for the host country's GDP per capita in thousands of US dollar. Unemployment rate is the host country's unemployment rate in percent. Year Dummies and Industry-Year Dummies indicates a full set of year fixed effects and industry-year fixed effects at the one-digit NACE level. All specifications include a full set of firm fixed effects. The within R-squared is reported at the bottom of the table.

Table 4: Robustness Checks I

Dependent Variable: Tax Payments over Total Assets

Variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*
Profitability	0.113***	0.090***			0.149***	0.128***	0.064***	0.022***	0.103***	0.028***	0.103***	0.037***
	(0.001)	(0.007)			(0.001)	(0.008)	(0.001)	(0.009)	(0.001)	(0.007)	(0.001)	(0.007)
Corporate Tax Base			0.320***	0.0357								
			(0.004)	(0.024)								
Profitability ×						0.002**		0.005***		0.009***		0.008***
Log Total Assets						(0.001)		(0.001)		(0.001)		(0.001)
Profitability × MNE		-0.082***				-0.047***		-0.020***		-0.059***		-0.058***
		(0.008)				(0.015)		(0.006)		(0.006)		(0.006)
Corporate Tax Base ×				0.034***								
Log Total Assets				(0.003)								
Corporate Tax Base × MNE				-0.197***								
				(0.019)								
Profitability ×		0.004***										
Log Employees		(0.001)										
Log Total Assets			-0.002***	-0.003***	-0.002***	-0.002***	-0.002***	-0.003***	-0.002***	-0.003***	-0.002***	-0.003***
			(0.0001)	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Log Employees	0.001***	0.001***										
	(0.0001)	(0.0001)										
Debt Ratio	-0.010***	-0.010***	-0.009***	-0.008***	-0.007***	-0.007***	-0.0001	0.0001	-0.006***	-0.006***	-0.006***	-0.005***
	(0.001)	(0.001)	(0.0004)	(0.0004)	(0.001)	(0.001)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)
Corruption Control (CCI)	0.032***	0.032***	0.033***	0.033***	0.003***	0.003***	0.035***	0.034***	0.037***	0.037***	0.034***	0.033***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Corporate Tax Rate	0.082***	0.082***			0.022***	0.022***	0.067***	0.067***	0.052***	0.054***	0.071***	0.070***
	(0.005)	(0.005)			(0.004)	(0.004)	(0.007)	(0.007)	(0.007)	(0.007)	(0.004)	(0.004)

Table 4: Robustness Checks I, continued

Dependent Variable: Tax Payments over Total Assets

Variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*
GDP/10^{12}	0.056***	0.056***	0.020***	0.021***	0.018***	0.016***	0.033***	0.034***	-0.006	-0.001	0.020***	0.023***
	(0.010)	(0.010)	(0.005)	(0.005)	(0.047)	(0.047)	(0.008)	(0.008)	(0.005)	(0.005)	(0.005)	(0.005)
GDP pC/10^4	0.126***	0.127***	0.136***	0.134***	-0.033***	-0.032***	0.085***	0.083***	-0.046***	-0.043***	0.127***	0.123***
	(0.008)	(0.008)	(0.007)	(0.007)	(0.008)	(0.008)	(0.009)	(0.009)	(0.015)	(0.015)	(0.006)	(0.006)
Unemployment Rate	-0.000	-0.000	-0.002***	-0.002***	-0.003**	-0.0003**	-0.001***	-0.001***	-0.002***	-0.002***	-0.002***	-0.002***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
# Observations	352,976	352,976	516,923	516,923	234,025	234,025	343622	343,622	478,241	478,241	516,515	516,515

Notes: Heteroscedasticity robust standard errors adjusted for firm clusters in parentheses. *, **, *** indicates significance at the 10%, 5%, 1% level. The observational units are firms per year. The dependent variable is the firm's tax payment per total assets. Profitability indicates the firm profitability as measured by pre-tax profits over total assets. Log Total assets depicts the logarithm of the firm's total assets and MNE indicates multinational entities with either a foreign parent or a foreign subsidiary. Debt ratio is the firm's debt over total assets. Corruption indicates the World Bank corruption index, corporate tax rate the country's statutory corporate tax rate. GDP stands for the host country's GDP in 10 trillions of dollars and GDP per capita for the host country's GDP per capita in thousands of US dollar. Unemployment rate is the host country's unemployment rate in percent. Year Dummies and Industry-Year Dummies indicates a full set of year fixed effects and industry-year fixed effects at the one-digit NACE level. All specifications include a full set of firm fixed effects. The within R-squared is reported at the bottom of the table.

Table 5: Robustness Checks II

Dependent Variable: Tax Payments over Total Assets

Variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
Profitability	0.103***	0.038***	0.092***	0.052***	0.101***	0.101	0.101		0.091***	0.248***
	(0.001)	(0.007)	(0.003)	(0.016)	(0.016)	(0.070)	(0.125)		(0.007)	(0.020)
Governm. Efficiency (GEI)	0.041***	0.040***								
	(0.001)	(0.001)								
Adj. TPI Corruption Index (CPI)			0.002	0.002						
			(0.001)	(0.001)						
Corruption Control (CCI)					0.030***	0.030***	0.030***	0.026***	0.038***	0.032***
					(0.001)	(0.006)	(0.005)	(0.001)	(0.001)	(0.001)
Profitability ×		0.008***		0.005***	0.002***	0.002	0.002			
Log Total Assets		(0.001)		(0.002)	(0.001)	(0.002)	(0.001)			
Profitability × MNE		-0.059***		-0.005	-0.056***	-0.056***	-0.056***		-0.081***	-0.109***
		(0.006)		(0.014)	(0.007)	(0.014)	(0.012)		(0.008)	(0.009)
Profitability ×					0.069***	0.069	0.069			0.100***
Corruption Control (CCI)					(0.007)	(0.082)	(0.120)			(0.008)
Profitability ×					-0.303***	-0.303	-0.303			-1.046***
Corporate Tax Rate					(0.039)	(0.301)	(0.447)			(0.056)
Profitability × GDP/10^{12}					-0.029***	-0.029	-0.029*			0.010***
					(0.002)	(0.020)	(0.017)			(0.003)
Profitability × GDP pC/10^4					0.223***	0.223*	0.223			0.141***
					(0.021)	(0.126)	(0.248)			(0.024)
Corporate Tax Base								-0.231***		
								(0.039)		
Corporate Tax Base ×								0.406***		
Corruption Control (CCI)								(0.027)		
Profitability ×									0.004***	0.006***
Log Employees									(0.001)	(0.001)
Corporate Tax Base × GDP/10^{12}								-0.186***		
								(0.005)		
Corporate Tax Base × GDP pC/10^4								2.130***		
								(0.080)		
Corporate Tax Base ×								0.010***		

Table 5: Robustness Checks II, continued

Dependent Variable: Tax Payments over Total Assets

Variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*
Log Total Assets								(0.003)		
Corporate Tax Base × MNE								-0.169***		
								(0.021)		
Log Total Assets	-0.002***	-0.003***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***		
	(0.0001)	(0.0001)	(0.0003)	(0.0003)	(0.0001)	(0.0002)	(0.0003)	(0.0001)		
Log Employees									0.0006***	0.0003**
									(0.0001)	(0.0001)
Corporate Tax Rate	0.095***	0.094***	0.074***	0.073***	0.089***	0.089**	0.089**		0.104***	0.168***
	(0.004)	(0.004)	(0.008)	(0.008)	(0.004)	(0.034)	(0.031)		(0.005)	(0.006)
GDP/10^{12}	-0.026***	-0.025***	0.005	0.010	0.058***	0.058	0.058*	0.074***	0.096***	0.105***
	(0.007)	(0.007)	(0.030)	(0.028)	(0.005)	(0.052)	(0.030)	(0.005)	(0.008)	(0.008)
GDP pC/10^4	-0.005	-0.009	-0.130***	-0.123***	0.099***	0.099**	0.099**	0.101***	0.150***	0.123***
	(0.006)	(0.006)	(0.044)	(0.044)	(0.007)	(0.041)	(0.036)	(0.007)	(0.008)	(0.008)
Unemployment Rate	0.0003***	0.0003**	0.001**	0.001**	-0.001***	-0.001	-0.001	-0.001***	-0.0003**	0.00001
	(0.0001)	(0.0001)	(0.0007)	(0.0007)	(0.0002)	(0.0008)	(0.001)	(0.0002)	(0.0001)	(0.0002)
Debt Ratio	-0.005***	-0.005***	-0.001	-0.001	-0.003***	-0.003**	-0.003	-0.004***	-0.010***	-0.006***
	(0.0004)	(0.0004)	(0.0008)	(0.0008)	(0.0004)	(0.001)	(0.003)	(0.0004)	(0.0006)	(0.0006)
# Observations	516,923	516,923	182,691	182,691	516,923	516,923	516,923	516,923	361,382	361,382

Notes: Heteroscedasticity robust standard errors adjusted for firm clusters in parentheses. *, **, *** indicates significance at the 10%, 5%, 1% level. The observational units are firms per year. The dependent variable is the firm's tax payment per total assets. Profitability indicates the firm profitability as measured by pre-tax profits over total assets. Log Total assets depicts the logarithm of the firm's total assets and MNE indicates multinational entities with either a foreign parent or a foreign subsidiary. Debt ratio is the firm's debt over total assets. Corruption indicates the World Bank corruption index, corporate tax rate the country's statutory corporate tax rate. GDP stands for the host country's GDP in 10 trillions of dollars and GDP per capita for the host country's GDP per capita in thousands of US dollar. Unemployment rate is the host country's unemployment rate in percent. Year Dummies and Industry-Year Dummies indicates a full set of year fixed effects and industry-year fixed effects at the one-digit NACE level. All specifications include a full set of firm fixed effects. The within R-squared is reported at the bottom of the table.

Table 6: Robustness Checks II - IV Estimations

Dependent Variable: Tax Payments over Total Assets

Variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Profitability	.0588***	−.0671***	−.0673***			
	(.0226)	(.0230)	(.0231)			
Profitability ×		.0177***	.0177***			
Log Total Assets		(.0034)	(.0034)			
Profitability × MNEs			−.0286			
			(.0618)			
Corp. Tax Base				.1757**	−.2757***	−.2758***
				(.0744)	(.1044)	(.1050)
Corp. Tax Base ×					.0551***	.0552***
Log Total Assets					(.0146)	(.0147)
Corp. Tax Base × MNEs						−.0797
						(.2153)
Log Total Assets	.0042***	.0023	.0024	.0045**	.0018	.0019
	(.0017)	(.0017)	(.0017)	(.0019)	(.0023)	(.0023)
Debt Ratio	−.0426***	−.0260***	−.0260***	−.0401***	−.0317***	−.0318***
	(.0129)	(.0097)	(.0097)	(.0140)	(.0110)	(.0110)
CCI	.0426***	.0361***	.0361***	.0416***	.0361***	.0361***
	(.0031)	(.0020)	(.0020)	(.0032)	(.0024)	(.0024)
Corporate Tax Rate	.1331***	.1165***	.1166***			
	(.0118)	(.0084)	(.0084)			
GDP per Capita/10^4	−.0186	−.0612*	−.0257	−.0190	−.0190	−.0190
	(.0450)	(.0365)	(0.0515)	(0.0456)	(0.0456)	(0.0457)
GDP/10^{12}	.0173***	.0177***	.0178***	.0182***	.0158***	.0159***
	(.0041)	(.0033)	(.0033)	(.0042)	(.0045)	(.0045)
Unemployment Rate	−.0050***	−.0054***	−.0054***	−.0051***	−.0050***	−.0050***
	(.0008)	(.0005)	(.0005)	(.0008)	(.0006)	(.0006)
Year Dummies	√	√	√	√	√	√
Observations	349,002	349,002	349,002	349,002	349,002	349,002
Number of Firms	142,556	142,556	142,556	142,556	142,556	142,556
AR(2)	[0.915]	[0.521]	[0.507]	[0.706]	[0.978]	[0.966]
Sargan Test	[0.562]	[0.698]	[0.697]	[0.658]	[0.613]	[0.612]
Hansen Test	[0.000]	[0.149]	[0.147]	[0.004]	[0.124]	[0.123]

Notes: *, **, *** indicates significance at the 10%, 5%, 1% level. The observational units are firms per year. The dependent variable is the firm's tax payment per total assets. Profitability indicates the firm profitability as measured by pre-tax profits over total assets. Log Total assets depicts the logarithm of the firm's total assets and MNE indicates multinational entities with either a foreign parent or a foreign subsidiary. Debt ratio is the firm's debt over total assets. Corruption indicates the World Bank corruption index, corporate tax rate the country's statutory corporate tax rate. GDP stands for the host country's GDP in trillions of dollars and GDP per capita for the host country's GDP per capita in thousands of US dollar. Unemployment rate is the host country's unemployment rate in percent. Year Dummies indicates a full set of year fixed effects. The model is estimated in first differences and the vector of firm variables (Profitability, Log Total Assets, Debt Ratio) is instrumented with lags of its levels. P-values of an Arellano-Bond test for second order autocorrelation, of a Sargan and of a Hansen test for exogeneity of the instruments with respect to the error term are reported in brackets at the bottom of the table.

Table 7: Developed Countries
Dependent Variable: Tax Payments over Total Assets

Variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Profitability	0.103***	0.092***	0.204***		.338**	
	(0.001)	(0.003)	(0.040)		(.175)	
Profitability ×	0.102***	0.114***				
Developed Countries	(0.003)	(0.004)				
Profitability ×			0.001		-.006	
Log Total Assets			(0.005)		(.019)	
Profitability×MNE			-0.009		-.058***	
			(0.007)		(.021)	
Corporate Tax Base				0.662***		1.017**
				(0.117)		(.462)
Corporate Tax Base ×				-0.0003		-.018
Log Total Assets				(0.014)		(.051)
Corporate Tax Base × MNE				-0.038*		-.165***
				(0.020)		(.057)
Corruption Control	0.024***	-0.000	0.003**	0.003**	.006***	.006***
	(0.000)	(0.001)	(0.001)	(0.001)	(.002)	(.002)
Corporate Tax Rate	0.041***	0.049***	0.005		.006	
	(0.003)	(0.005)	(0.009)		(.011)	
Log Total Assets	-0.002***	-0.002***	-0.004***	-0.003***	.002	.003
	(0.000)	(0.000)	(0.001)	(0.001)	(.009)	(.009)
GDP	0.000***	-0.000	-0.030***	-0.030***	-0.017***	-0.020***
	(0.000)	(0.000)	(0.004)	(0.004)	(0.007)	(0.006)
GDP pC	0.000***	-0.000***	0.027***	0.024***	0.010**	0.011**
	(0.000)	(0.000)	(0.003)	(0.003)	(0.005)	(0.005)
Unemployment Rate	-0.001***	0.001***	-0.0006***	-0.0007***	.0001	-.00002
	(0.000)	(0.000)	(0.0001)	(0.0001)	(.0002)	(.0002)
Debt Ratio	-0.005***	0.001	0.006***	0.006***	-.032**	-.024
	(0.000)	(0.001)	(0.002)	(0.002)	(.016)	(.016)
# Observations	582,407	250,720	65,484	65,484	49,889	49,889
Sargan Test					[0.138]	[0.147]
Hansen Test					[0.211]	[0.212]

Notes: *, **, *** indicates significance at the 10%, 5%, 1% level. The observational units are firms per year. The dependent variable is the firm's tax payment per total assets. Profitability indicates the firm profitability as measured by pre-tax profits over total assets. Log Total assets depicts the logarithm of the firm's total assets and MNE indicates multinational entities with either a foreign parent or a foreign subsidiary. Debt ratio is the firm's debt over total assets. Corruption indicates the World Bank corruption index, corporate tax rate the country's statutory corporate tax rate. GDP stands for the host country's GDP in trillions of dollars and GDP per capita for the host country's GDP per capita in thousands of US dollar. Unemployment rate is the host country's unemployment rate in percent. Year Dummies indicates a full set of year fixed effects. The model is estimated in first differences and the vector of firm variables (Profitability, Log Total Assets, Debt Ratio) is instrumented with lags of its levels. P-values of an Arellano-Bond test for second order autocorrelation, of a Sargan and of a Hansen test for exogeneity of the instruments with respect to the error term are reported in brackets at the bottom of the table.