Taxes, corruption, and entry

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Accepted Version

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Abstract Tax policies and corruption are important institutional considerations which can shape entrepreneurship. We investigate how tax rates, and the interaction between corruption and tax rates, influence variations in entry across a panel of 72 countries in the period 2005-2011. We use a series of panel estimations as well as several robustness checks to test these effects, using relevant controls for economic development, the size of the state, and other regulatory and tax policy measures. We find that higher tax rates consistently discourage entry. Further, we find that although the direct influence of corruption on entry is also consistently negative, the interaction influence of corruption and tax rate is positive. This indicates that corruption can offset the negative influence of high taxes on entry. We discuss the implications of our findings for policymakers and future research.

Keywords: Corporate tax; tax administration; entrepreneurship; corruption, institution
JEL codes: L26; H29; O50

Acknowledgments: We thank David Audretsch, Johan Eklund, Magnus Henrekson and participants at Academy of International Business for comments. Farzana Chowdhury thanks Erik Stam and Siri Terjesen.

1 Introduction

> "Over here, death, taxes and corruption are inevitable."
> -Comment on Tanzania, *The East African* newspaper, November 17, 2012

Entrepreneurship can vary significantly across countries (Stenholm et al. 2013), as can the quality of regulatory institutions (Djankov et al. 2002; Audretsch and Lehmann 2005) including tax regulations. The question of how tax policy influences entrepreneurship outcomes is closely tied to the broader institutional context (see Bruce and Mohsin 2006) and economic conditions in a country (see Baliamourne-Lutz and Garello 2014; Bacher and Brülhart 2010; Parker 2003; OECD 2000). Tax policy is an important part of the environment which shapes how entrepreneurs could perceive future expected returns to their efforts (Baumol 1990). They can shape entrepreneurial decision-making and risk perceptions for entrepreneurs, constraining or encouraging them to take action. Tax policy could act as an exogenous barrier for entrepreneurs (van Stel et al. 2007) by, for example, taking away income which individuals could have used to support entry or business activities (Baliamoune-Lutz 2015), or could create a type of insurance buffer by shifting risk from the entrepreneur to the government (Gentry and Hubbard 2000).

Considering tax policy across different country contexts also raises the question of corruption. There is growing consensus that corruption hurts entrepreneurs (Anokhin and Schulze 2009; Aidis et al. 2012; Acs et al. 2008), but its indirect influence on tax policy is a more complicated matter. Tax agents have discretion in enforcing tax law, which varies in complexity, adaptiveness, and enforceability across countries. The reality in many countries, especially many developing countries, is that the *de jure* policies simply do not match *de facto* activities (see Desai et al. 2013). Poorly developed or overly complex tax regulations in a country could lead to market failures, resulting from lack of contract enforcement (or

unreliable/inconsistent enforcement), expensive negotiation and compliance costs, inefficient search and information asymmetries (Estrin et al. 2006). Complying with *de jure* tax policy could be prohibitively costly in terms of time and money, and this could create incentives to seek other ways to comply. Complex tax policies could direct an entrepreneur to look for ways around them (see Web et al. 2009). Therefore, it is important to consider how entrepreneurship could be affected by unofficial ways to accomplish transactions, and whether corruption stimulates or discourages entrepreneurship (Kobrin 1978; Campos et .al. 2010; Dreher and Gassebner 2013). Recent research suggests institutions can interact with each other, and this should be investigated in further detail (see Aidis et al. 2012; Tonoyan et al. 2010).

This study expands on current knowledge (e.g., Estrin et al., 2013; Djankov et al., 2010; Anokhin and Schulze 2009; Torini 2005) on taxes, corruption and entrepreneurship. Using a panel of 72 countries over the years 2005-2011, we test for direct and indirect effects in the interplay of tax policy, corruption, and entrepreneurship. We find that the tax rate and corruption directly discourage entry, and we also find that in some environments, corruption can foster entry by offsetting the negative direct effect of tax policy.

We make three contributions to knowledge about the nexus of entrepreneurship, regulations, and corruption. First, we respond to calls for more nuanced analysis of how entrepreneurship is influenced by regulations (van Stel et al. 2007; Djankov et al. 2010; Stenholm et al. 2013), specifically tax policy (Da Rin et al. 2011; Henrekson et al. 2010) and corruption (Estrin et al. 2013; Aidis et al. 2012; Sobel 2008). In doing so, we advance entrepreneurship theory and empirical insights on "precisely which institutions are important" for entrepreneurship (Estrin et al. 2013). Second, our main empirical contribution lies in measuring the interplay between tax rates and corruption. In doing so, we provide some answers

to the long-standing question of whether corruption hurts or helps (Méon and Sekkat 2005; Djankov et al. 2002; Shleifer and Vishny 1993) entrepreneurship (Campos et al. 2010; Dreher and Gassebner 2013; Mahagaonkar 2008). Third, we test for direct and indirect influences of tax rate and corruption on entry. Our key findings are first that high taxes discourage entry and second, that corruption can offset the negative influence of high taxes on entry.

The remainder of the paper is as follows. Next, we discuss our theoretical underpinnings and hypotheses. We present our data and method in section three and report our results in section four. We discuss our findings in section five, followed by a brief conclusion.

2. Theoretical Background

2.1 Tax policies and entrepreneurship

Tax rates can shape how entrepreneurs anticipate expected returns to a potential new venture, by moving risk to (or from) the government. Domar and Musgrave (1944) argued that higher taxes actually shift risk from the entrepreneur to the government if the entrepreneur does not succeed, thereby offering insurance for entry (Gentry and Hubbard 2000: 284). Cullen and Gordon (2007) argued that taxes could affect entry through income shifting, risk subsidy, and risk sharing. In their perspective, the type of tax structure matters because small businesses can be taxed differently. For example, incorporated businesses in the United States are subject to corporate taxes and can deduct business-related expenses whereas self-employed/unincorporated businesses are taxed at the individual level. Thus depending on income level, tax policy could create a scenario where an individual receives a subsidy from the government, shaping risk and expected returns to entry. In this manner, tax policy could to some degree actually "compensate" for the risk of entry. On the other hand, tax policy could discourage entry because taxes can cut into income which otherwise could have been used by an individual to start a new firm or expand

an existing firm (Baliamoune-Lutz and Garello 2014), reducing the volume of financing available for entry. This could be especially salient for some types of entrepreneurs, like those aspiring to grow (Estrin et al. 2013) if taxes are progressive and lower expected gains from entry at higher levels.

Empirical findings on the relationship between the tax rate and entrepreneurship[1] have been mixed, at least in part because of heterogeneity in types of rates (e.g, marginal income tax, personal income tax, progressive tax), as well as different measures of entrepreneurship. Gentry and Hubbard (2004) found that progressive taxes influence individual risk-taking behavior even if someone is risk-neutral. However, Keuschnigg and Nielsen (2002) found that progressive tax has a negative impact on entrepreneurship and innovation, and Baliamoune-Lutz (2015) found progressive tax negatively influences both the established business ownership and nascent entrepreneurship in a panel of OECD countries. Cullen and Gordon (2007) found that allowing deductions for business losses on personal income tax returns raised entrepreneurial risk-taking by between 50-100%. Several studies on corporate tax rates support an adverse effect of higher corporate taxes on entrepreneurial activity (Djankov et al. 2010; Da Rin et al. 2011). Djankov et al. (2010) studied a range of tax policy measures in 85 countries and found that corporate taxes

[1] Many studies, mostly pre mid-2000s, proxied entrepreneurship as self-employment (see Acs et al., 2014; Bruce, 2002, 2000; Gentry and Hubbard, 2000; Parker, 1996). Some found a positive relationship between tax rate and self-employment in developed countries. Evans and Leighton (1989a, b) and Blau (1987) studied the US context, and Bacher and Brülhart (2010) studied the Swiss context, both finding a positive relationship of tax progressivity and self-employment. However, some found negative, mixed or insignificant effects. A negative influence of marginal tax rate on self-employment was found for Canadian micro data (Stabile, 2004); similar findings emerged for the US and Canada (Schuetze, 2000) and the UK (Parker, 1996; Blanchflower and Oswald, 1990). For Sweden, Fölster (2002) and Davis and Henrekson (1999) found a negative relationship between tax rates and self-employment, and Hansson (2012) found a negative relationship for both marginal and average tax rates. Another set of studies found no significance for tax rate and self-employment (Baliamourne-Lutz and Garello, 2014; Bruce and Mohsin, 2006, Parker, 2003; OECD, 2000). Mixed findings of different measures are not unusual: Robson and Wren (1999) studied OECD countries and found a positive relationship of self-employment with average tax rate, but a negative relationship with marginal tax rate. The distinction between self-employment (labor market trend) versus entry (new firm formation) has emerged, e.g related to educational level (Blanchflower, 2004; Parker, 2009) or conditions of unemployment and necessity (Arum and Mueller, 2004). We do not examine self-employment in this study as we concerned with businesses most likely influenced by tax rates: new formal firms. For more on self-employment versus entrepreneurship, see Blanchflower (2004), Parker, (2009) and Arum and Mueller (2004).

negatively influence entrepreneurial activity reflected as business entry rate. Da Rin et al. (2011) examined the relationship between corporate income tax and formal entry and entrepreneurial activity in 17 European countries over the period 1997-2004, and also found a significant and negative role of corporate taxation. Gurley-Calvez and Bruce (2013), Fossen and Steiner (2009) and Carroll et al. (2001) found evidence of a negative relationship between marginal tax rates and entrepreneurship. In addition, a negative relationship between taxation and entry has been found under different market structures (Romer, 1994; Applebaum and Katz, 1996). As argued by Appelbaum and Katz (1996), incumbents have advantages over new entrants since they can use profits as buffer, which new entrants cannot.

The structure of tax policy in a country can also affect tax morale, the "intrinsic motivation to pay taxes which arises from the moral obligation to pay taxes as a contribution to society" (Doerrenberg and Peichl, 2013: 295), and make tax evasion more attractive. If tax morale is low, tax compliance is also likely to be low. Torinni (2005) developed a model showing that tax evasion has a positive impact on self-employment, but the impact of the tax rate on self-employment depends on "country attitude toward tax evasion" (2005: 661).

The tax rate is critically important because more income taken away by a higher tax rate should discourage businesses overall (Baliamoune-Lutz, 2015), but especially potential new firms. Knowledge about the tax rate can help a potential entrepreneur calculate likely profits, and can guide risk-taking which influences the actual entry decision. In this manner, tax policy could have a strong and basically immediate influence on entrepreneurship, because tax rates can be accessed ahead of time and calculated before the entry decision. We thus hypothesize

HI: Higher tax rates will discourage entry.

2.3 Tax policy, corruption, and entrepreneurship

Corruption is the use of public office or authority for personal benefit (Rodriguez et al., 2006) and could reflect an inefficient or overregulated environment (Djankov et al., 2002) and/or ineffective political systems and national governments (Weston and Sorge, 1972).

While corruption is an important challenge for economic growth (see Kaufman and Kraay 2006; Méon and Sekkat, 2005), the many nuanced effects of corruption are difficult to capture. This could be because possible "intermediary" effects of corruption through other economic dynamics, like entry or firm dynamics related to innovation (Mahagaonkar, 2008), are hard to pick up, but, in turn, impact growth (Dreher and Gassebner, 2013).

It is well-accepted that corruption can become embedded (see Aidis et al., 2012; Estrin et al., 2013) in the *de facto* business environment in a country. This can happen in the tax system quite easily for at least two reasons: Tax morale, and a race to the bottom. First, corruption can create a vicious circle with the tax morale of individual entrepreneurs by generating mistrust in the government, solidifying incentives for corruption. In a highly corrupt environment, tax morale might be low and individuals may not trust that government will appropriately administer taxes for public services. This mistrust in government can make tax evasion more appealing.

Second, corruption in the tax regime can inspire a "race to the bottom" because it can change the cost structure of firms since it enables the entrepreneur to hide some or even all income. The entrepreneur can hide income by paying officials to overlook their actual income by allowing them to overstate deductions, underreport income, or not file tax returns at all. Cullen and Gordon (2007) note that small businesses can easily underreport taxable receipts. Corruption could provide another route for firms to avoid high tax rates. For example, the ability to bribe could mean firms simply pay less corporate tax or can negotiate unsanctioned agreements with

government agents for lower tax payments[2]. Partial or complete tax evasion is problematic because it allows an individual firm to temporarily lower its costs, giving it an unfair advantage over its competitors. The funds not paid in taxes can then be used for other purposes, including investment. Competing firms, in the next tax cycle, can either adhere to the policies or pay bribes in order to lower their own costs. This pressure is greater on potential entrepreneurs or new firms because they tend to have fewer resources to cope (see Tonoyan et al. 2010).

Tax policy and corruption are important institutional considerations for entry (see Djankov et al. 2002, 2010), and their relationship has implications for public revenues as well. Complicated tax regulations can create greater opportunities for bureaucrats to seek bribes. In particular, high tax rates directly relate to an increase in the likelihood of corruption, as government officials offer to facilitate transactions (Méon and Sekkat 2005). Bureaucrats may be motivated to seek bribes to exploit and take advantage of entrepreneurs, or they may take bribes in order to help entrepreneurs navigate a problematic regulatory system. Corruption can thus either have the effect of a *grabbing hand* or *helping hand* (Méon and Sekkat 2005; Shleifer and Vishny 1994, 2002). Regardless of motivation, complicated tax regulations can open the door for bureaucrats to seek bribes. In many developing countries, the government sector dominates (Tanzi and Davoodi, 2000) and public intervention in all spheres of public life is pervasive (Tanzi and Davoodi, 2000), so street level bureaucrats have ample opportunity to use discretion in applying tax policy. Inadequately specified rules or even contradictory policies can give bureaucrats significant discretionary powers to hurt or help entrepreneurs navigate tax policies.

[2] Value-added tax (VAT) is another tax policy tool which could enhance the desirability of corruption. Although many countries have adopted VAT, individuals might not register their business to lower tax liability, or register but submit personal expense invoices as business expense (Alm 2012, Gordon and Li 2009). Another strategy could be to buy or sell from firms owned by the same individual, within a country or overseas.

The grabbing effect occurs if bureaucrats are able to exploit entrepreneurs too much, e.g, multiple requests for bribes or overly high amounts or holding up transactions to force bribing. Poor enforcement of regulations is more problematic in developing countries, marked by less oversight of regulators and less formalized business customs (Braithwaite 2006). Higher transaction costs imposed by corruption could put an extra burden on entrepreneurs (Coase 1960) and impact perceptions about "the portion of the value that ventures create that the entrepreneur is able to capture for their own purposes" (Baker et al. 2005: 497). Corruption in this way takes a portion of the profits expected from entry, but given its innate hidden nature, the amount and frequency of bribing could itself also be unpredictable: In this way, corruption could increase uncertainty and discourage entry. To avoid exploitation by public agents, an individual might avoid entry completely (Aidis et al. 2012). Support for the grabbing nature of corruption on entrepreneurship has been found in 20 emerging and developing economies, where elites exert significant power (Tonoyan et al. 2010), and among small firms with fewer than 10 employees in municipalities in Brazil (Bologna and Ross 2015). Similarly, more effective control of corruption was found to positively influence entrepreneurship in 64 countries (Anokhin and Schulze 2009).

On the other hand, the helping effect occurs if efficient corruption allows entrepreneurs to get things done by bribing. Supporters of efficient corruption argue that corruption can grease the wheels of regulatory systems which are antiquated or inefficient, and can allow for greater efficiency in the allocation of constrained resources. Meon and Sekkat (2005) suggest corruption increases the rate at which bureaucrats issue permits, thereby speeding up the process. Therefore, individuals who are willing to pay bribes can enter the market and accomplish regulatory requirements more easily. Shleifer and Vishny (1993) note that efficient corruption could be effective if the bribe is well-defined and expected (predictable). In this way, corruption could

reduce uncertainty. Efficient corruption may allow entrepreneurs to pay less tax or entirely evade taxes in exchange for bribes. Entrepreneurs with personal connection/ties with bureaucrats and can bribe to their advantage (Pathak et al. 2015). Given this, corruption could be favorable to the entrepreneur by improving the "speed of money" if tax policy is particularly burdensome but could hurt if tax policy burden is low. For this reason, we hypothesize:

H2a: High corruption will offset a decline in the entry at higher tax rates.

3 Data and methodology

3.1 Data and Sample

We constructed our cross-sectional panel sample by matching data from the following sources at the country level: World Bank Group Entrepreneurship Snapshot (2005-2011), World Development Indicators (2005-2011), Doing Business Database (2005-2011), World Governance Indicators (WGI) (2005-2011) and Transparency International (2005-2011).

Missing data for many countries restricted our sample. We consider the inclusion of a larger sample of developing countries an important tradeoff in order to study variance around the world (Thai and Turkina 2014) and still manage to achieve a sample size large enough for the empirical analysis. Ultimately, our final dataset covers 72 countries over the period 2005-2011[3] with 307 observations. This is on average 4.2 years of observation for each country from 2005-2011. Variables are described in Table 1. Descriptive statistics and correlations are reported in Table 2.

- INSERT TABLES 1 AND 2 HERE -

[3] Two things are noteworthy about our time period, 2005-2011, which was restricted by data availability. First, results could be affected by the global recession, which occurred during this period. We accept this as a limitation which can be illuminated in future research as data availability improves. Second, as we detail in our discussion of the dependent variable, we use formal entry density to measure entrepreneurship. This standardized measure counts limited liability companies in a country using a well-defined process, so our measure captures registered firms which we infer to have been able to pay registration costs (and therefore will comply with tax and other regulations in the future), and are likely to have more financial resources than the self-employed or other entrepreneurs who act because they lack other opportunities (necessity-entrepreneurship). This strict adherence to a specific and "higher" level of entrepreneurship, to some degree, protects our results from being affected drastically by the recession.

3.2 Dependent variable

We measure *entry* as formal entry density is taken in logarithm, calculated as the number of new limited liability companies (LLCs) established per 1,000 people in a country. Creating a logarithm of our dependent variable ensures a normal distribution of the variable, as opposed to using the entry rate in levels. This measure comes from the World Bank Group Entrepreneurship Snapshot for the years 2005-2011.

Selecting any measure of entrepreneurship necessitates tradeoffs between overestimation using an overly generous definition, or underestimation using an overly restrictive definition. Our approach, given the time period for which data is available, is to be more restrictive in our definition in order to ensure a comparable measure which captures the same dynamic across countries, and which reflects a certain level ("quality") of entrepreneurial activity which is likely to be affected by formal regulation *and* which may be more insulated against the financial crisis than other measures. We, therefore, consider the selection of the World Bank's formal entry density more appropriate than other measures, such as self-employment and necessity entrepreneurship or similar measures, because it captures new formal firms, which logically would be more sensitive to tax regulations, and more appropriate measure of entrepreneurship. Our entrepreneurship measure is not per se superior to other measures of entrepreneurship, but as with Djankov et al. (2010), we feel it is the appropriate tradeoff for our purposes (see Acs et al., 2008 for more). Overall, developing countries are likely to have a less formal entry (country fixed effects capture change over the panel period, as noted later).

3.3. Independent variables

Our main measure of interest for tax policy is the *corporate tax rate,* capturing the direct financial burden imposed by tax policy. It is defined as the percentage of commercial profits paid

by businesses (Djankov et al., 2002; Kaufmann et al., 2006), and taken from the Doing Business database (see Dreher and Gassebner, 2013). The tax rate is taken in levels for linear models.

Our measure of corruption is the extent to which corruption is controlled in the country. We collected this from sources for comparative cross-country data on corruption used in previous research: World Governance Indicators (see Anokhin and Schulze, 2009; Kaufmann et al. 2006; Cuervo-Cazurra, 2006) and Corruption Perceptions Index (see Tonoyan et al., 2010).

- World Governance Indicators (WGI): The WGI corruption measure reflects 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 (Kaufmann, et al. 2006). Country scores range from -2.5 (high corruption) to 2.5 (low corruption). We reversed the measure by multiplying by -1 so that 2.5 corresponds to high corruption and -2.5 corresponds to low corruption.
- Corruption Perceptions Index (CPI) from Transparency International: This measure captures how corrupt is the public sector of a specific country from 2005-2011. The score ranges from 0 to 10, where 10 reflects low corruption level in the public sector. We reverse this index so that 10 reflects high corruption and 0 reflects low corruption.

Both corruption measures are used in levels in the linear and non-linear models in our analysis. Higher scores on these measures reflect higher corruption and lower scores reflect lower corruption (Aidis et al. 2012; McMullen et al. 2008).

3.4 Control Variables

We control for two other measures related to tax regulations – *procedures*, measured as the frequency of tax payments, and *time*, measured as the number of hours needed to prepare and pay taxes (see van Stel et al. 2007; Djankov et al. 2002, 2010). We do this because bureaucratic

procedures could lengthen the time and complexity (see Dreher and Gassebner 2013) to complete a transaction. This could also hinder entry by raising costs, discouraging an entrepreneur who might have to spend more resources, time, effort, etc. Both of these measures are taken from the Doing Business dataset.

We also control for other dimensions of the regulatory environment more broadly, using *insolvency cost*, measured as the cost to close a business (Klapper et al., 2006; Acs et al., 2008), and taken from the Doing Business database. We use *public registration bureau* to measure the effectiveness of the credit and broader financial system, taken from the Doing Business database (Baliamoune-Lutz, 2015). The index ranges from 0 to 6, with a high score corresponding to the strong depth of credit information.

We also account for the impact of a country's economic status on entrepreneurship over time (Carree et al., 2002; Parker 2009; Estrin et al., 2013; Stenholm et al., 2013) and the varied levels of socioeconomic and institutional development among countries in our sample. There could be differences in how high-income and low-income countries rely on sources for tax revenues, like corporate tax versus personal income tax (Gordon and Li, 2009). We control for *economic development* using GDP per capita, taken from World Development Indicators (Estrin et al. 2013; Aidis et al. 2012). In line with previous research approaches (Estrin et al., 2013; Carree et al., 2002) tying lower and higher levels of economic development, we use GDP per capita categorized into four quantiles, so we apply three dummies (instead of continuous GDP per capita) and omit the lowest quantile. All higher quantiles of GDP per capita are compared with the first one which is omitted.

We control for *human capital* in the country, measured as a percentage of population enrolled in tertiary education (Fritsch and Schroeter 2011).

We also need to consider the size of government. Tax policy could be driven by disincentive effects on entry, which could happen when there are a large state sector and employment choices (Henrekson et al. 2010; Aidis et al. 2012). If so, being an entrepreneur could be less attractive since benefits for employees are high. Extensive welfare support could undermine incentives for individual savings, which can how potential entrepreneurs save and especially high-growth entrepreneurs (Korosteleva and Mickiewicz 2011). Also, greater government activity could crowd out entrepreneurs (Aidis et al. 2012). We thus include the *size of the state*, measured as general government final consumption expenditure, to control for this possible disincentive[4]. This proxy includes take from the World Development Indicators and includes all government current expenditures for the purchase of goods and services, including compensation of employees. It also includes most expenditures on national defense and security but excludes government military expenditures which are part of government capital formation.

Finally, we include time fixed effects because of changes in the world financial system (e.g. crises, macroeconomic shocks), which occurred within the period 2005-2011 and affected all countries. Finally, we include country fixed effects to account for differences in culture, aspirations, capacity, and other country-specific factors.

3.4 Empirical strategy

No multicollinearity was detected except the corruption measures, which are highly correlated with a coefficient 0.88 – 0.92. These coefficients present correlations between WGI and CPI. This high correlation suggests that the corruption measures are interrelated and the results based on any of the measures are applicable when designing tax and entrepreneurship policy. Our empirical analysis is divided into two steps: (1) a log-linear basic panel data model with country fixed effects including variables related to tax rates (H1) and corruption and tax

[4] We are grateful to one of the reviewers of this paper for this suggestion.

rates (H2) and controls, including time and country dummies; (2) a log-linear basic panel data model with country fixed effects using interaction analysis while examining the conditional effect of corruption in a relationship between tax rate and entry. The model enables us to interpret changes, in percent, in a tax policy measure and the association with changes, in percent, with entrepreneurial entry. For robustness, we use both the WGI and CPI measures of corruption. We also add government final consumption expenditure as a proxy for the size of the state, to control jointly for possible disincentive effects of taxation. With this in mind, we develop a robust empirical model for the determinants of entry, as the following log-linear estimations in a panel of 72 countries for seven years:

$$y_{it} = f(\beta x_{it}, \Theta z_{it}, \tau * \theta, \alpha, \mu_{it}) \quad , \text{i=1,..., N;} \quad \text{t=1,...,T} \quad (1)$$

where y_{it} is new business registry per 1000 people in a given country *i* at time *t* taken in logarithms; β are parameters of the variables of interest related to our main hypothesis to be estimated and Θ are parameters of the control variables; x_{it} is a vector of independent explanatory variables and z_{it} is a vector of strictly exogenous control variables (taken in logs in log-log models); $\tau * \theta$ an interaction term of corruption and a type of tax policy. Alpha coefficient in the equation controls for time-fixed effects and u_{it} for country-specific effects. Regional and country heterogeneity of institutions is important to consider (Acs et. al., 2014; Belitski and Desai 2015). By including country-specific fixed effects, using country dummies, we are controlling for the time-invariant part of unobserved heterogeneity in countries. Year dummies are also included in all models to capture unobserved time-specific effects. Standard errors are clustered by country, allowing for inter-temporal correlation of regressors within the same country over time.

Controlling for country fixed effects, we first deal with endogeneity related to an omitted variable bias from unobserved country characteristics. Country dummies, if not included and the factors that they attempt to account for, will be placed within the idiosyncratic error term and may be correlated with other macroeconomic characteristics, institutions and tax policy variables in the equation. Endogeneity bias is correlated with a model which used country dummies as fixed effects.

In addition, one may argue that the time period is short for panel estimation. However, reverse causality is an obvious danger when corruption, entrepreneurship, and tax policy are concerned. One way to deal with reverse causality is to include lagged values of independent variables and institutional variables. Our particular concern is economic growth, which is co-determined with entry, as well as insolvency cost, the size of the state and tax financial and administrative regulation, which may be co-determined with the entrepreneurial outcomes in a country. For example, the demand for corruption could come from entrepreneurs who actively seek to grease the wheels (Mahagaonkar 2008), or it could be argued that lobbying from the business sector could affect how tax policy responds to a change in entry and market health. We use one-year lags for our explanatory and control variables; our final sample size is 307 observations with 72 countries. The lagged variables (including the interaction terms) enable us to resolve possible reverse causality. Institutional framework in a country could shape entrepreneurial perceptions and decisions in the future (Estrin et al. 2013), but this can take time. Confidence in the unbiased results in regard to endogeneity is achieved by controlling for country-fixed effects (omitted variable bias) and using lags. Various alternative specifications without lags were used but provided similar statistical significance. We used the lagged model for our final results with numerous robustness checks, using two proxies for corruption, various

model specifications with and without insolvency cost, public registration bureau, size of the state to identify possible bias and make the results more robust and intuitively interpretable.

4. Results

4.1 Panel regression model (Table 3)

The results of the linear regression model are reported in Table 3. Specification 1 includes tax corruption (using the WGI measure) and all control variables with time and country dummies. Specification 2 uses the full model with all tax policy measures for financial (corporate tax rate) and administrative (frequency of tax payments, time to pay taxes) costs. Specifications 3 and 4 introduce the interaction analysis of tax rate, conditional on corruption, and controlling for procedural tax burden (time and procedures to pay taxes). Specification 5 also tests our null hypothesis by excluding public registration bureau and insolvency cost, which may pick up some of the effects of economic development on entry. Specification 5-7 is a robustness check to see results which exclude public registration bureau and insolvency cost, but keeps in economic development and adds the size of the state.

Results for our control variables are interesting. Our controls for procedural tax policies, the frequency of tax payments and time to pay taxes (specifications 2, 4-7) are not significant across specifications. Our other controls for non-tax regulations, public registration bureau, and insolvency cost are also not significant across specifications.

Human capital is positive and significant with entrepreneurship ($\beta=0.04$; $p<0.01$), consistent with previous research (Audretsch and Feldman 1996; Fritsch and Schroeter, 2011; Audretsch and Belitski, 2013). The magnitude of this relationship is not large: A 1 percent increase in tertiary education enrollment (ICSED 5 and 6) in the population is associated with 0.04 percent increase in entry density. The size of the state, in specifications 6 and 7, is negative as expected

(Estrin et al. 2013; Stenholm et al. 2013; Acs et al. 2008) but not statistically significant even at the 10% level (β=-0.01; p<0.20).

Countries with higher than average economic development (3rd quantile) have lower entry than those with lower level of economic development, in particular in the first quantile (β=0.82; p<0.05); lower economic development corresponds with on average 0.82 percent more entry density per 1,000 residents, a finding in line with previous research (Carree et al. 2002; Parker 2009). It is worth also noting our robustness checks to see if some regulatory controls might be picking up economic development effects and if the size of state could have disincentive effects. In specification 5, we exclude public registration bureau and insolvency cost but we include economic development in quartiles. In specification 6, we add the control for the size of the state. We run the full model in specification 7. We find results for economic development do not change.

Corruption in all specifications in Table 3 demonstrates a negative association with entrepreneurship, varying from -1.04 to -1.24 at 1% statistical significance, consistent with previous research (Djankov et al. 2002; Henrekson et al. 2010; Tonoyan et al. 2010; Aidis et al. 2012; Estrin et. al. 2013). This means that a one unit change in corruption, proxied using the WGI measure and varying from negative 2.5 to positive 1.92 in our sample, is associated with a shift in entry density from 104 to 124 percent. In other words, entry is highly responsive to corruption (Djankov et al., 2002; Aidis et al., 2012).

We now turn to the influence of tax policy on entry. In specifications 2-7, we find a negative association between corporate tax rate and entry (β= from -0.01 to -0.03; p<0.01). An increase of the corporate tax by one percent is associated with a decrease in entry density by 2 percent (β=-0.02; p<0.01). This supports H1, which predicted that higher tax rates discourage entry.

We now examine how tax rate influences entry under conditions of high and low corruption by including the interaction term corruption*tax rate. In specification 3, we see the coefficients remain negative for corporate tax rate (β= -0.02; $p<0.05$) and corruption (β= -1.44; $p<0.05$), while the interaction term shows the conditional effect of corruption on the relationship between tax rate and entry is positive and statistically significant (β= 0.01; $p<0.05$), supporting H1. This effect is similarly observed in specifications 5-7 in the robustness checks in table 4 (β= 0.01; $p<0.05$). This suggests corruption could mitigate higher tax rates in the direction of a helping effect (Méon and Sekkat 2005; Mahagaonkar 2008), with coefficients being positive. In specifications 3-7 (Table 3) a unit change in corruption offsets 1 percent of a decrease in entry density while the tax rate increases by one percent (β= 0.01; $p<0.05$). In other words, though tax rate deters entry density by 2%, the interaction term representing corruption*tax rate compensates this fall by 1%. This is a net interaction effect of corruption on the relationship between tax rate and entry.

4.2. Panel regression model - robustness (Table 4)

The results of the estimations in Table 3 clearly demonstrate the direct influence of tax rate and corruption on entry, but also assumed a relationship to be conditional on corruption. This condition calls for further consideration that the marginal impact of the tax rate on entry could differ at different levels (see Klapper and Love, 2010). Also, it could be the case that a single measure of corruption could be biased or correlated with the error term of the estimations in Table 3. We, therefore, run a full set of robustness checks for a set of models similar to ones estimated in Table 3 using a different measure of corruption - the Corruption Perceptions Index

(CPI) from Transparency International[5]. We run our log-linear models in specifications 1-7, reported in Table 4. Overall, we find empirical support consistent with our results in the main specifications in Table 3, which used the WGI measure for corruption.

Results for controls are similar. Similar to findings in Table 3, frequency of tax payments, time to pay taxes, public registration bureau, and insolvency costs are all not significant. As with the main estimations, human capital is positive and significant with entry, and size of the state is not significant. Our control for economic development is also similar to the main estimations, with average economic development (3rd quantile) associated with less entry. We ran checks in Table 4, analogously to those for economic development effects and size of state disincentive effects in Table 3. In specification 5, we excluded public registration bureau and insolvency cost. We added the size of the state in specification 6 and ran the full model in specification 7. Our findings are consistent overall.

Corruption is found to be negative and significant for entry, with the partial regression coefficient changing (β= from -0.38 to -0.58; $p<0.01$). Results show that a one unit increase of corruption, proxied by the CPI which varies from zero to 10 in our sample, discourages entry density by 38-58 percent. Although results in the robustness checks (Table 4) are lower than the main estimations (Table 3), the difference in the estimated coefficients demonstrating the impact of corruption on entry is not statistically significant between Tables 3 and 4.

As with the main findings, the tax rate is negatively associated with the entry (β= from -0.01 to -0.10; $p<0.01$) in the log-linear models (specifications 1-7). We find that a 1% increase in the tax rate leads to a decline in entry density between 1 to 5 percent.

[5] We also conducted a set of checks using a third measure of corruption from the Heritage Foundation's Index of Economic Freedom. This measure is derived in part with Transparency International (TI), and is correlated with the CPI measure (+92), so we do not report it here and consider the use of CPI adequate for our purposes.

Finally, when we add the interaction term corruption*tax rate, we find the conditional effect of corruption on the relationship between the tax rate and entry (specifications 1-4) is positive and significant, with the coefficient ranging between 0.01 and 0.005 ($p<0.05$). This indicates that a 1% change in corporate tax rate while an increase of one unit in corruption (0 to 10 scale) offsets decrease in entry density by 0.5-1 percent

5 Discussion

Both our main results (Table 3) and the robustness checks using another measure of corruption (Table 4) demonstrated a significant negative and direct influence of tax rate on entry. This finding is straightforward and consistent with previous research (Djankov et al., 2002, 2010). Interestingly, we find no significant relationship for entry when we use our controls for other tools of tax policy - the number of tax payments and time required to pay taxes. These findings, when taken together, indicate the direct financial costs imposed by the tax rate (Estrin et al. 2006, 2013) have a pronounced effect on entry, unlike procedural or bureaucratic costs related to tax policy. This suggests policymakers should prioritize the tax rate for policy reforms, and less so the procedural dimensions of tax policy, such as the number of forms or the amount of time needed to file the forms. However, we advise caution when interpreting these findings, because this is not to say the number of tax payments is unimportant. Procedures Further research should more deeply investigate how different measures and tools within the tax policy regime influence entry, and further. Our findings make a strong argument for future research to treat the tax (see Estrin et al. 2006, 2013) as well as other dimensions within the regulatory environment themselves as multi-dimensional (Audretsch et al. 2015; Belitski and Desai 2015;

Klapper and Love, 2010), and to explore multiple tools and measures of a specific institutional dimension (e.g, tax policy, export regulation, entry regulation).

We find the direct influence of corruption to be negative and significant for entry, which is not surprising given previous research (Djankov et al. 2002; Henrekson et al. 2010; Tonoyan et al. 2010; Aidis et al. 2012; Estrin et. al. 2013). We also find the interaction influence of corruption and tax rate to be positive and significant on entry. This means that changes in tax rate and willing to pay bribes influences the impact of the tax rate on entry. In other words, we find that entry is harmed when tax rates are high, but this effect could be offset with corruption. For countries with high taxes and high corruption, our findings indicate that policymakers would be well-advised to optimize the corporate tax rate concurrently with fighting corruption, which itself acts as a type of tax. In addition, policymakers should be concerned about the "attractiveness" of paying bribes to offset high tax rates.

It is also worth mentioning that we ran several robustness checks related to credit registration bureau, insolvency costs, the size of the state, and economic development. These indicated that the effect of tax rate does not come from a disincentive effect and a large state sector and welfare policy (Henrekson et al. 2010; Korosteleva and Mickiewicz 2011; Aidis et al. 2012).

Our findings underscore the need for policymakers to continue to fight corruption, and further, for researchers to pay special attention to the indirect effects of corruption on different regulatory dimensions. Future research could both deepen and widen the implications related to our findings. As policymakers often use fiscal policy tools to support entrepreneurship (Audretsch and Feldman 1996; Acs et al. 2009), it would be productive for future research to more deeply investigate. In addition, future research could widen the scope of knowledge of regulations, corruption and entry by considering other regulatory institutions (e.g, related to

property registration, contract enforcement, export, entry regulation, etc) and how these might interact with corruption at different levels of economic development to influence entry. Finally, future research could use our approach to examine how tax policy and corruption, and other types of regulation, drive other entrepreneurial activities, such as informal entrepreneurship, high-growth entrepreneurship, export-oriented entrepreneurship, etc.

6 Conclusion

In this paper, we examined the influence of corporate tax rates on entry as well as the interaction effect of corruption with the corporate tax rate on entry, on a panel of 72 countries in the period 2005-2011. Using a robust empirical strategy comprising panel data analysis and a set of robustness checks, we provide new insight into the direct and indirect influence of tax rate and corruption on entry. Our main findings are first that higher tax rates discourage entry, and second, that corruption can help offset this effect when tax rates are high.

We contribute to a growing research agenda on the national regulatory and institutional environment for entrepreneurship (e.g., Klapper et al. 2006; Acs et al. 2008; Estrin et al. 2013; Stenholm et al. 2013) and specifically taxes and entrepreneurship (e.g., Da Rin et al. 2011; Henrekson et al. 2010; Djankov et al. 2002, 2010) and corruption and entrepreneurship (e.g., Chowdhury et al. 2015; Mahagaonker 2008). We extend previous research (Carree et al. 2002; van Stel et al. 2007; Campos et .al. 2010; Aidis et al., 2012; Dreher and Gassebner 2013) on the complex relationship of corruption and entry, and clearly demonstrate that corruption can facilitate entry (Méon and Sekkat 2005) by offsetting high taxes.

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TABLE 1: Variables and sources (2005-2011)

Variable name	Variable description	Source
Entry(ln)	The number of newly registered corporations per 1,000 working-age people (those age 15-64) in logarithms.	World Bank Group Entrepreneurship Survey
Economic Development	GDP per capita (constant LCU)	World Development indicator (2005-2011)
Public registration bureau	Individuals and firms listed by a private credit bureau with information on their borrowing history from the past 5 years (% of population).	Doing Business Data
Insolvency cost	The cost of the proceedings is recorded as a percentage of the estate's value.	Doing Business Data
Human Capital	Total is the total enrollment in tertiary education (ISCED 5 and 6), regardless of age, expressed as a percentage of the total population of the five-year age group following on from secondary school leaving (% gross).	UNESCO Institute for Statistics
Corruption (WGI)	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 score ranges from -2.5 to 2.5. We reversed the order by multiplying by -1(2.5=most corrupt, -2.5=least corrupt).	Kaufmann, et al. 2009
Corruption (CPI)	The Corruption Perceptions Index (CPI) ranks countries in terms of the degree to which corruption is perceived to exist in the misuse of public power for private benefit. Index units, 10=most corrupt, 0=least corrupt (after we reversed order)	Transparency International
Corruption (IEF)	The index is primarily derived from CPI. The score ranges from 0 to 100. 100=most corrupt, 0= least corrupt (after we reversed order).	Heritage Foundation
Corporate Tax	The amount of taxes on profits paid by the business as a percentage of commercial profits.	Doing Business Data
Frequency of tax payments	The total number of tax payments per year, the frequency of payment.	Doing Business Data
Time to pay taxes	Time to prepare and pay taxes (hours)	Doing Business Data
Size of State	General government final consumption expenditure (% of GDP)	WB - World Governance Indicators (2005-2011)

Source: World Bank Group Entrepreneurship Snapshot (2005; 2011), World Development Indicators (2005-2011), Doing Business Database (2005-2011), and World Governance Indicators (2005-2011).

Table 2: Descriptive Statistics and Correlation Matrix

	Mean	St dev	1	2	3	4	5	6	7	8	9	10	11
1. Entry(ln)	-0.13	1.7	1										
2. GDP per capita	10.42	2.33	-0.10	1									
3. Public registration bureau	6.20	11.53	0.20*	-0.11	1								
4. Insolvency cost	15.29	9.52	-0.11	0.11*	-0.18*	1							
5. Human capital	32.48	21.88	0.57*	-0.06	0.23*	-0.03	1						
6. Corruption (CPI)	6.52	1.34	-0.52*	-0.01	-0.18*	0.12*	-0.25*	1					
7. Corruption (IEF)	65.78	13.3	-0.53*	0.001	-0.24*	0.17*	-0.28*	0.92*	1				
8. Corruption (WGI)	0.30	0.63	-0.56*	-0.04	-0.18*	0.05	-0.22*	0.92*	0.88*	1			
9. Corporate Tax	47.11	25.95	-0.22*	0.07	-0.05	-0.01	0.16*	0.30*	0.26*	0.31*	1		
10. Frequency of tax payments	39.2	28.16	-0.13*	0.02	-0.15*	0.22*	0.13*	0.33*	0.31*	0.31*	0.31*	1	
11. Time to pay taxes	347.7	254.1	-0.10	-0.01	-0.04	0.23*	0.22*	0.31*	0.29*	0.29*	0.26*	0.51*	1
12. Size of state	72.26	17.11	0.32*	0.00	-0.01	-0.01	0.42*	0.17*	0.22*	0.22*	-0.03	0.13*	-0.11*

Note: Number of obs.: 307. *level of significance is 5%.

Source: World Bank Group Entrepreneurship Snapshot (2005; 2011), World Development Indicators (2005-2011), Doing Business Database (2005-2011), and World Governance Indicators (2005-2011).

Table 3: Regression results for linear models (log-linear): ***DV - Entry (ln)***

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
GDP per capita 2nd quantile	-0.34 (0.37)	-0.19 (0.36)	-0.18 (0.35)	-0.18 (0.36)	-0.22 (0.35)	-0.21 (0.34)	-0.16 (0.35)
GDP per capita 3rd quantile	-0.88* (0.46)	-0.86** (0.40)	-0.79** (0.40)	-0.82** (0.40)	-0.84** (0.40)	-0.82** (0.40)	-0.79** (0.39)
GDP per capita 4th quantile	-0.37 (0.33)	-0.26 (0.32)	-0.18 (0.33)	-0.18 (0.33)	-0.22 (0.29)	-0.22 (0.30)	-0.17 (0.34)
Size of state						-0.01 (0.01)	-0.01 (0.01)
Public credit bureau	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)			0.01 (0.01)
Insolvency cost	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)			-0.01 (0.01)
Human capital	0.03*** (0.01)	0.03*** (0.01)	0.04*** (0.01)	0.03*** (0.01)	0.03*** (0.01)	0.03*** (0.01)	0.03*** (0.01)
Corruption (WGI)	-1.24*** (0.19)	-1.04*** (0.21)	-1.44*** (0.24)	-1.41*** (0.25)	-1. 34*** (0.25)	-1.41*** (0.25)	-1.43*** (0.24)
Financial tax policy (tax rate)		-0.02** (0.00)	-0.02*** (0.01)	-0.02*** (0.01)	-0.02*** (0.01)	-0.02*** (0.01)	-0.02*** (0.01)
Administrative tax policy (frequency of tax payments)		0.001 (0.00)		0.001 (0.00)	0.001 (0.00)	0.001 (0.00)	0.001 (0.00)
Administrative tax policy (time to pay taxes)		-0.003 (0.00)		-0.003 (0.00)	-0.003 (0.00)	-0.003 (0.00)	-0.003 (0.00)
Corruption (WGI) x Financial tax policy (tax rate)			0.01** (0.01)	0.01** (0.01)	0.01** (0.01)	0.01** (0.01)	0.01** (0.01)
Constant	-0.06 (0.56)	0.21 (0.53)	0.29 (0.54)	0.27 (0.55)	-0.14 (0.55)	0.48 (0.82)	0.59 (0.82)
R2	.56	.59	.60	.60	.60	.60	.60
RMSE	1.18	1.15	1.13	1.13	1.13	1.13	1.13
F stat	9.75	8.28	9.63	8.84	9.31	10.91	9.57
Year & country controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Number of obs.: 307. Number of countries: 72. Level of statistical significance is * 0.10%; ** 0.05%. and *** 0.01%. Standard errors are in parenthesis and are robust for heteroskedasticity and clustered by country. Year dummies and country dummy are included and suppressed to save space. Reference year: 2005. Reference country: Estonia.

Source: Authors calculation

Table 4: Robustness: Regression Results linear (models and non-linear (log-log) models with CPI (DV: ***Entry, log)***

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Linear models (log-linear)						
GDP per capita 2nd percentile	-0.29 (0.39)	-0.13 (0.38)	-0.14 (0.37)	-0.14 (0.38)	-0.16 (0.37)	-0.14 (0.36)	-0.11 (0.37)
GDP per capita 3rd percentile	-0.80* (0.44)	-0.80* (0.45)	-0.73** (0.36)	-0.76** (0.36)	-0.79** (0.37)	-0.75** (0.37)	-0.74** (0.38)
GDP per capita 4th percentile	-0.30 (0.34)	-0.18 (0.33)	-0.13 (0.33)	-0.14 (0.34)	-0.16 (0.29)	-0.16 (0.30)	-0.11 (0.35)
Size of state						-0.007 (0.01)	-0.007 (0.01)
Public credit bureau	0.001 (0.01)	0.001 (0.01)	0.001 (0.01)	-0.001 (0.01)			-0.002 (0.01)
Insolvency cost	-0.006 (0.01)	-0.006 (0.01)	-0.01 (0.01)	-0.01 (0.01)			-0.01 (0.01)
Human capital	0.04*** (0.01)	0.04*** (0.01)	0.04*** (0.01)	0.04*** (0.01)	0.04*** (0.01)	0.04*** (0.01)	0.04*** (0.01
Corruption (CPI)	-0.51*** (0.09)	-0.38*** (0.10)	-0.59*** (0.12)	-0.54*** (0.12)	-0.53*** (0.12)	-0.57*** (0.13)	-0.58*** (0.12)
Financial tax policy (tax rate)		-0.01** (0.00)	-0.05** (0.02)	-0.05** (0.02)	-0.05** (0.02)	-0.05** (0.02)	-0.05** (0.02)
Administrative tax policy (frequency of tax payments)		0.001 (0.00)		-0.001 (0.00)	0.001 (0.00)	0.001 (0.00)	0.001 (0.00)
Administrative tax policy (time to pay taxes)		-0.001 (0.00)		-0.001 (0.00)	-0.001 (0.00)	-0.001 (0.00)	-0.001 (0.00)
Corruption (CPI) x Financial tax policy (tax rate)			0.005** (0.00)	0.005** (0.00)	0.005** (0.00)	0.005** (0.00)	0.005** (0.00)
Constant	2.66*** (0.89)	2.38*** (0.82)	3.66*** (0.96)	3.51*** (0.97)	3.38** (1.02)	3.89*** (1.20)	4.01*** (1.17)
R2	.51	.55	.55	.56	.56	.56	.56
RMSE	1.23	1.19	1.18	1.18	1.18	1.18	1.18
F stat	8.76	8.26	9.74	9.13	9.19	10.14	9.36
Year & country controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Specifications 5-7 is robustness check taking out the cost of the proceedings recorded as a percentage of the estate's value (insolvency cost) and public credit bureau. We also add control there for the size of state to check the robustness of the disincentive effect of a tax hypothesized in H2Number of obs: 307. Number of countries: 72. Level of statistical significance is * 0.10%; ** 0.05%. and *** 0.01%. Standard errors are in parenthesis and are robust for heteroskedasticity and clustered by country. Year dummies and country dummies are included and suppressed to save space. Reference year: 2005. Reference country: Estonia. Source: Authors calculation.