Incorporation and Taxation: Theory and Firm-level Evidence

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Abstract

This paper provides a theory and firm-level evidence on the incorporation decision of entrepreneurs in a model of taxes and corporate governance. The theory explains how the incorporation decision of entrepreneurs is driven by taxation (corporate and personal income taxes), corporate transparency, access to external capital and limited liability. We estimate features of this model using a large cross-section of more than 540,000 firms in European manufacturing. We find that higher personal income tax rates favor incorporation while higher corporate tax rates reduce the probability to incorporate. These findings are robust to the inclusion of other economic and institutional determinants of external financing and choice of organizational form.

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1 Introduction

A substantial number of firms are run as a sole proprietorship or non-corporate firm. They tend to be small and are typically characterized by concentrated ownership. A single entrepreneur or only a few partners make the key decisions. Large firms, in contrast, are almost exclusively organized as corporations and are subject to much tighter company laws, accounting standards and book keeping regulations. For these reasons, large firms tend to be more transparent and are more easily evaluated by external investors and other stakeholders. Obviously, the tighter reporting requirements impose extra overhead costs and make this legal form more expensive. The larger administrative costs should be justified by economic benefits of incorporation. Little is known about the precise nature of these advantages. Economists mention limited liability and improved access to the capital market as main advantages of incorporation. It is rather unclear, however, how exactly the corporate form facilitates access to capital market financing and how, if at all, limited liability of the owners could promote the expansion of the firm. Our paper offers a theoretical explanation of the decision to incorporate. Further, we provide firm-level evidence on the main predictions of the theory.

The public economics literature has empirically analyzed the impact of taxes on the choice of organizational form [e.g. Gentry, 1994, Goolsbee, 2004, 1998, Gordon, 1998, Gordon and MacKee-Mason, 1994, MacKee-Mason and Gordon, 1997, de Mooij and Nicodème, 2008]. However, this literature typically assumes an exogenous distribution across firms of the net benefits or losses from incorporation. The focus is typically on the use of the corporate form as a means to save taxes which leads to a larger rate of incorporation in reduced form. By incorporating, entrepreneurs might be able to avoid high personal income taxes under the sole proprietorship and instead become liable to low corporate tax and personal dividend and capital gains taxes. This literature does not provide a deeper structural explanation of the economic determinants of the choice of organizational form. The law and economics literature has recently emphasized the importance of legal rules such as degrees of investor protection, reporting requirements,

bankruptcy rules etc. on economic performance.[1] This literature is mainly empirical and has not focussed on the choice of organizational form.

Our analysis rests on corporate finance theory as recently summarized in Tirole (2006). This literature explains how the conflict of interest between entrepreneurs and managers, protected by limited liability, and external investors bears on a firm's ability to raise external financing. Part of the literature explicitely addresses the role of transparency for corporate governance [see Hermalin and Weisbach, 2007, and Almazan, Suarez and Titman, 2007 for two very recent contributions]. The choice of organizational form and its economic determinants and consequences have not been analyzed, however. This paper sets out to develop a theoretical framework of the main advantages and disadvantages of incorporation. We then explain how firms self-select into organizational forms. The analysis determines the decomposition of the business sector into corporate and non-corporate form, and the relative size and other characteristics of these two types of firms.

The proposed theory formalizes two often cited advantages of incorporation: limited liability and access to external capital. Adopting the corporate form requires to implement tighter bookkeeping, accounting and reporting standards which imposes an extra overhead cost that would not be necessary with a sole proprietorship or partnership. The advantage of these standards is increased transparency to external investors and other stakeholders. Therefore, the managerial discretion and autonomy of the entrepreneur is lower, the more transparent and tighter the reporting requirements are. It becomes cheaper to incentivize the entrepreneur. The firm's pledgeable income that may credibly be promised as a repayment to external investors, increases. The entrepreneur is thus able to raise more external capital for any given amount of own equity. This formalizes the 'access to capital market' argument which is often cited as an advantage of incorporation.

The other commonly stated advantage is limited liability. Typically, entrepreneurs

[1] See Armour and Cumming (2008), Berkowitz and White (2004), Crawford and Freedman (2007), Djankow et al. (2002), Fan and White (2004), and La Porta et al. (1997, 1998, 2000). Spamann (2008) and Martynova and Renneboog (2009) investigated the sensitivity of results in empirical law and finance research. Bushman et al. (2004) provide an accounting perspective on corporate transparency.

not only dispose of financial assets that they inject as own equity in the firm, but are also endowed with 'private' assets such as one's own family house. Probably, the value of private assets is higher for the entrepreneur than for the bank because they provide an extra 'consumer surplus' such as living in one's own house. We argue that banks can seize all assets of sole proprietors including private assets. In contrast, depending on bankruptcy rules, the corporate form protects a larger part of private assets on account of limited liability. We emphasize two opposing consequences of limited liability. The need to pledge all private assets sharpens incentives of sole proprietors and allows them to raise more external financing. However, entrepreneurs attach much higher value to their private assets than banks or the market do. They might thus be very unwilling to pledge the asset and to loose it in case of bankruptcy. The need to pledge private assets emphasizes the downside risk of sole proprietorships. If entrepreneurs have a sufficiently high valuation of the private asset and are thus highly risk-averse, they might want to protect it against the downside risk even if the asset could serve as collateral and raise borrowing capacity. Hence, sufficiently risk-averse entrepreneurs prefer to incorporate to benefit from limited liability and protect their private wealth. However, it might also be the case that incorporated entrepreneurs voluntarily offer their private asset as collateral to facilitate external financing if they are not very averse to the downside risk. Hence, the value of limited liability is ambiguous.

To explore the central predictions of the theoretical model empirically, we compile a cross-sectional data-set of more than $540,000$ firms in manufacturing of 26 European economies. These data on firm characteristics are merged with other country specific data on taxes, entry and exit costs and corporate governance variables such as accounting standards and measures of investor protection. The estimates of a variety of empirical specifications of the incorporation decision are in line with the theoretical hypotheses. Most importantly, a higher effective corporate tax rate (comprising the corporate tax rate plus personal income taxes at the shareholder level) reduces a firm's probability to incorporate while a higher personal income tax rate of the entrepreneur boosts incorporation. With respect to economic determinants, we find that better accounting standards

and better creditor rights which facilitate external financing, lead to larger incorporation rates. In contrast, costs of starting businesses which mostly relate to corporate firms and their compliance with accounting and reporting regulations, significantly reduce the probability to incorporate. We also find that costs of closing businesses, relating to the downside risk of bankruptcy, have a significantly positive impact on incorporation rates. We conclude that limited liability is valuable in protecting private wealth which might be more important than the benefits of using private assets as a collateral to secure credit. Finally, we find that tax and economic determinants importantly interact. Firms that are comparable in all other respects, become significantly and substantially larger when adopting the corporate form. In line with our theory, the (endogenous) incorporation decision boosts firm size in terms of fixed assets, but this impact is compressed (reduced) by a higher effective corporate tax burden.

The remainder of the paper is organized as follows. The subsequent section presents a stylized theoretical model of the decision to incorporate in the presence of taxes. Section 3 derives comparative static results for the key variables of interest. Section 4 introduces the data-set, describes features of the data, presents the empirical model, and summarizes the key empirical results. The last section concludes.

2 A Model of Incorporation

2.1 Tax Environment

The taxation of firms differs by organizational form. An entrepreneur organizing as a non-corporate firm or sole proprietorship is subject to personal income tax. Denote the statutory rates by t_w, as applied to labor earnings. Sole proprietors are usually taxed at the same rate. It will be useful to use a separate symbol, $t_n = t_w$, where n refers to non-corporate firms. If incorporated, an entrepreneur pays corporate tax at rate τ but is also liable to personal income taxes on distributed profits. In constrast to directly progressive

wage taxes, many countries tax dividends, interest and capital gains at separate, proportional and often different rates. Capital gains are usually tax preferred, either by reduced rates or simply by the tax advantage of the realization principle. We summarize personal level taxation of capital income by an effective tax rate t_e. Most countries use methods to avoid double taxation. This can be achieved by adopting a certain rate structure. Denote by t_c the total, effective tax rate on corporate income paid by the shareholder. A few countries still adhere to the classical system of full double taxation at the company and personal level, leading to an *effective corporate tax rate* of

$$t_c = \tau + (1 - \tau)t_e. \tag{1}$$

Double taxation is avoided if $t_c = t_w$. However, wage taxes are typically progressive so that tax rates rise with income. In contrast, capital income taxes at the firm and personal levels, τ and t_e, are often proportional. In this case, double taxation is much more difficult to avoid. Full integration with single taxation in all income brackets would require that the corporate tax is considered a prepaid personal tax and is fully credited (and possibly refunded) against the personal income tax. The personal tax liability would be $t_e = t_w - \tau$, leading to an effective rate equal to the rate on labor income, $t_c = t_e + \tau = t_w$. When personal capital income is tax at proportional rates, double taxation may be avoided on average only by appropriately setting tax rates in (1) but $t_c \gtrless t_w$ if t_w is directly progressive. Some countries apply a "half-rate method" or, more generally, include only a fraction α of distributions as taxable personal income. This means that the effective rate on dividends etc. is $t_e = \alpha t_w$, leading to an effective rate $t_c = \tau + (1 - \tau)\,\alpha t_w$. The subsequent analysis is based on the effective rate t_c which may exceed or fall short of the personal income tax with progressive rates t_w.

An additional problem in taxing corporate income arises when effective tax rates on labor and capital income differ. Suppose capital income is taxed at a lower effective rate than labor income, $t_c < t_w$. Entrepreneurs can then save tax by incorporating and collecting income in terms of lightly taxed dividends, instead of paying a heavily

taxed manager's salary for their managerial labor input.[2] Income shifting by relabelling entrepreneurial labor income as lightly taxed capital income can potentially lead to high losses from income tax on wage earnings and artificially inflate revenues from corporate tax and is often a substantial problem in countries with a dual income tax, see De Mooij and Nicodème (2008), Sorensen (2005) and Fjaerli and Lund (2001) in a European context. Sivadasan and Slemrod (2008) empirically documented significant tax induced shifting of income from profits to managerial wages in India. The found that income shifting in response to the tax law change of 1992 explains almost all of the observed increase in measured wage inequality. Gordon and Slemrod (2000) have discussed this problem in a more general context, pointing to other channels of income shifting between corporate and personal tax bases, and found it to be empirically important for various periods in the U.S. Cullen and Gordon (2007) point to a particular way of tax avoidance by means of organizational choice. Entrepreneurs stay non-corporate when the company makes losses and the income tax burden is low, either due to low tax rates in low income brackets, or by off-setting business losses against other income. When the firm starts to earn profits, income tax liability rises progressively. Entrepreneurs then face a strong tax incentive to incorporate in order to benefit from a relatively lower effective tax rate on corporate income. Given our focus on other determinants of incorporation, we choose to keep the model simple and do not explicitely address income shifting. In any case, the additional tax advantage of incorporation due to income shifting should be captured by the coefficients of the tax rates in our econometric estimates of the probability to incorporate.

[2] To capture income shifting, an earlier version of this paper assumed a true profit contribution of the entrepreneurial labor input equal to w, adding to other profit $\tilde{\pi}$ from investment. Given a total gross of tax profit $w+\tilde{\pi}$, and claiming a management salary w_t, the total tax liability is $t_w w_t + t_c (w + \tilde{\pi} - w_t) = t_w w + t_c \tilde{\pi} - (t_w - t_c)(w - w_t)$. The 'correct' tax liability is $t_w w + t_c \tilde{\pi}$ when the 'true' entrepreneurial labor earnings are received as a management salary. Entrepreneurs can save tax $(t_w - t_c)(w - w_t)$ by setting an artificially low salary w_t, possibly equal to zero.

2.2 Entrepreneurial Finance

Entrepreneurship requires managerial effort and is subject to bankruptcy risk. There is a mass one of entrepreneurs who are endowed with financial assets A and private wealth H. The consumption value $(1+\beta)H$ of the private asset (one's own family house) exceeds market valuation H by external investors. If the private asset must be liquidated, entrepreneurs suffer a deadweigth utility loss equal to βH.[3] End of period utility $u = y+\beta H+b$ consists of expected wealth y (income plus wealth endowment $A+H$, where the deposit rate is normalized to zero), consumer surplus βH from the private house (if not liquidated), and the value of leisure b when shirking ('private benefits'). Supplying high managerial effort requires to give up private benefits which reduces utility to $u = y+\beta H$.

After starting a firm, entrepreneurs must choose the organizational form. We abstract from entry and assume that all entrepreneurs start a firm endowed with a single project which is developed in two stages. The life-cycle of a firm consists of a start-up and an expansion stage. Early stage investment k is fixed and self-financed out of own assets A, expansion investment I is of variable size and is leveraged with external funds. Firms are heterogeneous in their success probability q of the fixed cost k and, thus, move with a variable probability from start-up to expansion stage. This success probability is known to firms at the beginning of period, and characterizes a firm's type. The success probability of expansion stage investment is either high or low, depending on managerial effort, but is otherwise symmetric across firms.

The timing of events is the following: (i) Given its type q, a firm chooses organizational form $j \in \{n, c\}$, and a specific early stage investment k_j is sunk;[4] (ii) The firm either fails (with probability $1-q$) or continues with expansion investment; (iii) After self-financing k_j, the owner is left with equity $E_j \equiv A-k_j < I_j$. To go ahead, banks must lend $D_j = I_j - E_j$; (iv) Expansion investment is sunk and the entrepreneur chooses effort. High effort (no

[3] We interpret the loss of consumer surplus in case of bankruptcy as down-side risk-aversion.

[4] Whether probability q is private information or not, does not matter. Since early stage investment is fully self-financed by assumption, there is no adverse selection problem in financing start-ups.

private benefits) yields a high success probability p, low effort (consumption of private benefits, or leisure) leads to $p_L < p$; (v) Given a rate of return ρ, investment yields end of period value $(1+\rho) I_j$ if successful, and nothing if failed. If successful, the owner pays back credit and consumes. As usual, the model is solved by backward induction.

Entrepreneurs find it optimal to put up all their financial assets A as own equity to achieve maximum leverage. The corporate form offers limited liability so that entrepreneurs can protect their private assets. As a matter of choice, they can pledge their private asset as a collateral h_c for repayment equal to the market value in the bad state, $h_c \in \{0, H\}$. In contrast, sole proprietors are, by law, fully liable with all private wealth, $h_n = H$. Depending on choice and organizational form, banks can always get a repayment of at least h_j and can thus issue a riskless amount of debt equal to h_j. Since the refinancing cost equal to the deposit rate is normalized to zero, a competitive bank can break even by charging no interest on safe debt. The zero profit condition for safe debt is $ph_j + (1-p) h_j = h_j$. After getting safe debt, the firm still needs risky debt equal to $D_j = I_j - E_j - h_j$ which can be repaid only in case of success while a failed firm is unable to repay anything. Lending an amount D_j, the bank must thus charge a positive interest on risky debt to break even, $p(1+i) D_j \geqslant D_j$.

Taking account of the distinction between safe and risky debt, the company's surplus is divided between the owner and the bank according to[5]

$$\begin{aligned} \pi_j^e &= p\left[(1+\rho) I_j - T_j - (1+i) D_j\right] - \left[1 + (1-p)\beta\right] h_j - E_j, \\ \pi_j^b &= p(1+i) D_j - (I_j - E_j - h_j), \\ \pi_j &= \left[p(1+\rho) - 1\right] I_j - pT_j - (1-p)\beta h_j, \end{aligned} \tag{2}$$

[5]Equivalently, $\pi_j^e = p\left[(1+\rho) I_j - T_j - (1+i) D_j - h_j\right] - (1-p)(1+\beta) h_j - E_j$. The owner repays safe debt h_j in the good state. Since a failed firm has no profits, the owner looses the full consumption value of her house in the bad state. Bank profits are $\pi_j^b = p\left[(1+i) D_j + h_j\right] + (1-p) h_j - (I_j - E_j)$ where the last term is total debt. Repayment in the good state is $(1+i) D_j$ on risky and h_j on safe debt. In the bad state, only h_j is repaid upon liquidation of the collateral which leads to a deadweight loss of βh_j. Note that π_j^e is the surplus over initial wealth. See Appendix A for the end of period utility.

where $E_j \equiv A - k_j$ is own equity. Tax $T_j = t_j(\rho I_j - iD_j)$ is due only if the company succeeds, and depends on organizational form. If the venture succeeds, all debt is repaid. Repayment of risky debt $D_j = I_j - E_j - h_j$ includes interest i, the loan rate on safe debt is zero. If the company fails, the bank gets repayment only on safe debt h_j by seizing the owner's private house with liquidation value h_j. A competitive bank charges no interest on safe debt since the deposit rate and, hence, the bank's refinancing cost are normalized to zero. Liquidation of the private asset results in a deadweight loss βh_j when the firm fails. Adding tax to the last line yields a social surplus of $\pi_j^* = [p(1+\rho) - 1] I_j - (1-p)\beta h_j$.

Perfectly competitive banks can do no better than break even. A binding participation constraint, $\pi_j^b = 0$, leads to two consequences. First, given zero profits in banking, the owner appropriates the entire joint surplus, $\pi_j^e = \pi_j$, as long as she obtains external financing. Second, the zero profit condition requires a positive lending rate on risky debt,

$$p(1+i) = 1, \quad \rho > i > 0. \tag{3}$$

Assumption (A1) below means that entrepreneurs earn, per unit of investment, a non-negative surplus $p(1+\rho) > 1$, which implies $\rho > i$ in (2).

2.3 Credit Analysis

External financing are often subject to moral hazard and entrepreneurial opportunism. Since effort is costly, entrepreneurs might shirk and consume private benefits if they gain little extra income by supplying full effort. The bank, on the other hand, can break even only if high effort is guaranteed and repayment is likely. For bank lending to be incentive compatible, entrepreneurs must keep a high enough stake for high effort to be worthwhile when effort is costly in terms of foregone private benefits $b_j = \gamma_j I_j$. Private benefits are assumed to rise linearly with the investment level. In raising the firm's success probability from p_L to p, more effort not only results in a higher expected end of period wealth but also reduces the risk of loosing the consumer surplus βh_j of the private asset. The incentive constraint relating to (2) requires that the utility gain from a higher success probability

must exceed the extra effort cost,

$$(1+\rho)\, I_j - T_j - (1+i)\, D_j + \beta h_j \geqslant \gamma_j I_j / (p - p_L) \equiv \Gamma_j I_j. \tag{4}$$

Since effort changes only the success probability, state independent terms do not enter the incentive constraint.

The entrepreneur must keep a minimum amount Γ_j per unit of investment to guarantee her effort. However, the income share going to the owner limits the company's debt servicing capacity and, therefore, the size of a possible bank loan. Pledgeable income that the firm can credibly promise for repayment of debt, is equal to the total project value net of tax, $(1+\rho)\, I_j - T_j$, minus the minimum incentive compatible income $\Gamma_j I_j$, but is augmented by βh_j. The threat of loosing the consumer surplus from one's own house sharpens incentives, reduces the cost of incentivizing the entrepreneur, and thereby augments pledgeable income. Substituting tax liability $T_j = t_j (\rho I_j - i D_j)$ and rearranging shows the maximum incentive compatible debt level

$$D_j \leqslant \frac{\left[1 + (1-t_j)\,\rho_j - \Gamma_j\right] I_j + \beta h_j}{1 + (1-t_j)\, i} \equiv D_j^+. \tag{5}$$

The firm's capacity to repay risky debt is exhausted by D_j^+. Since the entrepreneur's surplus in (2) increases linearly with investment I_j, she wants to borrow and invest as much as possible until her borrowing capacity is exhausted. Substituting D_j^+ into the bank's break even condition and noting $(1+i)\, p = 1$ yields

$$I_j = m_j \cdot \left(E_j + \tilde{\varphi}_j \cdot h_j\right), \quad m_j \equiv \frac{1 + (1-t_j)\, i}{\Gamma_j - (1-t_j)\,(\rho - i)}, \quad \tilde{\varphi}_j \equiv 1 + \frac{\beta}{1 + (1-t_j)\, i}. \tag{6}$$

The firm invests more by leveraging equity E_j with outside funds $I_j - E_j$. Ignoring h_j, the inverse of the leverage factor m_j would be the equity ratio E_j / I_j. Private assets may serve as collateral, augmenting the borrowing capacity and allowing for higher investment.

We impose the following assumption:

$$p\,(1+\rho) > p\Gamma_j > p\,(1+\rho) - 1 > 0. \tag{A1}$$

The last inequality implies that, in the absence of tax, the owner's surplus *per unit of investment* is positive, see (2). The entrepreneur thus wants to invest as much as possible which makes her borrow until she exhausts the firm's borrowing capacity. In the absence of tax, using $p(1+i)=1$, the leverage factor reduces to $m_j = 1/[p\Gamma_j - p(1+\rho)+1]$ and is positive by the second inequality. The first inequality also implies $p(1+\rho-\Gamma_j)>0$ which implies that the multiplier $m_j = 1/[1-p(1+\rho-\Gamma_j)]$ is not only positive, but also larger than one. Otherwise, the firm wouldn't need outside financing. The multiplier m_j thus indicates by how much own equity is leveraged with outside financing. We assume taxes to be small enough so that all properties also hold in the presence of tax.

The multiplier declines with higher private benefits, i.e. with $\Gamma_j = \gamma_j/(p-p_L)$. More severe agency problems reduce credit and investment. A higher tax rate also reduces the multiplier, essentially because it reduces pledgeable income:

$$\frac{dm_j}{d\Gamma_j} = -\frac{m_j^2}{1+(1-t_j)\,i} < 0, \quad \frac{dm_j}{dt_j} \equiv -m_j \cdot \frac{i+(\rho-i)\,m_j}{1+(1-t_j)\,i} < 0. \tag{7}$$

In the last derivative, we have $\rho > i$ on account of (3). Both a higher effective tax rate and more severe agency problems reduce debt leverage and investment. The investment reducing effect results because the tax reduces cash-flow and, thereby, the firm's borrowing capacity. This is entirely different from standard neoclassical models where investment is not finance constrained and, thus, not sensitive to cash-flow.

Proposition 1 ***(Access to Capital)*** *Tight reporting standards and book keeping rules under corporate legal form make firms more transparent to external investors, reduce managerial independence and agency costs (lower γ_j). The firm's pledgeable income rises which allows to raise more external capital for a given amount of own equity.*

2.4 The Value of Limited Liability

With perfect competition among banks, the entrepreneur extracts the entire joint surplus in (2). Since it linearly increases in I_j, investment is expanded as much as possible. Banks

lend an amount of risky debt equal to $D_j = I_j - E_j - h_j$ (only this gives rise to interest deductions since safe debt is available at zero interest). Upon substitution, tax liability equals $T_j = t_j(\rho - i) I_j + t_j i (E_j + h_j)$. Using this in (2) yields [again use $p(1+i) = 1$ when necessary]

$$\pi_j = (1 - t_j)(\rho - i) p \cdot I_j - [t_j ip + (1-p)\beta] \cdot h_j - t_j pi \cdot E_j.$$

Finally, substituting the constrained investment level $I_j = m_j \cdot \left[E_j + \tilde{\varphi}_j \cdot h_j\right]$ from (6) gives a closed form solution for the entrepreneur's surplus,

$$\begin{aligned} \pi_j &= [(1 - t_j)(\rho - i) m_j - t_j i] p \cdot E_j - \varphi_j \cdot h_j, \\ \varphi_j &\equiv (1-p)\beta + t_j ip - (1 - t_j)(\rho - i) p m_j \cdot \tilde{\varphi}_j, \end{aligned} \tag{8}$$

where $p(\rho - i) = p(1+\rho) - 1 > 0$ is the gross of tax surplus per unit of investment. Own equity E_j unambiguously raises the owner's surplus when taxes are small.

The coefficient φ_j is key to our analysis. A value $\varphi_j > 0$ means that pledging the private asset diminishes the surplus π_j. Entrepreneurs would not want to pledge their own house, and they do not need to do so if protected by limited liability. A positive net value can therefore be interpreted as people's value of having their own house or private asset protected by limited liability. By law, only the corporate form provides this protection. However, the sign of φ_j is in general ambiguous, reflecting opposing influences. The first term parameterizes the deadweight loss from liquidating private assets, i.e. the owner's private value attached to her house exceeds market valuation by a factor of β. An entrepreneur looses highly valued private assets when the business fails despite of high effort. The utility loss from loosing one's house can also be interpreted as risk-aversion. The value of limited liability is in avoiding part of the downside risk of the business. The second term reduces the surplus for tax reasons. When pledging her own house, an entrepreneur can obtain a safe credit from a bank at a zero loan rate, instead of risky debt with a loan rate i. Replacing risky debt thus reduces interest deductions in case of success and inflates the tax bill by $tiph_j$ on average. The third term reflects the collateral value of one's house. By pledging private wealth, the entrepreneur can increase

her borrowing capacity. She can invest an additional amount $m_j\tilde{\varphi}_j h_j$ because the risk of loosing one's house reduces the financial incentives necessary to prevent shirking, thereby augmenting the company's pledgeable income and allowing banks to lend more. Each unit of investment contributes an extra surplus net of tax equal to $(1-t_j)(\rho-i)p$.

By law, limited liability is granted only when adopting the corporated form which is subject to tighter accounting standards. Limited liability is denied to non-corporate firms with less transparent book keeping and reporting rules. We can now state the following condition, in the absence of tax, for a positive value of limited liability,[6]

$$(1-p)\beta/(1+\beta p) > p(\rho-i)m(\Gamma_j) \quad \Rightarrow \quad \varphi_j > 0. \tag{A2}$$

The condition is satisfied if (i) risk-aversion as measured by the above market valuation β of the private asset, and (ii) agency costs as measured by Γ_j, become larger. The left hand side increases with β and approaches a maximum value of $(1-p)/p$ for $\beta \to \infty$. For any given value of β, the multiplier on the right hand side declines when the moral hazard problem becomes more severe ($m_j' < 0$). The condition is also assured if the cash-flow shrinks such that $\rho \to i$ which reduces the right hand side to zero.

Condition (A2) thus holds when entrepreneurial misbehavior is sufficiently damaging to business survival (large Γ_j and, thus, small m_j). In the absence of limited liability, the entrepreneur bears a larger downside risk which sharpens her incentives, raises pledgeable income, relaxes the borrowing constraint and raises investment and expected income. Assumption (A2) implies that the risk of loosing private assets in case of business failure imposes a utility loss from foregone consumption value which exceeds the utility gain from increased borrowing and investment. In other words, the safety net provided by limited liability is worth more than the extra expected income from sharper incentives. Hence, an entrepreneur opting for incorporation does *not* want to pledge private assets as a collateral to banks and sets $h_c = 0$ in order to maximize the surplus in (8). An unincorporated entrepreneur, by law, is liable with her entire private wealth ($h_n = H$

[6] With tax, the condition is $\frac{(1-p)\beta+t_j ip}{1+\beta/[1+(1-t_j)i]} > (1-t_j)(\rho-i)pm_j$.

always) and therefore suffers a utility loss. If condition (A2) is satisfied, limited liability clearly favors incorporation. If the condition fails to hold, incorporated entrepreneurs optimally set $h_c = H$. They voluntarily use private assets as a collateral and prefer not to take advantage of limited liability under corporate form. In this case, limited liability is not relevant for the decision to incoporporate.[7]

Proposition 2 ***(Limited Liability)*** *Limited liability is positively valued since it protects against the loss of highly valued private assets, and negatively since the denial of private assets as a collateral restricts access to external capital. Limited liability has a positive net value and favors incorporation if (i) the above market valuation β of private assets is large, and (ii) agency costs γ_j are large.*

3 Law, Taxation and Incorporation

3.1 Costs and Benefits of Incorporation

The cost of incorporation is that adopting the corporate form requires a larger start-up investment which is self-financed out of the entrepreneur's own wealth, $k_c > k_n = 0$. For simplicity, we normalize early stage investment of non-corporate firms to zero so that $k_c = k$ is the differential cost of incorporation. These additional organiziational start-up expenses reflect the extra costs created by the need to comply with the tighter book-keeping and reporting standards which result in a higher degree of firm transparency and investor protection. This additional expense also leads to an indirect cost. Since it is self-financed, it reduces own equity and investment leverage.

The main benefit of incorporation is improved access to capital markets, i.e. external financing. Non-corporate firms are rather intransparent to external investors, giving large

[7] Condition (A2) thus formalizes the statement in Berkowitz and White (2004, p. 71): "In making loans to small corporations, lenders therefore may require that owners personally guarantee the loans. This abolishes the legal distinction between corporations and their owners for purposes of the particular loan and puts the owner's personal assets at risk to repay the loan."

autonomy and therefore large private benefits to the entrepreneur. Corporate firms, in contrast, must comply with tight accounting rules and are, thus, much more transparent to external investors, allowing to raise more external financing. Higher transparency reduces the possible private benefits from shirking when choosing the corporate form, $\gamma_c < \gamma_n$ and, thus, $\Gamma_c < \Gamma_n$. With lower agency costs, it becomes cheaper to incentivize entrepreneurs so that pledgeable income and borrowing capacity is increased. Firms can raise more funds (multiplier $m_c > m_n$ larger) and thereby achieve a larger leverage of own equity. This is one aspect of 'better access to external capital' which is commonly viewed as a major advantage of corporate compared to non-corporate form. For the same reason, corporations are larger!

The law and finance literature emphasizes that better legal institutions and tighter investor protection tend to reduce agency costs and facilitate investment, see the papers by La Porta et al. (1997 etc.), or Armour and Cumming (2006, 2008). Other things equal, better law towards more corporate transparency restricts managerial autonomy and thereby reduces the possible benefits from reaping private benefits in conflict with interests of outside investors. Within a country, the increased transparency under corporate legal form allows entrepreneurs to secure more credit and raises the leverage of own equity: the difference in private benefits $\gamma_c < \gamma_n$ induces a difference in multipliers as a measure of leverage, $m_c > m_n$.

Another potential benefit of incorporation is limited liability to protect some private wealth in case of business failure. With limited liability, the owner does not need to pledge private wealth and is protected against downside risk. Assumption (A2) implies $\varphi_c > 0$ for corporate firms with low agency costs γ_c. In choosing the corporate form, an entrepreneur does not need to and does not want to pledge private wealth. Hence, h_c is optimally set to zero in (8) which raises the owner's surplus. A positive collateral would only reduce expected surplus, despite of the fact, that it also helps to raise more funds. In contrast, limited liability and downside protection is not available for sole proprietorships. In this case, the owner has no choice, $h_n = H$. By law, she is liable with her full private

wealth which reduces her surplus by $\varphi_n H$ where $\varphi_n > \varphi_c > 0$.[8] The advantage of limited liability clearly favors incorporation. However, if the consumer surplus from private assets is small, and agents are little averse to the downside risk of bankruptcy, then $\varphi_j < 0$. In consequence, entrepreneurs prefer not to make use of limited liability and voluntarily offer all private wealth as a collateral in order to raise more external financing, independent of organizational form. In fact, since $\varphi_c < \varphi_n < 0$, offering collateral is more valuable to corporate firms which are more transparent and can raise more external capital than sole proprietorships. In this case, limited liability does not favor incorporation.

3.2 Incorporation Decision

Entrepreneurs are assumed to be heterogeneous with respect to the quality of their firm, as measured by the project specific early stage success probability q', which is distributed in [0,1] with a cumulative distribution $G(q) = \int_0^q g(q')\,dq'$. A firm with a project of type q' survives the start-up period with probability q', and earns a zero return if it fails with probability $1-q'$. Establishing a corporation yields a net present value $\pi_c q' - k$ which varies across firms with different q'. The net present value of remaining a sole proprietor leaves $\pi_n q'$ instead. Maximizing end of period utility requires to choose the organizational form which yields the higher net present value.[9] Given the extra fixed cost of incorporation, the corporate form must yield a higher surplus to be attractive at all, $\pi_c > \pi_n$. An interesting interior solution requires some conditions on the relative magnitudes of these terms which are discussed below. Under these assumptions, the cut-off value determining business segmentation is given by the indifference condition $q \cdot \pi_c - k = q \cdot \pi_n$. The pivotal success probability is (see Figure 1 for illustration)

$$q = k/(\pi_c - \pi_n)\,. \tag{9}$$

It would be easy, although uninteresting, to find parameters such that one or the other organizational form does not exist in equilibrium. Our analysis focuses on parameters that

[8] Given $\Gamma_c < \Gamma_n$, (6) implies $m_c > m_n$. As $\tilde{\varphi}_j$ is independent of Γ_j, (8) yields $\varphi_n > \varphi_c$.

[9] Comparing utilities is equivalent to comparing net present values, see (A.1) in the Appendix.

support an interior equilibrium. For example, $1 > q > 0$ requires $\pi_c - \pi_n > k$. Inspecting (2) reveals that, in the absence of tax, corporate surplus is larger if $I_c > I_n$. The inequality $\pi_c > \pi_n$ holds not only due to larger corporate investment but also because incorporation offers the valuable option of protecting one's private wealth. If entrepreneurs are very averse to bankruptcy, they want to keep their private asset safe and take advantage of limited liability under corporate form. The value of a sole proprietorship, in contrast, is reduced by the potential loss of private wealth in case of business failure (i.e. $h_c = 0$ and $h_n = H$). The following assumption (in the absence of tax, $T = 0$) indeed guarantees that corporations invest more than non-corporate firms, even if they do not offer collateral. Without taxes, and using $p(1+i) = 1$, we have $\tilde{\varphi} \equiv 1 + p\beta$ and, therefore, $I_c = m_c [A - k]$ and $I_n = m_n [A + (1 + p\beta) H]$. Hence, $I_c > I_n$ is guaranteed if

$$\frac{m_c}{m_n} > \frac{A + (1 + p\beta) H}{A - k} > 1. \tag{A3}$$

The middle term necessarily exceeds unity. The inequalities are satisfied if the transparency of corporations leads to a much larger multiplier than for sole proprietorships. Making Γ_c small relative to Γ_n raises m_c/m_n while the middle term is close to unity if k and H are small relative to A.

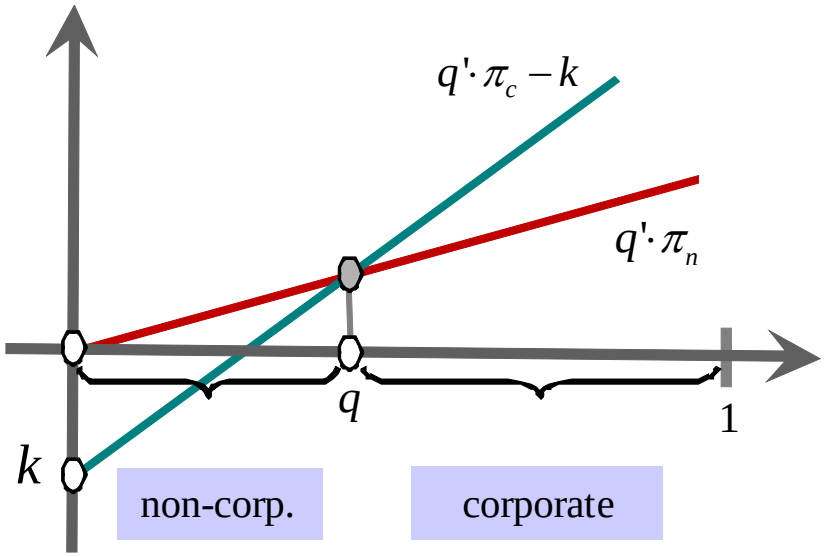

Figure 1: Incorporation

For further analysis, we write expected surplus in (8) separately for the two alternative legal forms, after substituting in the optimal investment level,[10]

$$\begin{aligned} \pi_c &= [(1-t_c)(\rho-i)m_c - t_c i]\, p\cdot(A-k), \\ \pi_n &= [(1-t_n)(\rho-i)m_n - t_n i]\, p\cdot A - \varphi_n \cdot H. \end{aligned} \tag{10}$$

3.3 Tax Effects

We consider first a higher corporate tax which, for given taxes at the personal level, inflates the effective tax t_c on corporate profits, and so do higher dividend taxes at the personal level. When $\varphi_j > 0$, entrepreneurs want to benefit from limited liability. When incorporating, they choose to protect private assets and deny collateral by optimally setting $h_c = 0$. There is thus no tax effect on the value of collateral. A corporation's NPV will importantly hinge on the level of expansion investment $I_c = m_c(A-k)$. By reducing available cash-flow for repayment of external debt, the tax erodes the firm's borrowing capacity and reduces the leverage ratio m_c in (7) and thereby constrains investment. With a binding finance constraint, a reduction in investment has a strictly negative first order effect on firm value. In total, the corporate surplus in (10) declines by

$$\frac{d\pi_c}{dt_c} = -\left[(\rho-i)m + i - (1-t_c)(\rho-i)\frac{dm_c}{dt_c}\right] p(A-k) < 0. \tag{11}$$

The first two terms in the square bracket express the direct reduction in firm value due to higher tax payments. The third is the negative behavioral effect via investment. The reduction in corporate value obviously discriminates against incorporation. This could be illustrated in Figure 1 by the downward rotation of the $q'\pi_c - k$ line.

Proposition 3 ***(Effective Corporate Tax Rate)*** *A higher effective tax rate on corporate profits reduces borrowing, investment and firm value of corporations and reduces the*

[10] We focus on $\varphi_j > 0$ below, i.e. limited liability is valuable. In the absence of tax, $\pi_c = (\rho-i)pI_c > \pi_n = (\rho-i)pI_n - \varphi_n H$. In the case $\varphi_c < \varphi_n < 0$, both types of firms voluntarily offer collateral, leading to $\pi_c = (\rho-i)pI_c - \varphi_c H > 0$. Corporations leverage investment even more relative to non-corporates and also derive a larger gain from offering collateral so that $\pi_c > \pi_n$ holds a fortiori.

probability to incorporate.

In many countries, income of sole proprietors is subject to the standard progressive income tax. Due to double tax relief or a separate lower tax on interest, dividends and capital gains, personal capital income is often taxed at a much lower rate. A higher personal income tax will thus have only a limited impact on the effective corporate income tax. We thus consider an increase in the personal income tax, holding the effective tax t_c on corporate income constant. This scenario thus affects investment and profits in a way parallel to the paragraph above. The only difference stems from the fact the owner of a non-corporate firm cannot protect her private wealth. By (6), the collateral value of the private asset rises with the tax rate, $d\tilde{\varphi}_n/dt_n = \beta i/\left[1+(1-t_n)\,i\right]^2 > 0$, which boosts investment and partly offsets the other detrimental tax effects. The reason is seen from the incentive constraint (4-5). An entrepreneur who must pledge privately valued assets, has more at stake if the business fails. The collateral value of H sharpens incentives and allows for a larger incentive compatible debt level. Due to the tax savings from the additional interest deductions, the private asset expands debt capacity by $\beta H/\left[1+(1-t_n)\,i\right]$ in (5). The value of the tax deduction increases with the tax rate. The collateral value of the private asset for this reason expands debt capacity and investment to a larger extent when the tax rate is higher, leading to $d\tilde{\varphi}_n/dt_n > 0$. The tax saving arising from the collateral value of the private asset thus reduces somewhat the other detrimental effects of the tax rate on investment.

The personal income tax also reduces the NPV of non-corporate firms. The only difference to (11) again derives from the tax implications of the collateral value of H. Taking the deriviative of (8) yields

$$\frac{d\varphi_n}{dt_n} = ip + (\rho - i)\,pm_n\tilde{\varphi}_n - (1-t_n)\,(\rho-i)\,p\left[\tilde{\varphi}_n\frac{dm_n}{dt_n} + m_n\frac{d\tilde{\varphi}_n}{dt_n}\right] > 0. \qquad (12)$$

The square bracket is negative, making the overall effect positive.[11] A higher personal tax rate reduces the net present value of non-corporate firms qualitatively in the same way

[11] After some steps, one can show $\tilde{\varphi}_n\frac{dm_n}{dt_n} + m_n\frac{d\tilde{\varphi}_n}{dt_n} = -\frac{[1+(1-t_n)i]i+[\beta+1+(1-t_n)i](\rho-i)m_n}{[1+(1-t_n)i]^2}m_n < 0.$

as in (11) referring to corporations. However, the inability of entrepreneurs to protect their private assets reduces the value of non-corporate firms by the term φ_n in (10), and the negative valuation effect is even stronger when the tax rate increases ($d\varphi_n/dt_n > 0$ reduces π_n even more than in 11). For this additional reason, the personal income tax should create a strong reason to incorporate. In Figure 1, the $q\pi_n$-line tilts down, reduces the pivotal q and increases the probability to incorporate.

Proposition 4 ***(Personal Income Tax)*** *The personal income tax reduces borrowing, investment and net present value of non-corporate firms and thereby increases the probability to incorporate.*

3.4 Institutional Determinants

Our framework points to a number of institutional determinants that should affect the incorporation decision and which enter our econometric analysis as independent control variables. The theory is importantly driven by the trade-off between increased transparency for outside investors and the better access to external financing under the corporate form, and the extra costs of complying with tighter accounting and reporting standards. The 'access to external capital' argument should also be particularly important for firms with a high return to investment and, therefore, a high growth potential. On the other hand, the 'limited liability' argument for incorporation seems less important since limited liability seems to be a bane and a boon at the same time. Short of providing rigorous proofs, we now state the following conjectures:

(i) We conjecture that the quality of a country's commercial law (accounting and reporting rules, degrees of investor protection, corporate governance and transparency standards etc.) reduce the discretion for managerial misbehavior in the corporate organization (γ_c falls relative to γ_n). Control variables capturing aspects of accounting standards and corporate governance should thus raise corporations' borrowing capacity and thereby increase size and value of corporate firms relative to sole proprietorships. The same should

be true for creditor rights which facilitate the oversight by external investors (relationship banking), allowing to commit more funds when they can gain control over firms in financial distress and force repayment more easily. The probability of incorporation should thus increase in measures of accounting standards and creditor rights.

(ii) Firms face various set-up costs. Since corporate firms must comply to tighter commercial and legal regulations and reporting standards, the costs of creating a corporate firm are larger. In fact, we conclude that many standard empirical measures of entry costs such as days necessary to start a business, registering costs, costs of starting a business etc. mainly apply to corporations rather than non-corporate firms (increasing k). In Figure 1, the corporate value line shifts down and raises the pivotal q. We thus conjecture that these variables should reduce the probability of incorporation.

(iii) Our formal analysis revealed that limited liability does not unambiguously favor corporate firms. On the one hand, protecting one's private wealth is valuable for an entrepreneur and thus favors the corporate form. On the other hand, the threat of loosing one's private wealth also sharpens incentives and raises the borrowing capacity. This reduces the value of limited liability and would speak against incorporation. We thus conclude that measures such as costs of closing business or tightness of bankruptcy rules should have no clearcut effect on the incorporation decision.

(iv) Finally, we find a statistically significant and consistently negative impact of antidirector rights. This variable measures the control of and influence on directors or managers of the firm by outside shareholders. In the extreme case, outside investors such as venture capitalists could easily replace the founding entrepreneur as it frequently happens in venture capital financing (see Hellmann and Puri, 2002, for evidence from Silicon Valley). Black and Gilson (1998) argue that entrepreneurs are rather averse to giving up independence and autonomy and are willing to accept venture capital only because of its time-limited nature. Although outside our theoretical model, we believe that tight antidirector rights might render the corporate form unattractive as they interfere with the entrepreneurs' desire for independence and personal autonomy.

4 Empirical Analysis

In the empirical part, we use a large data-set of 544, 291 firms which are located in Europe and whose major business activity is in manufacturing. The data-set is made available by Bureau van Dijk through the large edition of Amadeus (Update 146, published in November 2006). While the original source comprises a panel data-set, the strength of Amadeus lies in the cross-section rather than the time series.[12] To avoid the influence of particular years and the loss of cross-sectional information due to missing time-series data, we compute averages of the data between 1999 and 2004 throughout.

We link the data-set with four other sources of data available at the country level: information on the effective shareholder corporate tax burden (including local taxes on profits and dividends) is taken from KPMG's Corporate Tax Rate Survey 1993-2006,[13] personal income tax rates and wages in manufacturing are collected by Egger and Radulescu (2008).[14] Institutional determinants of the incorporation decision are collected by La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1999) and available from the World Bank's Doing Business 2003-2007.

From the database of La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1999), we use three variables which are related to transparency of reporting and monitoring costs,

[12] There is substantial attrition in the panel and, even more importantly, time-series data-points are frequently inter- or extrapolated by collecting authorities. The latter renders the exploitation of the time-series dimension in the data over the available short period after 1999 almost useless.

[13] To calculate this tax burden, we assume that a typical shareholder is subject to the corporate income tax and – if profits are paid out as dividends – to an additional personal income tax. Thereby, we account for integration schemes between corporate and personal income taxes. For instance, for a statutory corporate tax rate of 30 percent and a withholding tax on dividends of 20 percent, we obtain an effective shareholder tax burden of 44 percent in the case of a classical system, see (1).

[14] The original sources of the data are the Organisation for Economic Co-operation and Development, PriceWaterhouseCoopers, and the International Bureau of Fiscal Documentation, described in detail in Egger and Radulescu (2008). We use the top personal income tax rate expressed as a fraction of unity. Hence, a top personal income tax rate of average wages of 0.5 indicates a tax rate of 50 percent in the highest income bracket.

namely indices capturing creditor rights, accounting standards and anti-director rights (i.e., shareholder protection rules). Thes are discussed in paragraphs (i) and (iv) of section 3.4. In the context of our model these costs reflect an average firm's access to external financing. From the World Bank's Doing Business data-set, we use indices capturing the costs of starting and closing a business. In the context of our model, these reflect the fixed costs of setting up a firm and exit costs (see paragraphs (ii-iii) in Section 3.4).[15] According to the theoretical model, we expect to find a positive impact of better accounting standards and creditor rights on the probability to incorporate, and a negative impact of antidirector rights. Higher entry costs should reduce incorporation while we have no clear-cut prediction on the value of limited liability and, thus, on the impact of higher exit costs.

4.1 Data and Econometric Specification

Of the 544, 291 manufacturing firms included in our sample, about 93 percent are incorporated and the rest is unincorporated. The large fraction of incorporated firms is not due to a selection of mainly large firms in our sample: about 10 percent of the included firms have only one employee, average firm size is about 65 employees (the median firm has less than 9 employees), and firms in the inter-quartile range have between 3 and 26 employees. About 10 percent of the included firms have been incorporated between 1999 and 2004. The average incorporated firm is about 17 years old, and the median is 13 years old. The inter-quartile range of firm age covers units which are between 7 and 20 years old. The firms are located in one of the 26 European economies listed in Table A1 of the Appendix. The representation of the firm population varies across countries due to the coverage in Amadeus. Countries which are particularly well represented are Belgium, Denmark, Finland, France, Italy, Netherlands, Portugal, Spain, and most of the Central

[15] These variables refer to the average time to complete all necessary procedures to start up and operate a business, the cost of bankruptcy proceedings, and the recovery rate informing about how many cents on the dollar claimants (creditors, tax authorities, and employees) recover from an insolvent firm.

and Eastern European economies.

Other features of the data are found in Table A2 of the Appendix. The Table reports observation numbers for the explanatory variables together with the mean and standard deviation of each covariate used in the subsequent regressions.[16] The descriptive statistics for the effective shareholder corporate tax burden and personal income tax variables are most notable. For instance, the effective shareholder corporate tax and the top personal income tax rate on average wages tend to be lower in countries, where incorporated firms are located in, than in other countries, on average. However, we should be careful with drawing firm conclusions from Table A2 for two reasons. First, the tax variables are significantly correlated with each other so that Table A2 is not telling about the partial impact of the tax instruments on the probability of incorporation at the firm level.[17] This can be done by means of a multivariate model. Second, incorporation is captured by a binary indicator variable which – according to Sections 2 and 3 – is the observable counterpart to the unobservable (latent) profit comparison undertaken by entrepreneurs in advance of the incorporation decision. Inference on the impact of any of the tax instruments on the incorporation decision should account for the non-linear relationship between the tax instruments and the indicator variable. The latter can be done in a non-linear probability model. Accordingly, the probability of incorporation is given by

$$\begin{aligned} \Pr(y_f|\mathbf{X}_{ci}) &= \Pr(y_f^*|\mathbf{X}_{ci}) \\ &= \mathrm{F}(\mathbf{X}_{ci}\boldsymbol{\theta}) \\ &= t_c\beta_1 + t_n\beta_2 + \mathbf{Z}_{ci}\boldsymbol{\delta} + \varepsilon_f, \quad \forall f = 1, ..., N \end{aligned} \tag{13}$$

where f, c, and i are firm, country, and industry specific indices, respectively. y_f^* denotes

[16] Not all the regressors are available for all 26 countries in the sample which explains the differences in observations both across the covariates in Table A2 and across the estimated models below.

[17] The correlation coefficient between the effective shareholder corporate tax burden and the top personal income tax rate on average wages amounts to 0.721. Moreover, the personal income tax rate at average wages in manufacturing is correlated with the top personal income tax rate between the average and five times the average wage with a coefficient of -0.297. All of the mentioned coefficients are significantly different from zero at one percent.

the unobserved variable (i.e., the profitability of incorporation), and y_f is the observed binary variable of the legal status of the firm (where entry one stands for an incorporated firm with $y_f^* > 0$). t_c and t_n indicate the country-specific effective shareholder corporate tax burden and the top personal income tax rate. Z_{ci} is an $N \times K$ matrix of country and industry specific controls (including a constant or country specific effects at the NACE 3-digit level). Finally, ε_f is the remainder error term. β_1, β_2, β_3, and the $K \times 1$ vector $\boldsymbol{\delta}$ are unknown and need to be estimated.

4.2 Empirical Results

In Table 1, we summarize the findings from parsimonious and less parsimonious models where the firm-level decision to incorporate is a function of the two tax instruments of interest (corporate and top personal income tax rates), a constant or fixed NACE 3-digit industry effects, and a number of control variables. In Probit1, we assume that the coefficients across all NACE 3-digit industries are identical. Alternatively, we allow for industry-specific effects and include a complete set of 127 NACE 3-digit industry dummies in Probit2. All regressions in Table 1 are non-linear probability models, assuming that the latent variable (i.e., the net benefit from incorporation to the firm) is normally distributed (see Cameron and Trivedi, 2005; Greene, 2008).

The following conclusions can be drawn from the results in the table. In general, the explanatory power of the tax variables alone is remarkable.[18] McFadden's pseudo-R^2 in Probit 1 amounts to about 14 percent, which is due to the tax variables and the constant only. A higher corporate profit tax rate reduces, and a higher top marginal income tax rate raises the probability to incorporate. The theoretical model suggests that the entrepreneur-manager is less likely to incorporate when the effective shareholder corporate tax burden is high. On the other hand, higher personal income tax rates – i.e., higher costs of staying unincorporated – should raise the probability of incorporation.

[18] The standard errors are robust to clustering at the country level and to heteroskedasticity of arbitrary form throughout the paper.

The empirical results are supportive of these hypotheses.

The inclusion of the 127 NACE 3-digit dummies in Probit 2 does not improve the pseudo-R^2 of the model a lot.[19] The latter may be a first indication of the relative importance of country-level variables as opposed to industry-level variables for the incorporation decision at the firm level. However, the joint impact of the industry dummies is significantly different from zero so that we include them always in the subsequent empirical models. Notice that the parameter estimates of the two tax instruments included in Probit 2 are very close to the ones in Probit 1 with excluded industry dummy variables.

Table 1

Other important drivers of the decision to incorporate are (institutional) variables related to the fixed costs of incorporating as well as entering and exiting the market. Such variables are collected in La Porta, Lopez-Silanes, Shleifer, and Vishny (1999), and the World Bank's Doing Business Data described above. Probit 3 and Probit 4 in Table 1 summarize the findings from less parsimonious specifications than Probit 1 or 2. The institutional variables, however, are not available for all countries in the sample. We must thus rely on a somewhat smaller number of observations. Yet, in Probits 3 and 4, the number of included firms still exceeds $360,000$.

The institutional variables in Probit 3 include creditor rights, accounting standards, and anti-director rights as well as log GDP per capita (the latter being a measure of wage costs).[20] These institutional covariates are relatively important: the pseudo-R^2 in Probit 3 is about 12 percentage points higher than its counterpart in Probit 2. Based on our

[19] However, the industry dummies have a nontrivial explanatory power which becomes evident from the amount of perfect predictions due to these dummies alone: while the parameter estimates in Probit 1 relied upon 544,291 observations, the ones in Probit 2 only use 521,286. The difference is simply the number of perfect predictions due to the inclusion of the industry dummies.

[20] In an earlier version of the paper, we used average wage costs per employee (including social security contributions) in a country's manufacturing sector, and the results turned out similar to the ones we obtain with GDP per capita. However, we prefer the current specification, since it avoids a further loss of observations due to missing wage data. Using wages per employee at the firm level is not an

theoretical model, we have argued in section 3.4, paragraph (i), that better accounting standards as well as creditor rights should boost the probability to incorporate, and we have concluded in paragraph (iv) that anti-director rights might discourage incorporation. The empirical results of Probit 3 support these hypotheses. When associating a higher level of per-capita GDP with higher wage expectations, it is consistent with our model that an increase in wage expectations reduces the probability to incorporate.

Probit 4 includes two additional control variables from the World Bank's Doing Business Data: the costs of closing business and the costs of starting business. We tend to associate the costs of starting businesses as mainly being relevant for corporate firms and therefore reflecting fixed costs of incorporation. We find, in line with our theoretical results, that higher starting costs deter incorporation. Further, the coefficient in Probit 4 shows that higher exit costs raise the probability of incorporating. Associating exit costs with the tightness of bankruptcy rules, one might think of this as putting some discipline on entrepreneurs, thereby reducing agency costs and facilitating external financing. This benefit is potentially offset by the risk of loosing highly valued private assets so that theory provides no clear prediction. We find a significantly positive impact of higher costs of closing business, possibly indicating that the disciplining role of bankruptcy procedures favors incorporation. However, while the exit and entry cost variables enter significantly different from zero, they are not as important as the corporate governance variables when it comes to their marginal explanatory power (the pseudo-R^2 was 0.271 in Probit 3 and it is 0.274 in Probit 4).

Altogether, the results in Probits 3 and 4 indicate that the two pillars of our theoretical model – corporate and personal income tax rates as well as accounting and governance standards together with fixed costs of incorporation, as captured by entry cost – are important to explain the variation of the incorporation indicator variable. The relative

option here and would induce an endogeneity problem: individuals decide upon incorporation ex ante, i.e., before realizing profits or wages; moreover, the firm-level data-set does not allow discerning wages of managers from those of workers. Similarly, the inclusion of other firm-level variables such as the number of employees is not advisable because of a possible endogeneity problem.

magnitude of the coefficients on corporate profit and personal income tax rates are lower in Probits 3 and 4 than in Probits 1 and 2. The reason for the latter is mainly the correlation between tax rates and per-capita GDP (0.868 and 0.778, respectively). However, while the impact of the considered tax instruments on the probability to incorporate is somewhat smaller in Probits 3 and 4 than in their more parsimonious counterparts, the qualitative insights remain unaffected by considering a larger number of country-level covariates.

To get a sense of the relative importance of the tax variables for the incorporation decision, we compute the marginal effects and their standard errors for Probit 4. We may evaluate these effects at the sample mean as well as the sub-sample means of incorporated and unincorporated firms. We find that a one-percentage-point increase in the effective shareholder corporate tax burden results in a decline of the probability to incorporate of about 0.1 percentage points for the average firm. The response probability for the incorporated firms reacts in the same way, while that of the unincorporated firms declines by almost 0.3 percentage points. All of the estimated marginal effects are significantly different from zero at one percent. Given that the standard deviation of the effective shareholder corporate tax burden is almost 14 percentage points in the sample, a band of ± 1 standard deviation of the tax burden implies a band of percentage point changes in the response probability of about ± 1.4 percentage points on average.

4.3 Sensitivity Analysis

We regard Probit 4 as our preferred empirical model of firm-level incorporation choice and assess the sensitivity of results along three different lines: the inclusion of industry-by-country average capital intensity measured by the log ratio of cash flow to fixed assets as an additional covariate;[21] the use of alternative governance variables (creditor rights; accounting standards; and anti-director rights) from Martynova and Renneboog (2009) instead of the ones from La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1999), the

[21] We conjecture that firms with a larger cash-flow ratio are more profitable, invest more and, thus, benefit more from incorporation to facilitate external financing.

functional form of the non-linear probability model, and the exclusion of large firms. For the sake of brevity, we focus on the parameters of the tax variables – the corporate profit and top personal income tax rates – to discuss the results of the sensitivity analysis in Table 2. For convenience, we repeat the benchmark results of Probit 4 in the first column.

Table 2

The findings from our sensitivity analysis may be summarized as follows. First, the coefficient of average cash flow over fixed assets in manufacturing of a country in Probit 5 (referred to as Alternative 1 in the table) is positive and significantly different from zero at conventional levels. The model predicts that a higher capital intensity of an industry in a country leads to a larger number of incorporated firms there. However, adding this variable to the list of covariates has little bearing for the other parameter estimates.

Second, the construction of the variables reflecting creditor rights, accounting standards, and anti-director rights by La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1999) has been criticized recently. It turns out that some of their original findings are sensitive to the use of more accurate indices than theirs in replication studies. In Probit 6 (referred to as Alternative 2 in Table 2), we use an alternative set of indices for the same governance measures which has been made available by Martynova and Renneboog (2009). It turns out that the explanatory power is slightly better with these variables than with the ones in Probit 4 (with a pseudo-R^2 of 0.274 in Probit 4 and one of 0.275 in Probit 6). However, there is no qualitative difference between the two models in the sense that the signs of the coefficients remain unaffected and they remain significant at conventional levels. One exception is the coefficient of the costs of starting business, which is more collinear with the variables from Martynova and Renneboog (2009) than with the ones of La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1999) and not significantly different from zero in Probit 6.

Third, we estimate the specification by logit instead of probit (Alternative 3 in Table 2). The logit model displays a somewhat higher value for McFadden's pseudo-R^2 than

probit and would be preferable to probit (see Davidson and MacKinnon, 2004, for a likelihood-based test on probit versus logit). However, there is no qualitative difference between the results in Probit 4 and the logit model in terms of the coefficient signs. All of the coefficients of the variables of interest in the logit model are significantly different at conventional levels.

Finally, we run Probit 4 on sub-samples which exclude firms with more than 200 employees (Alternative 4) or more than 100 employees (Alternative 5), respectively. We find that the results display only little sensitivity to those restrictions which is remarkable: the number of observations drops from 362,224 in Probit 4 to 99,977 in Alternative 4 and to 91,901 in Alternative 5. Even though we mentioned before that our sample mainly consists of firms in the relevant size range, we feel more comfortable with the results being insensitive to the exclusion of large to medium-sized enterprises.

4.4 Extension

We have focused on the determinants of the incorporation decision. A possible extension of the empirical exercise guided by our theoretical model is to consider the consequences of incorporation and its interaction with the effective shareholder corporate tax burden for firm size. One goal of our research was to model the incorporation decision as a choice. This suggests that an indicator variable of incorporation should not be treated as exogenous in empirical work on the impact of incorporation on firm size. We may account for endogenous firm selection into incorporation by means of matching based on the propensity score (i.e., the estimated response probability as in Tables 1 and 2). Assuming that the determinants of incorporation are observable and captured by a model such as Probit 4, that incorporation choice apart from the included observables is random, and that selection into incorporation of a firm does not affect other firms' decisions, we may estimate the impact of endogenous incorporation on firm size consistently.

We use the estimated response probabilities of Probit 4 to determine suitable control units – unincorporated firms with the same probability to incorporate as the actually

incorporated ones – and estimate the average treatment effect of incorporated firms as the average difference in firm size between the incorporated and the suitable control firms.[22] The theoretical model suggests that incorporated firms are larger than unincorporated ones after controlling for self-selection. Furthermore, the model suggests that a higher effective shareholder corporate tax burden compresses (reduces) this positive main effect of incorporation on firm size. The latter can be inferred by including an interactive term between the incorporation indicator variable and the effective shareholder corporate tax burden in the conditional mean regression model after matching (see Blundell and Costa Dias, 2002). Following the theoretical model, we use log fixed assets at the firm level as a measure of firm size and report the results from exogenous and endogenous incorporation effect estimates in Table 3.

Table 3

The results in Table 3 suggest the following conclusions. First, taking account of endogenous selection matters. The treatment effect of incorporation on the actually incorporated firms is negative without conditioning on the observables and positive otherwise. Let us refer to the corresponding estimate as the exogenous treatment effect and the one obtained with matching as the endogenous treatment effect. Both the exogenous and endogenous treatment effects are significantly different from zero at one percent when applying conventional levels of statistical significance. Note that incorporation would actually reduce firm size if the estimate of the exogenous average treatment effect of

[22] We apply matching based on the propensity score with common support which works as follows. First, estimate the propensity of incorporation by means of a nonlinear probability model. Second, exclude all incorporated firms for which the propensity of incorporation is larger than the maximum propensity of incorporation in the group of unincorporated firms. Similarly, exclude all those unincorporated firms whose estimated propensity to incorporate is smaller than the minimum propensity to incorporate of the group of incorporated firms. What we are left with is referred to as the common support region. Third, use the estimated propensity scores within the common support region to find closest-possible matches for each incorporated firm in the group of unincorporated firms. Fourth, calculate the average difference in the outcome (in our case, firm size) between the incorporated and the matched unincorporated firms. This difference is referred to as the average treatment effect (of incorporation) of the treated on outcome.

incorporation in the first column of Table 3 were taken. However, the estimate of the endogenous average treatment effect of the incorporated firms in column three of the Table is clearly positive. The point estimate suggests that incorporation causes firm size to increase by about $100 \cdot \exp(0.408 - 1) \simeq 55\%$.

Second, our theory suggests that a higher effective shareholder corporate tax alters the impact of incorporation on firms size. An impact on firm size is found for the (inconsistent) exogenous treatment effect as well as the endogenous treatment effect. In line with the hypotheses from our theoretical model, a higher effective shareholder corporate tax compresses the positive treatment effect of incorporation on firm size, but only after accounting for endogenous selection into incorporation (see the last column of Table 3). The interactive effect of incorporation and the effective corporate tax burden is significantly different from zero at one percent at conventional levels. The results in the last column of Table 3 imply that the effective shareholder corporate tax burden which renders the average treatment effect of incorporation of the incorporated firms consistent with the estimate in the third column, amounts to about 52.13%. This rate is higher than the average tax rate among all incorporated firms reported in the first row of Table A2. This has to do with the exclusion of observations outside the common support region of propensity scores.[23] According to the parameter estimates in the last column of the table, an increase of the effective shareholder corporate tax burden by one percentage point from that average level reduces the positive effect of incorporation on firm size by about 5 percentage points.[24]

5 Conclusions

This paper studies the decision to incorporate at the firm level. We analyze a model where new firms decide whether to adopt corporate or non-corporate form. In particular, we

[23] Matching reduces the discrepancy between corporate and non-corporate firms with regard to all observables (not only the effective corporate tax) included in the selection model for incorporation.

[24] $100 \cdot [\exp(5.397 - 9.570 \cdot 0.5313 - 1) - \exp(5.397 - 9.570 \cdot 0.5213 - 1)]$, using coefficients in Table 3.

study two main arguments in favor of incorporation that are emphasized largely informally in the literature: limited liability and access to capital. We propose an agency model where firm transparancy improves corporate governance and thereby facilitates externally financed investment. The analytical part of the paper finds that better access to external capital is an important benefit of the corporate form when firms are finance constrained while the effect of limited liability on the incorporation decision is generally ambiguous. Differential tax rates are also a crucial factor determining the incorporation decision. A higher effective corporate tax, measuring both firm level taxes and personal taxes on distributed profits, discriminates against incorporation while a higher personal income tax rate on non-corporate firms encourages incorporation.

The empirical part exploits a large cross-sectional data-set of more than $540,000$ firms in 26 European countries to study the impact of corporate and personal income tax instruments on the incorporation decision at the firm level. The data are supportive of key hypotheses of our theoretical model. Most importantly, a higher effective corporate tax rate reduces a firm's probability to incorporate while a higher personal income tax rate (in particular, at high income levels) does the opposite. In particular, incorporation leads to substantially larger firm size in terms of fixed assets (investments), compared to unincorporated firms with identical characteristics other than organizational form. However, the size effect of incorporation is compressed by a higher effective corporate tax rate (i.e., the combined tax burden between corporate taxes and the personal income tax at the shareholder level).

Appendix

A Model Closure

Incorporation imposes a differential fixed cost k. A firm with success probability q of early stage investment yields expected net present value of $q\pi_c - k$ if incorporated, and

$q\pi_n$ if not. Note that π_j is the surplus over the value of financial and private assets, A and $(1+\beta)H$. Expected end of period utility of an E with a type q project is

$$u_j(q) = q\pi_j - k_j + [A + (1+\beta)H + z], \tag{A.1}$$

where $k_j = k$ if corporate and $k_n = 0$ if not, and z is a lump-sum transfer from government.

After observing q', agents choose organizational form. All $q' > q$ incorporate while $q' < q$ remain as a sole proprietor and avoid the cost k, where the indifferent type is given by $q\pi_c - k = q\pi_n$. A share $n = \int_q^1 dG(q')$ of firms incorporates but only $s_c = \int_q^1 q' dG(q') < n$ of all corporations and $s_n = \int_0^q q' dG(q') < 1 - n$ of all non-corporate firms survive to the mature stage. Due to business failure, $s_n + s_c < 1$.

Consider end of period welfare of entrepreneurs when taxes are refunded back to them. The fiscal constraint yields a per capita transfer $z = p[s_n T_n + s_c T_c]$. End of period utility is either u_n or u_c, depending on organizational choice. Upon integration, $\bar{u} = s_n\pi_n + s_c\pi_c - kn + A + (1+\beta)H + z$. Substituting π_j from (2) and z yields

$$\bar{u} = A + (1+\beta)H - kn + [p(1+\rho) - 1]\textstyle\sum_j s_j I_j - (1-p)\beta\sum_j s_j h_j. \tag{A.2}$$

The first two terms are end of period consumption value of wealth, the third term is early stage investment from n start-ups, the fourth term is output minus expansion investment in both sectors, and the last term is the loss in housing surplus due to business failure where $h_n = H$ and $h_c \in \{0, H\}$ depending on whether incorporated firms use private assets as a collateral or not.

B Data and Descriptive Statistics

We summarize the sample coverage across countries in Table A1 and descriptive statistics of the independent variables considered in Table A2. We report means and standard deviations along with the available numbers of observations not only for the whole sample but also the sub-samples of incorporated and unincorporated firms. The means and standard deviations of the country-level independent variables in the two sub-samples are

frequency-weighted averages according to the numbers of incorporated and unincorporated firms, respectively, across the included economies.

Tables A1 and A2

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Table 1 - The impact of corporate and personal income taxation on the incorporation decision

Explanatory variables	**Probit 1**	**Probit 2**	**Probit 3**	**Probit 4**
Effective shareholder corporate tax burden	-3.103 **	-3.071 **	-1.745 **	-0.863 *
	1.439	1.437	0.747	0.480
Top personal income tax rate	8.856 ***	8.406 ***	3.799 ***	4.713 ***
	3.001	2.926	1.449	0.461
Creditor rights (0-3; higher index value means more rights)	-	-	0.362 ***	0.514 ***
	-	-	0.034	0.026
Accounting standards (0-100; a higher index value means higher standards)	-	-	0.056 ***	0.100 ***
	-	-	0.013	0.010
Anti-director rights (0-6; a higher index value means more rights)	-	-	-0.405 ***	-0.843 ***
	-	-	0.132	0.094
Log GDP per capita	-	-	-0.516	-3.812 ***
	-	-	0.439	0.562
Costs of closing business (1-42; a higher index value means higher costs)	-	-	-	0.028 ***
	-	-	-	0.005
Costs of starting business (0-35.2; a higher index value means higher costs)	-	-	-	-0.092 ***
	-	-	-	0.010
Observations	544'291	521'286	362'224	362'224
Fixed NACE 3-digit industry effects (127)	no	yes	yes	yes
Log-likelihood	-124'645	-120'763	-77'257	-76'966
McFadden's pseudo-R^2	0.139	0.151	0.271	0.274

Notes: A constant is included in all models. The corresponding coefficient and standard error in Probit 1 are 2.618 and 1.467, respectively. Figures below coefficients are standard errors which are robust to clustering at the country level and to heteroskedasticity. ***, **, * denote coefficients which are significantly different from zero at 1, 5, and 10 percent, respectively.

Table 2 - Sensitivity analysis

Explanatory variables	Benchmark (Probit 4)	Probit 5 Alternative 1	Probit 6 Alternative 2[a)]	Logit Alternative 3	Excl. firms>200 empl. Alternative 4	Excl. firms>100 empl. Alternative 5
Effective shareholder corporate tax burden	-0.863 *	-0.902 *	-1.744 ***	-1.076 **	-1.086 ***	-0.742 *
	0.480	0.482	0.549	0.549	0.416	0.420
Top personal income tax rate	4.713 ***	4.694 ***	3.179 ***	10.244 ***	2.870 ***	2.609 ***
	0.461	0.466	0.382	0.595	0.649	0.664
Creditor rights (0-3; higher index value means more rights)	0.514 ***	0.515 ***	0.551 ***	1.121 ***	0.528 ***	0.487 ***
	0.026	0.026	0.034	0.038	0.036	0.035
Accounting standards (0-100; a higher index value means higher standards)	0.100 ***	0.100 ***	0.023 ***	0.231 ***	0.094 ***	0.093 ***
	0.010	0.011	0.004	0.009	0.007	0.007
Anti-director rights (0-6; a higher index value means more rights)	-0.843 ***	-0.842 ***	-0.724 ***	-1.905 ***	-0.781 ***	-0.761 ***
	0.094	0.095	0.129	0.091	0.056	0.055
Log GDP per capita	-3.812 ***	-3.797 ***	-1.250 **	-8.518 ***	-3.697 ***	-3.706 ***
	0.562	0.566	0.551	0.748	0.540	0.574
Costs of closing business (1-42; a higher index value means higher costs)	0.028 ***	0.028 ***	0.022 ***	0.056 ***	0.032 ***	0.032 ***
	0.005	0.005	0.007	0.008	0.004	0.004
Costs of starting business (0-35.2; a higher index value means higher costs)	-0.092 ***	-0.092 ***	0.003	-0.209 ***	-0.085 ***	-0.083 ***
	0.010	0.011	0.009	0.013	0.013	0.013
Average cash flow/fixed assets in manufacturing of the country	-	0.004 ***	-	-	-	-
	-	0.001	-	-	-	-
Observations	362'224	362'223	362'224	362'224	99'977	91'901
Fixed NACE 3-digit industry effects (127)	yes	yes	yes	yes	yes	yes
Log-likelihood	-76'966	-76'963	-76'890	-76'901	-23'805	-21'168
McFadden's pseudo-R^2	0.274	0.274	0.275	0.275	0.268	0.246

Notes: Figures below coefficients are standard errors which are robust to clustering at the country level and to heteroskedasticity. ***, **, * denote coefficients which are significantly different from zero at 1, 5, and 10 percent, respectively. - a) The model in Alternative 2 replaces the antidirector rights index of LaPorta, Lopez-Silanes, Shleifer, and Vishny (1999) by the alternative measure of Martynova and Renneboog (2008).

Table 3 - Firm size (log fixed assets) and incorporation (using Probit 4 to estimate propensity scores)

Treatment effect of the treated	**Exogenous incorporation**		**Endogenous incorporation (nearest-neighbor matching)**	
Incorporation	-0.760 ***	-2.390 ***	0.408 *	5.397 ***
	0.013	0.702	0.239	1.600
Incorporation × Effective shareholder corporate tax burden	-	3.808 *	-	-9.570 ***
	-	1.942	-	2.889

Notes: Figures below coefficients are standard errors which are robust to clustering at the country level and to heteroskedasticity. ***, * denote coefficients which are significantly different from zero at 1 and 10 percent, respectively.

Table A1 - Country coverage and firm distribution across countries

Country	Firms	Country	Firms
Austria	1'012	Italy	100'312
Belgium	21'165	Latvia	804
Bulgaria	6'385	Lithuania	1'468
Croatia	3'378	Netherlands	17'848
Czech Republic	9'988	Poland	6'039
Denmark	8'949	Portugal	10'669
Estonia	5'950	Romania	56'061
Finland	11'110	Russian Federation	56'992
France	102'108	Slovak Republic	1'235
Germany	8'874	Slovenia	2'084
Greece	7'228	Spain	96'093
Hungary	5'169	Switzerland	15
Iceland	1'617	Ukraine	1'738

Table A2 - Descriptive statistics

Explanatory variable	Full sample			Non-incorporated firms			Incorporated firms		
	Obs.	Mean	Std.dev.	Obs.	Mean	Std.dev.	Obs.	Mean	Std.dev.
Effective shareholder corporate tax burden	544'291	0.424	0.138	40'748	0.503	0.107	503'543	0.418	0.138
Top personal income tax rate	544'291	0.514	0.069	40'748	0.520	0.041	503'543	0.514	0.071
Creditor rights (0-3; higher index value means more rights)	385'383	1.444	0.935	31'403	0.421	0.917	353'980	1.534	0.881
Accounting standards (0-100; a higher index value means higher standards)	385'383	63.952	6.058	31'403	67.624	3.335	353'980	63.626	6.137
Anti-director rights (0-6; a higher index value means more rights)	385'383	2.427	1.280	31'403	2.652	0.887	353'980	2.407	1.308
Log GDP per capita	544'291	9.351	1.010	40'748	9.657	0.864	503'543	9.326	1.017
Costs of closing business (1-42; a higher index value meanshigher costs)	542'674	11.079	5.584	40'740	10.407	5.261	501'934	11.133	5.606
Costs of starting business (0-35.2; a higher index value means higher costs)	542'674	11.141	6.745	40'740	5.996	7.320	501'934	11.558	6.521
Average cash flow/fixed assets in manufacturing of the country	542'193	30.829	1044.971	40'731	4.686	267.701	501'462	32.952	1083.872

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