A Journey from a Corruption Port to a Tax Haven

Shafik Hebous and Vilen Lipatov

Oxford University Centre for Business Taxation
Said Business School, Park End Street,
Oxford, Ox1 1HP

WP 12/04

A Journey from a Corruption Port to a Tax Haven*

Shafik Hebous and Vilen Lipatov
Goethe University Frankfurt

November 2011

Abstract

We sketch a model according to which tax havens attract corporate income generated in corrupted countries. We consider the choice of optimal bribes by corrupt officials and the share of the proceeds of corruption that will be concealed in tax havens. In our framework, tax havens have two opposite effects on welfare. First, tax havens' services have a positive effect on welfare through encouraging investment by firms fearing expropriation and bribes in corrupt countries. Second, by supporting corruption and the concealment of officials' bribes, tax havens discourage the provision of public goods and hence have also a negative effect on welfare. The net welfare effect depends on the specified preferences and parameters. One source of this ambiguity is that the presence of multinational firms in corrupted countries is positively associated with demanding tax havens' operations. Using firm-level data, we provide empirical support for this hypothesis.

*hebous@wiwi.uni-frankfurt.de; Lipatov@em.uni-frankfurt.de. We have received useful comments and suggestions from Clemens Fuest, Johannes Voget, Alfons Weichenrieder, Tom Zimmermann, and participants in the seminar at the Norwegian School of Economics and Management, Vienna University of Economics and Business, Goethe University Frankfurt, the summer symposium at the CBT at the University of Oxford, and the 67th annual congress of the IIPF in Ann Arbor at the University of Michigan. We thank the research centre of the Deutsche Bundesbank for its kind hospitality. The first author gratefully acknowledges the financial support of the Vereinigung von Freunden und Förderern at the Goethe University Frankfurt. The usual disclaimer applies.

Keywords: Tax Havens, Tax Avoidance, Tax Evasion, Multinational Firms, Corruption

JEL Classification: F23, H25, H32

1 Introduction

Tax havens have recently been heavily debated in the policy arena for several reasons, ranging from fragile fiscal positions of many economies to recent revolutions against many corrupt autocratic officials who stored their assets in havens. Academically, the role of tax havens in the world economy is largely viewed within the framework of international tax competition. Most studies assume that the real operation of the firm takes place in a high-tax country, possibly one with an advanced economy. The function of the affiliate in the tax haven is to receive (a portion of) the corporate income, which is thus shifted away from the domestic high-tax country for purposes of tax avoidance.[1]

In this study, we focus on other roles of tax havens in the world economy. First, we examine theoretically the connection between the operations of firms in corrupt countries (possibly with low- and middle-income economies) and firms' demand for tax havens' services.[2] Second, we model the corrupt authority's problem of choosing the optimal bribe rate. Third, we provide new insights into welfare consequences of eliminating tax havens. Fourth, we empirically analyse the link between operating in corrupt countries and the presence of multinational firms in tax havens, using German firm-level data.

Firms operating in highly corrupt countries face special circumstances. First, firms bribe officials to maintain their investment activities. Second, bribes do not insulate firms from risks. In the absence of a credible rule of law, contracts are not enforceable. Firms fear expropriation, blackmailing, or a sudden eruption of instability in the corrupt host economy. Hence, even if the corporate income tax rate in a corrupt country is relatively low, multinational affiliates have a strong incentive to conceal and shift (a portion of) their income. The question is then: Where to? The origin country is not the most preferred option available for the multinational firm, especially if the parent firm is located in a high-tax country. Alternatively, multinational

[1] Dharmapala (2008) provides a survey.

[2] The negative relationship between corruption and GDP per capita is documented in Svensson (2005), along with other variables related to corruption. Bardhan (1997) surveys the literature on corruption and development. See *Financial Action Task Force* (2011) for recent examples.

affiliates can transfer the income generated in highly corrupt countries to tax havens.[3]

Public debates and media reports often assert that not only firms but also corrupt officials, at various levels, use tax havens for hiding income. Reported figures are rather high (e.g., *Los Angeles Times* 2011). Our theoretical sketch explicitly considers the transfer of proceeds of corruption to offshore tax havens, and allows the probability of revolt against the corrupt authority (eruption of instability) to be a function of the provided amount of public goods. A higher bribe rate increases the extracted rent by officials, but at the same time it reduces the bribe base, since firms' demand for tax havens' services increases with higher bribes.

We analyse the welfare implications under various scenarios. The effects of eliminating tax havens on the citizens of the corrupt country can be summarised as follows:

- Firms' investment in the corrupt country decreases under standard assumptions on the interest elasticity of capital demand and on the cost of shifting income from the corrupt country to the tax haven. Accordingly, private consumption by the citizens of the corrupt country decreases. Thus, the effect on welfare through firms' investment is negative.

- In a world without tax havens, it is more difficult for corrupt officials to conceal bribes. As a result, the provision of public goods unambiguously increases in order to lower the probability of revolt and losing office. Hence, eliminating tax havens has a positive effect on welfare by precluding their support for corruption.

The overall welfare effect depends on the functional forms and parameters of the model. These new welfare results for a corrupt country complement those in Slemrod and Wilson (2009), who consider only a non-corrupt country. In our framework, as in theirs, tax havens constitute a drain on revenues of the non-corrupt country. In our setting, the welfare effect of eliminating tax havens' operations on the non-corrupt country is positive provided that factor prices are constant.

Other, related studies point out that tax havens have positive effects on welfare. These are summarised in three effects: (1) Tax havens support an

[3] Firms in the corrupt country can be broadly interpreted to include not only foreign affiliates but also domestic firms.

equilibrium where all non-havens set the same (high) tax rate and hence raise revenues (Johannesen; 2010a), (2) borrowing from tax havens increases the efficiency of the firm and its investment at home (Hong and Smart; 2010), and (3) tax havens with advanced banking sectors (offshore financial centres) improve competition in the banking sectors in neighbouring countries, generating positive welfare effects (Rose and Spiegel; 2007). However, these studies consider the issue from the standpoint of sufficiently advanced economies, whereas our model stresses the importance of viewing the welfare effects of tax havens from a global perspective by incorporating features of less advanced economies. The notion that tax havens are linked to corruption and development has been a concern in many discussions. The Norwegian Ministry of Foreign Affairs published in 2009 a report focusing on tax havens and development. In a chapter of this report, Torvik (2009) emphasises the effects of tax havens on resource-rich countries and gives examples of dictators who shift money from dubious sources to tax havens. Related studies are by Schjelderup (2011), who argues that tax havens reduce the costs of entering illegal businesses, and Slemrod (2008), who underlines the status of tax havens as a means of commercialisation of state sovereignty.[4]

Empirically, welfare and detailed information on tax evasion and corruption-related matters are unobservable. However, one essential source of bribes is foreign investment. To check the empirical relevance of our model, we test the hypothesis stemmed from our model positing that the presence of multinational firms in corrupt countries is positively associated with a high probability of demanding tax havens' operations. Based on conditional fixed-effects logistic regressions and after controlling for firm size and unobserved heterogeneity at the parent firm level, we find empirical support for this hypothesis. This new result contributes to the existing empirical literature that links firms' demand for tax havens' affiliates to the tax regime of the home country or the size of the firm (e.g., Desai et al., 2006, and Gumpert et al., 2011). Also, our result is related to studies supporting the notion that bribes constitute high costs for firms. For example, Fisman and Svensson (2007) find that high bribe rates negatively affect the growth of firms in Uganda.

We proceed as follows. Section 2 presents the benchmark model and the resulting equilibrium equations determining the share of firms that use

[4]The increasing academic interest in the tax havens' businesses is reflected in a number of recent contributions focusing on other, related aspects. Examples are Becker and Fuest (2010), Johannesen (2010b), and Maffini (2009). Hebous (2011) provides a recent survey.

tax havens and the optimal bribe rate. In section 3, we provide a welfare analysis of shutting down tax havens. Section 4 generalises the benchmark setup by allowing the probability of revolt against the corrupt government to be endogenous. Section 5 provides empirical results using the German MiDi firm-level data. Section 6 concludes.

2 Benchmark Model

2.1 The Setup

We build on the model of Slemrod and Wilson (2009), and extend their setup by including a corrupt country, denoted by c, in addition to the non-corrupt country, denoted by n, and the tax haven. Each of the non-haven countries has a population of L_i; $i = n,\ c$. Each resident possesses one unit of labour and k^* units of capital. The utility function is $u\left(x, g\right)$, where x is private consumption and g is the consumption of the publicly provided private good. Both goods are normal. Each government levies taxes on capital income that is earned within its borders. The corrupt government has an additional, but unofficial, source of revenues through bribes. The stock of capital employed in country i is K_i. All firms employ the same constant returns to scale technology in order to produce a final good in a competitive environment. Each firm uses one unit of capital, hire labour, and decide over the share of income that will be shifted to a tax haven. We allow for differences across firms regarding the costs of using tax havens.

The timing of events is as follows. First, the non-corrupt country chooses tax rates and tax enforcement, whereas corrupt governments choose the bribe rates, the level of public goods, and the share of rents to shelter in a tax haven. The decisions of the governments are simultaneous. In the second stage, firms are formed to ensure that the net expected interest rate is the same in each country. In the third stage, taxes and bribes are paid, a share of capital returns is sheltered, and public goods are provided. Finally, in the last stage, expropriation either occurs or does not.

2.2 Firms in the Non-Corrupt Country

The problem of the firms in the non-corrupt country is identical to that in Slemrod and Wilson (2009).[5] The technology depends on labour L and capital K, and exhibits constant returns to scale. The before-tax return on capital R is given by:

$$R = f(L/K) - W(L/K) \times (L/K),$$

where $W(.)$ denotes the wage as a function of the labour-capital ratio. The non-corrupt country sets a tax rate t on capital. Firms buy services c from the tax haven to conceal a share s_n of capital income.[6] The share s_n is a concave function of c. The tax haven sets a price p per unit of provided services c. Hence, the variable cost of buying these services is pc. Firms differ in the fixed costs of using tax havens as captured by the parameter θ, which is the rrealisation of a random variable with a continuous distribution function $G(\theta)$. The reported share of income, $(1 - s_n)$, is subject to the tax rate t. After-tax profits with the advantage of income-shifting are:

$$r_n = R\left[s_n - (pc + \theta) + (1 - s_n)(1 - t)\right]. \tag{1}$$

Correspondingly, the first order condition is

$$ts'_n = p.$$

The following equality determines the share of firms that will use the tax shelter:

$$\theta = ts_n - pc.$$

2.3 Firms in the Corrupt Country

Without loss of generality, we assume that the tax rate in the corrupt country is zero. Further, firms operating in the corrupt country face a probability of

[5] There are three reasons for including the non-corrupt country. First, it enables a direct comparison with the implications of the model of Slemrod and Wilson (2009). Second, it makes it clear that the implications of the model are not driven by the assumption that there isn't a non-corrupt country. Third, it makes the mapping from the theory to our empirical analysis more intuitive.

[6] In this study, we abstain from modelling the choice of a country to become a tax haven, since this is considered in several studies such as Kanbur and Keen (1993), Dharmapala and Hines (2009), and Slemrod and Wilson (2009). The standard result is that small jurisdictions find it more attractive to become tax havens.

expropriation δ. The corrupt country sets a bribe per euro of capital earnings, b. The firm aims to circumvent reporting a portion of its profits in the corrupt country to avoid paying higher bribes. When the firm shifts profits from the corrupt country to the non-corrupt country, whether by standard methods of profit shifting such as transfer pricing or by tax evasion, profits will be subject to the high tax rate of the non-corrupt country. Although bribes enter our model exactly in the same way as taxes in the non-corrupt country do, there is an essential difference between the two. The latter instrument is the product of the rule of law, whereas the former is at the discretion of government officials. As with any product of discretion, there is no guarantee that paying bribes prevents future extortion.[7] After-tax profits are then

$$r_c = R[s_c - (pc + \theta) + (1 - s_c)(1 - \delta)(1 - b)], \tag{2}$$

where s_c is the share of capital income concealed by a firm in the corrupt country. Consequently, the FOC is

$$s_c'(b + \delta - b\delta) = p. \tag{3}$$

Comparing this with the expression for the non-corrupt country $ts' = p$, for $b = t$, we note that s' is smaller in the corrupt country than in the non-corrupt country. Further, because of convex costs, s must be larger in the corrupt country. Thus, the number of firms that use tax havens is also larger in the corrupt country:

$$\theta = \tilde{b}s_c - pc,$$

where $\tilde{b}$ is defined as: $\tilde{b} := b + \delta - b\delta$. This can be interpreted as the effective expected bribe rate that reflects both the necessity to bribe and potential extortion. To summarise, we can state that:

- Given identical tax rates in the non-corrupt and the corrupt country, a firm uses tax havens more extensively if it operates in a corrupt country: $s_c > s_n$. This is in line with Shleifer and Vishny (1993), who state that corruption is more distortionary and costly than taxation.

[7] The probability of expropriation in the tax haven is assumed to be zero. This is consistent with the evidence in Dharmapala and Hines (2009). Tax havens are typically highly stable entities with sound governance. For an overview of issues of tax evasion, weak auditing, and enforceability of tax rules in developing economies, see Fuest and Riedel (2010). Kesternich and Schnitzer (2010) show that multinational affiliates have higher debt levels in environments of high expropriation risks.

- The proportion of income shifted to tax havens increases with an increase in bribes b and the probability of expropriation δ.

2.4 Equilibrium

The corrupt government maximises its rents (bribes net of public goods) subject to an obligation to provide at least a minimal level of public goods ($g \geq g_0$). Equivalently, another interpretation of this problem is that the tax is raised at rate b, and officials choose what fraction of the tax revenue to allocate to personal uses and what fraction to allocate to g. The first interpretation is phrased in terms of bribery whereas the second interpretation is phrased in terms of embezzlement. Both bribery and embezzlement are forms of corruption. The corrupt government faces a probability of revolt by its own citizens and hence losing office (η). For the moment, we assume that η is exogenous. We will relax this assumption in the next section, and explicitly permit η to be a decreasing function of public goods g. The government may choose to conceal (a portion of) bribes from its own citizens by channeling them to the tax haven at a cost of θ_g. The households' budget is the same as in the non-corrupt country ($x = r_c k^* + W(R)$), where k^* is the fixed stock of capital owned by the inhabitants of the corrupt country.

Taking the expectation of the interest rate across firms as given by (2), we obtain the last constraint:

$$\frac{Er_c}{R} = 1 - \tilde{b}\,(1-\beta) - \beta E\left(\theta|\theta < \tilde{b}\right), \tag{4}$$

where $\beta := G(\tilde{b}s_c - pc)$ is the share of firms that demand concealment services from tax havens. The problem of the government is

$$\max_{\tilde{b}, s_g, g} [s_g \left(\tilde{b}\,(1-\beta s_c) - \theta_g\right) + (1-s_g)\,(1-\eta)\,\tilde{b}\,(1-\beta s_c)\,]Rk - g \tag{5}$$

$$\begin{aligned} s.\,t \quad &: \quad g \geq g_0 \\ x \quad &= \quad r_c k^* + W(R), \end{aligned}$$

and constraint (4). The choice variable s_g is the share of bribe/tax revenues concealed with the help of the tax haven. Hence, the first term in the objective function, $[s_g\left(\tilde{b}\,(1-\beta s_c)-\theta_g\right)]Rk$, is the concealed government revenues net of the cost of using the services of the tax haven θ_g. The second term of the objective function presents the additional payoff of the corrupt government in the case of staying in office. The last term of the objective function, the provision of public good g, is a net loss from the perspective of the corrupt government.

The government will use tax havens to shift its entire revenues if the fixed costs of concealment services are smaller than expected benefit of income shifting; that is if

$$\eta\tilde{b}\,(1-\beta s_c) > \theta_g. \tag{6}$$

Otherwise, the government will not demand concealment services at all. If η is exogenous, then the first constraint is binding: $g = g_0$. In this case, the problem becomes one-dimensional with the necessary optimality condition for an interior solution:[8]

$$\left(1-\beta s_c - s_c\tilde{b}\tfrac{d\beta}{d\tilde{b}} - \beta\tilde{b}\tfrac{ds}{d\tilde{b}}\right)Rk + \left(\tilde{b}\,(1-\beta s_c)-\theta_g\right)k\tfrac{dR}{d\tilde{b}}$$
$$+\left(\tilde{b}\,(1-\beta s_c)-\theta_g\right)R\tfrac{dk}{d\tilde{b}} = 0.$$

Let $\varepsilon := -\frac{dk}{dR}\frac{R}{k}$ be capital demand elasticity, then since

$$\frac{dk}{d\tilde{b}} = k'(R)\frac{dR}{d\tilde{b}},$$

we derive the following expression:

$$\left(1-\beta s_c - s_c\tilde{b}\frac{d\beta}{d\tilde{b}} - \beta\tilde{b}\frac{ds}{d\tilde{b}}\right)R + (1-\varepsilon)\left(\tilde{b}\,(1-\beta s_c)-\theta_g\right)\frac{dR}{d\tilde{b}} = 0. \tag{7}$$

Intuitively, the corrupt government benefits directly from a higher bribe rate and a higher interest rate, but at the same time it loses the bribe base. The loss of bribe base consists of three parts: (1) the number of firms using havens' services, $-s\tilde{b}\frac{d\beta}{d\tilde{b}}$, (2) the amount of service used by each firm, $-\beta\tilde{b}\frac{ds}{d\tilde{b}}$, and (3) a potential loss of investment due to a higher interest rate, $Rk'(R)$.

We first consider the corrupt country as having a small open economy that does not affect the net interest rate.

[8] The second-order condition is presented in the appendix.

3 Welfare Effects of Eliminating Tax Havens' Services

We analyse two particular cases: First, there is no tax haven. (Technically, tax havens' services are prohibitively costly.) Second, tax havens are pervasive; that is, capital can be shifted to the tax haven with zero fixed cost.

3.1 Eliminating Tax Havens

We can model the no-havens situation by shifting the distribution of θ up to make it prohibitively high. Then, $s_c = c = \beta = 0$, , and net profits take the value

$$\frac{Er_c}{R} = 1 - \tilde{b}. \tag{8}$$

Since government also cannot use havens' services, using the same optimality condition (7) with explicit derivative $\frac{dR}{d\tilde{b}} = \frac{R}{1-\tilde{b}}$, we obtain

$$\tilde{b} = \frac{1}{\varepsilon}.$$

Note that if $\varepsilon \leq 1$, the government will want to charge the full bribe. Therefore, ε has to be larger than 1 ($\varepsilon > 1$). The intuition behind this condition is similar to the textbook result in the case of a monopolist that operates only on the elastic segment of the demand function. This requirement is satisfied, for example, in the case of a Cobb–Douglas function: $f = k^{\alpha}$ where α is a constant.

3.2 Pervasive Tax Havens

If $\theta \equiv 0$, all firms shift the same amount determined by (3), and $\beta = 1$. The net profit is

$$\frac{Er_c}{R} = 1 - \tilde{b}\,(1 - s_c) - pc, \tag{9}$$

whereby $\tilde{b}s > pc$.

The optimal bribe can be determined as:

$$\tilde{b} = \frac{r^c \left(1 + \frac{s_c'^2}{s_c''(1-s)}\right)}{R\,(\varepsilon - 1)\,(1 - s)}, \tag{10}$$

and thus it depends on the properties of the function of the cost of avoidance and on the elasticity of capital demand.[9]

3.3 Comparison

Let ζ denote the elasticity of capital income with respect to the bribe rate:

$$\zeta := -\frac{d\left(Rk\left(R\right)\right)}{d\tilde{b}}\frac{\tilde{b}}{Rk\left(R\right)},$$

and let ϕ denote the elasticity of the share of reported income with respect to the bribe rate:

$$\phi := \frac{\tilde{b}}{1-s}\frac{ds}{db} = -\frac{\tilde{b}}{1-s}\frac{d\left(1-s\right)}{db}.$$

Both ζ and ϕ are evaluated at $\tilde{b} = 1/\varepsilon$. We show in the appendix that bribes are higher in the presence of the tax haven if

$$\zeta + \phi < 1. \tag{11}$$

We can distinguish between three cases:

Case 1 $\left(\zeta + \phi\right)|_{\tilde{b}=1/\varepsilon} > 1$

The bribe rate decreases in response to the availability of tax havens. Since $\frac{dR}{d\tilde{b}} > 0$ for any bribe rate, the investment increases further. Therefore, the investment in the new equilibrium with tax havens will be higher than without tax havens. If the reported income is very sensitive to a change in the bribe rate, introducing the tax haven increases investment and decreases the bribe rate.

Case 2 $\left(\zeta + \phi\right)|_{\tilde{b}=1/\varepsilon} < 1$ *and* $\tilde{b}^h < b_0$

The bribe rate increases. This exerts downward pressure on investment. Moreover, it raises the elasticity $\zeta + \phi$, as otherwise no interior solution is possible. The new equilibrium is then characterised by $\tilde{b}^h$ such that $\left(\zeta + \phi\right)|_{\tilde{b}=b^h} = 1$. Let b_0 be the bribe rate that results in no-havens investment level: $R\left(b_0\right) = \frac{\varepsilon}{\varepsilon - 1} r$. The investment level in the new equilibrium is

[9] The derivation is documented in the appendix. Note that alternatively, we can consider the case when $p = 0$, $\theta > 0$. In this case, those firms with $\theta \leq \tilde{b}$ shift all their income to the tax haven whereas the rest of the firms do not use the tax haven at all. The results are similar to the case where $\theta \equiv 0$, and are available upon request.

Table 1: The Bribe Rate and Investment after Introducing the Tax Haven

	$(\zeta+\phi)\|_{\tilde{b}=1/\varepsilon} > 1$	$(\zeta+\phi)\|_{\tilde{b}=1/\varepsilon} < 1$, $\tilde{b}^h < b_0$	$(\zeta+\phi)\|_{\tilde{b}=1/\varepsilon} < 1$, $\tilde{b}^h > b_0$
Bribe rate	↓	↑	↑
Investment	↑	↑	↓

higher than without havens if $\tilde{b}^h < b_0$. When the reported income is not very sensitive to the bribe rate, but if it responds then it will respond sufficiently fast, then both the bribe rate and investment rise.

Case 3 $(\zeta+\phi)|_{\tilde{b}=1/\varepsilon} < 1$ *and* $\tilde{b}^h > b_0$

If the reported income is neither very sensitive to the bribe rate, nor fast in changing, then the bribe rate will rise and investment will fall. The bribe rate increases with an introduction of cheap havens' services. This may not seem intuitive at the first sight; why it should be more profitable to charge higher bribes when it is easier for the firms to escape these bribes? The reason is that the corrupt government as a first mover fully internalises the potential benefit. However, this requires a special form of avoidance cost function with a very high degree of convexity of the costs of avoidance such that the bribe elasticity decreases with the amount of shifted income. This in turn allows higher monopoly prices – higher bribes. We view this scenario as a merely theoretical possibility, though, and we rule it out in the rest of the paper.

To sum up, table 1 presents the results of these three cases. Finally, note that if $\zeta + \phi = 1$, then bribes and investment remain unchanged if we shut down the tax haven.

We summarise this discussion in the following proposition.

Proposition 1 *Investment in the corrupt country is higher when all firms demand tax havens services as compared to the case when no firm demands tax havens' services.*

Proof. The proof of proposition 1 directly follows from the above discussion. ■

Since investment is mechanically related to the gross interest rate and hence also to the wage, the following corollary is immediate:

Corollary 1 *Under the assumptions of Proposition 1, the gross interest rate R (wage W) in the corrupt country is lower (higher) in the case of pervasive havens than in the case of no tax havens.*

Intuitively, the rents of the corrupt government should decrease in the presence of a tax haven because avoidance opportunities for firms put an additional constraint on the bribes that the government would like to impose.

Proposition 2 *In the absence of the threat of revolt, the corrupt government is at least not worse off in a situation without a tax haven than in the situation with a haven.*

Proof. See appendix. ■

There is a caveat in our formulation that may revert the result of Proposition 2. The corrupt government also wants to use tax havens, if $\eta > 0$. Clearly, for large values of the revolt probability, the gain from not letting the firms avoid bribes is dwarfed by the danger of losing all the bribe revenue as a result of people's upheaval.

Corollary 2 *There exists $\eta^\circ > 0$ such that the corrupt government prefers no havens for any $\eta < \eta^\circ$ and pervasive havens for any $\eta > \eta^\circ$.*

4 Extended Model

4.1 Endogenous Probability of Revolution

Thus far, we have assumed that probability of revolt η is exogenously given. However, it is likely that it is affected by the amount of provided public good.[10] In the following we assume that $\eta(g)$ is a decreasing convex function with $\lim_{g\to\infty} \eta(g) = 0$. We assume that g_0 is low enough not to be binding when havens are not available. Then the part of optimal solution for the problem (5) will be

$$-(1-s_g)\,\tilde{b}\,(1-\beta s_c)\,Rk\eta'(g^*) = 1. \tag{12}$$

[10] For example, the popular uprisings during the Arab Spring triggered a number of reports on dictators' secret deposits in tax havens (e.g., Schweizer Fernsehen; 2011). Protesters were demanding reforms (more public goods in our model) or the stepping down of rulers.

The use of tax havens is now profitable as long as $\eta(g^*)\tilde{b}(1-\beta s_c) \geq \theta_g$, so there will generally be an interior s_g^* such that the pair g^*, s_g^* solves the equation above together with

$$\eta(g^*)\tilde{b}(1-\beta s_c) = \theta_g. \tag{13}$$

Clearly, this interior solution is only possible, if $\tilde{b}(1-\beta s_c) > \theta_g$. Otherwise, no tax haven is used by the government.

4.1.1 The Effect of Tax Havens' Services

For prohibitively high θ, (13) can no longer hold, but (12) determines g^*:

$$-\tilde{b}Rk\eta'(g^*) = 1, \tag{14}$$

where bribe is determined by (9), i.e., independently of g. Thus, the probability of revolt can be determined from the inverse of the government revenue $1/\tilde{b}Rk$; the higher the government revenue, the higher the provision of public good.

In the opposite case, when buying concealment services is costless, the government will not provide any public good, and hence the public good constraint is binding. Notice that Proposition 1 still holds in our extended model, because its proof does not rely on any properties of η. To sum up, we have the following proposition.

Proposition 3 *It is always more attractive to eliminate tax havens if η is endogenous.*

Proof. See appendix. ■

Intuitively, the endogenous probability of losing the office adds another channel through which tax havens negatively affect the welfare in the corrupt countries. Namely, havens decrease the provision of public good in corrupt countries.

4.2 The Effects on the Corrupt and Non-Corrupt Countries

The above analysis has focused on the corrupt country. In this subsection, we consider the above-mentioned scenarios with a full setting. The tax haven fully shuts down and is prevented from providing services in either the corrupt or the non-corrupt country. In this extended setup, there is a potential asymmetry in the capital stock of both the non-corrupt and the corrupt country. Despite the fact that the net interest rates are equalised, the gross rates do not have to be equal, because of the different government objective functions. The market-clearing condition is $k(R) + k(R^c) = k^*$.This condition pins down the net interest rate in the world.

We summarise the results in the following proposition:

Proposition 4 *The elimination of tax havens increases welfare in the non-corrupt country and decreases it in the corrupted country, if factor prices are unaffected.*

Proof. See appendix. ■

Naturally, this result may be weakened or overturned if the endogenous revolt probability is taken into account. As we can see, Propositions 1 and 4 isolate different channels through which tax havens may affect welfare in the corrupt country. Proposition 1 describes a change in welfare due to the change in investment and hence wage income of the people. Proposition 4 studies the change in the world return on capital and through it on the welfare of the people who own this capital. Our finding is that the presence of tax havens affects welfare in the same direction through both channels.

If factor prices do change, the welfare effect in the corrupt country may arise from the change in investment and the net capital return. As for the non-corrupt country, it may benefit from an increase in R in the corrupt country only by attracting additional capital so that the results of Slemrod and Wilson hold. Correspondingly, a decrease in R in the corrupt country may act against the welfare gains of the non-corrupt country following eliminating tax havens.

4.3 Example

To provide a deeper insight, we present in this subsection an example employing specific functional forms and parameter values. The production is characterised by a Cobb–Douglas function: $f = k^\alpha$. This yields $R = \alpha k^{\alpha-1}$. Consequently, we obtain expressions for k, , $k'(R)$, and ε. Further, we calibrate the parameter $\alpha = \frac{1}{3}$ – a standard value in the literature. We assume that $\eta(g) = \frac{1}{1+Ag}$ where $A > 0$, and we solve for the optimal g. We calibrate

Table 2: Numerical Example

Parameter	α	ε	ap	r	A	B			
Value	$\frac{1}{3}$	$\frac{3}{2}$	0.05	0.01	2.7	0.95			
The tax haven provides services to the non-corrupt but not to the corrupt country									
Variable	s	$\tilde{b}^h$	$\tilde{b}^{nh}$	R^h	R^{nh}	k^h	k^{nh}	g^{nh}	
Value	0	0.05	$\frac{2}{3}$	$\frac{0.013}{0.95}$	0.03	178.2	37.037	0.15	
Tax havens' services are fully eliminated									
Variable	s	$\tilde{b}^h$	$\tilde{b}^{nh}$	R^h	R^{nh}	k^h	k^{nh}	g^{nh}	r^h
Value	0	0.05	$\frac{2}{3}$	$\frac{0.017826}{0.95}$	0.03	74.873	37.037	0.153	0.017

A by assuming that the real net interest rate is 1%. This gives $A = 2.7$. Note that $B := 1 - t(1 - s_n) - pc = 0.95$ to ensure equal gross interest rate across countries.

Suppose that the cost function for using tax havens' services is of the form $s = 1 - \exp\left\{-\frac{c}{a}\right\}$.[11] The parameter $a > 0$. Higher values of a correspond to high costs of avoidance. A summary of the numerical example is presented in table 2.

Consider a tax haven that provides services to the non-corrupt country but not to the corrupt country. The tax haven serves as a threatening mechanism that forces the corrupt government to keep the bribe rate rather low. This in turn lowers the gross interest rate and enhances investment. In the lowest panel in table 2, we consider completely shutting down the tax haven. As a result, the net interest rate can be altered. In the absence of the tax haven, the following condition holds:

$$\left(\frac{r}{(1-t)\,\alpha}\right)^{\frac{1}{\alpha-1}} + \left(\frac{r}{\alpha^2}\right)^{\frac{1}{\alpha-1}} = k^*,$$

in contrast to a world with a tax haven, where

$$\left(\frac{1}{\alpha}\frac{r}{1-t(1-s_n)-pc}\right)^{\frac{1}{\alpha-1}} + \left(\frac{1}{\alpha}\frac{r}{1-\tilde{b}}\right)^{\frac{1}{\alpha-1}} = k^*.$$

The results show that the positive effect of the tax haven on investment is weakened by the general-equilibrium effect. The outflow of capital is not

[11] This functional form is suggested by Reinganum and Wilde (1986).

as large as in the case of fixed net and gross interest rates in the non-corrupt country. The welfare channel through the provision of public good, however, does not change. In the next subsection, we summarise our results and position our contribution in the literature.

4.4 A Summary of Our Welfare Analysis

Is the elimination of tax havens welfare enhancing? Our contribution for answering the above question can be summarised as follows:

- For a fixed bribe rate, tax havens can have positive effects on welfare by facilitating investment by firms fearing bribes and expropriation in corrupt countries. However, this effect is weakened by the corrupt government reducing the bribe rate. The net effect depends on the exact functional form of the cost of using tax havens and on the interest elasticity of capital demand.

- Welfare effects of tax havens go beyond firms' operations. Tax havens have negative effects on welfare by facilitating deporting and the concealment of officials' bribes.

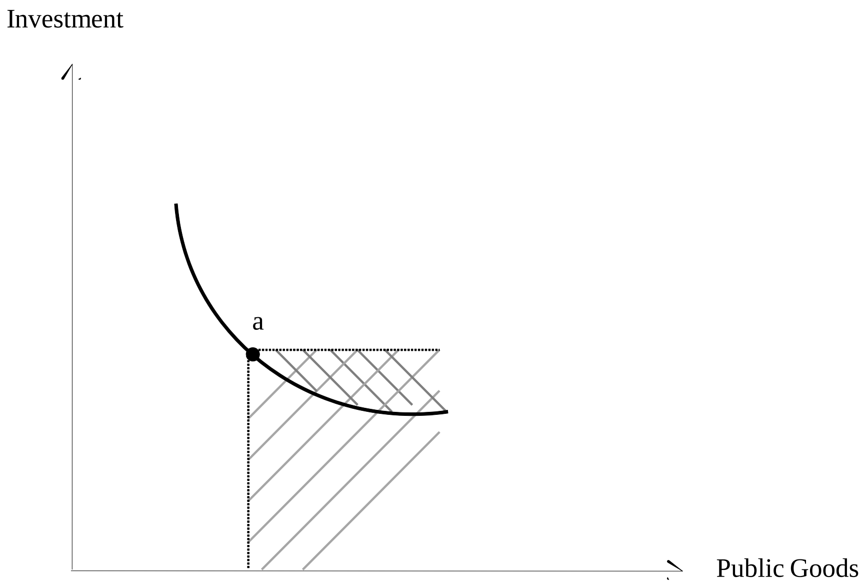
- The final effects on welfare are illustrated in figure 1. Under standard preferences, the welfare function is concave in investment and public goods. Even if we assume that investment will always decrease as a result of shutting down tax havens, the net impact on welfare can be positive. Starting from an initial point (a), eliminating tax havens' services will cause either a movement along the welfare curve to the south of (a) or a shift to another welfare curve within the shaded rectangle. The final effect will be positive if the new welfare curve is located somewhere within the shaded region determined by the initial welfare curve and the horizontal line through point (a).

5 Empirical Analysis

5.1 Firm-Level Data

We use the German MiDi firm-level data on outbound foreign direct investment (FDI). This data set is exceptionally suited for our analysis. In

Figure 1: Welfare Effects of Eliminating Tax Havens' Services

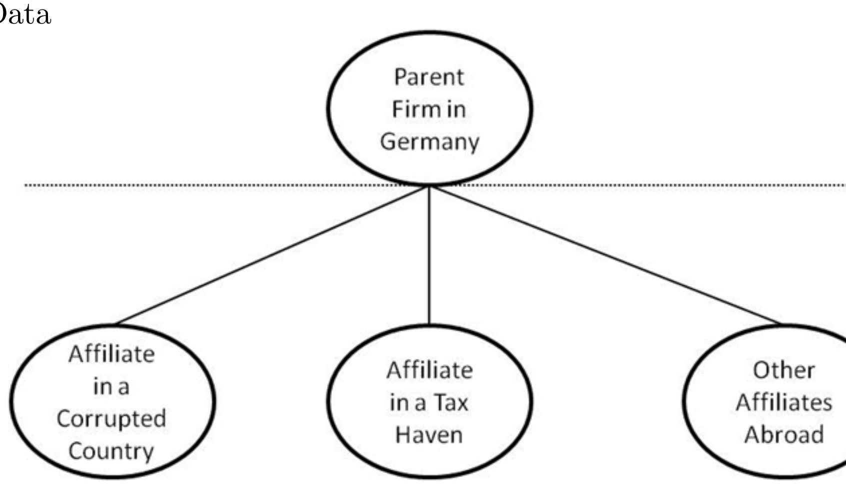


contrast to several other firm-level data, the MiDi data include the "population" of German firms investing abroad. The German foreign trade and payments regulation obliges all firms investing abroad, and satisfying the reporting requirements, to report key information on their affiliates abroad. Consequently, we are not greatly concerned about sample selection bias or non-random sampling. The data contain detailed information on the ownership chain. That is, we can observe if the parent firm indirectly, via another firm, owns an affiliate in a tax haven. The data span from 1996 to 2008 and contain about 23,000 observations a year at the affiliate level (about 7000 parent firms a year). Lipponer (2008) provides a detailed description of the MiDi data.

5.2 Econometric Specification

Empirically, welfare and detailed information on tax evasion and corruption-related matters are unobservable. However, our data contain parent firms located in Germany investing via affiliates around the world. To map from our theory to the empirics, we note that the maximisation problem of the par-

Figure 2: A Demonstration of a Simple Structure of a Multinational Firm in the Data



ent firm is equivalent to maximising profits separately in the non-corrupted country and in the corrupted country. Our idea is to test the crucial hypothesis directly implied by our theoretical sketch.

Hypothesis 1: The number of firms using tax havens increases with an increase in bribes b and the expropriation probability δ.

An increase in bribes and/or the probability of expropriations is in essence an increase in a measure of corruption. For the empirical analysis, Hypothesis 1 can be reformulated as:

Hypothesis 1' : The presence of a firm in a highly corrupt country, as captured by a corruption measure, has a positive effect on the probability of having an affiliate in a tax haven.

To test Hypothesis 1', we have to transform the country-specific variables associated with affiliated firms to parent-firm-specific variables. Figure 2 illustrates the structure of the data in connection with our application. for this purpose, we exploit the information on the ownership structure and the foreign investment of the parent firm.

We employ a discrete choice setup:

$$y_{k,t} = \alpha_0 + \alpha_1 hc_{k,t} + \alpha_2 high\_taxfirm_{k,t} + \boldsymbol{\beta}\mathbf{X}_{k,t} + \boldsymbol{\psi}_k + \boldsymbol{\phi}_t + e_{k,t} \qquad (15)$$

The dependent variable is defined as follows:

- $y1_{k,t} = \begin{cases} 1 \text{ if parent firm } k \text{ has an affiliate in a tax haven in year } t \\ 0 \text{ otherwise} \end{cases}$

Table 3 displays a list of tax havens in our data set. This list draws on Rose and Spiegel (2007). The corresponding variable is denoted by y_1. As emphasised in Hines (2010), different lists based on different criteria share to a very a large extent identical countries. For robustness, since some may debate the role of Austria as a haven and it might be particularly important for German firms, we also define y_2 after excluding Austria from the list of havens. Further, we define y_3 based on the OECD report published in 2009 that lists jurisdictions that had not committed to (or committed but not substantially implemented) the internationally agreed tax standard, and also other financial centres.

The variable of interest is

- $hc_{k,t} = \begin{cases} 1 \text{ if parent firm } k \text{ operates in a highly corrupt country in year } t \\ 0 \text{ otherwise} \end{cases}$

A country is considered to be highly corrupt if the value of its corruption index lies in the lowest quartile of the World Bank Control of Corruption index.[12] Table 4 displays the countries that satisfy this criterion. We denote the variable based on this list by hc_1. For robustness, we also define another variable, hc_2, based on the Freedom from Corruption index of the Heritage Institute.

We employ pooled and also conditional fixed-effects logistic regressions allowing for unobserved heterogeneity at the parent level as captured by $\boldsymbol{\psi}_k$. Additionally, we include year-fixed effects $\boldsymbol{\phi}_t$. The residual is denoted by $e_{k,t}$. We rely on maximum likelihood estimations. Since $hc_{k,t}$ is defined as an alternative-specific variable, the sign of the estimated coefficient α_1 reflects the sign of the effect of $hc_{k,t}$ on $y_{k,t}$. Our interest is in the qualitative effects rather than the magnitudes of the elasticities.

We control for tax planning activities related to multinational affiliates located in high-tax countries by including the following variable in the regressions:

- $high\_taxfirm_{k,t} = \begin{cases} 1 \text{ if parent firm } k \text{ operates in a high-tax country in year } t \\ 0 \text{ otherwise} \end{cases}$

[12] A high value of this index indicates a low level of corruption. See Kaufmann, Kraay, and Mastruzzi (2010) for details on the methodology and construction of the Control of Corruption index.

Table 3: A List of Tax Havens in Our Sample

Tax Havens			
Europe	Middle East and Africa	America	Asia
Austria*	Bahrain*	Bahamas*	Macau
Cyprus	Israel	Barbados	Malaysia*
Gibraltar*	Kuwait	Belize	Marshall Islands*
Guernsey	Liberia*	Bermuda*	Singapore*
Isle of Man	Morocco	British Virgin Islands	Thailand
Jersey	Mauritius	Cayman Islands*	
Liechtenstein*	Oman	Costa Rica*	
Luxembourg*		Dominica*	
Malta		Netherlands Antilles*	
Switzerland*		Panama*	
		St. Kitts and Nevis*	
		Uruguay*	

Note: This list of countries is used to construct y1. The variable y2 is based on this list excluding Austria. The variable y3 is based on countries marked with "*" in addition to Antigua and Barbuda, Belgium, Guatemala, Philippines, and San Marino

A country is considered to be a high-tax country if its statutory corporate income tax rate lies in the highest quartile of tax rates in the sample. De facto, Germany exempts foreign income from taxation. Hence, it is particularly attractive to establish an affiliate in a tax haven if the parent firm operates in high-tax country.[13] As further control variables in **X**, following Desai et al. (2006), we include the size and the square of the size of the firm as captured by the sum of all revenues from its operations abroad (excluding revenues from affiliates located in tax havens). Some theoretical studies suggest that larger firms are more likely to demand tax havens' services (Krautheim and Schmidt-Eisenlohr; 2011). Table 5 lists the variables used in the regression analysis and descriptive statistics.

[13] See Gumpert et al. (2011).

Table 4: Countries with High Levels of Corruption in Our Sample (World Bank Index)

Europe and CIS	Middle East and Africa	America	Asia
Albania	Algeria	Bolivia	Bangladesh
Azerbaijan	Angola	Columbia	Indonesia
Belarus	Cameroon	Dominican Republic	Iran
Bulgaria	Congo	Ecuador	Pakistan
Georgia	Côte d'Ivoire	El Salvador	Philippines
Kazakhstan	Egypt	Guatemala	Vietnam
Macedonia	Kenya	Honduras	
Moldova	Lebanon	Nicaragua	
Romania	Libya	Paraguay	
Russian Federation	Malawi	Venezuela	
Ukraine	Nigeria		
Uzbekistan	Syria		
	Tanzania		
	Uganda		
	Zambia		

Table 5: A List of Variables

Variable	Description	Mean	Standard Deviation	Source
y1	dummy equals 1 if a parent firm has an affiliate in a tax haven in a certain year according to table (1). Otherwise, it is zero	0.49	0.49	MiDi data
y2	dummy equals 1 if a parent firm has an affiliate in a tax haven in a certain year according to table (1) excluding Austria. Otherwise, it is zero	0.34	0.47	MiDi data
y3	dummy equals 1 if a parent firm has an affiliate in a tax haven in a certain year according to the OECD 2009; a subset of table (1)	0.53	0.49	MiDi data
hc1	dummy equals 1 if a parent firm has an affiliate in a very corrupt country in a certain year according to table 2; (lowest quartile of the World BankControl of Courrption Index). Otherwise, it is zero	0.10	0.31	MiDi data and Kaufman et al. (2010)
hc2	dummy equals 1 if a parent firm has an affiliate in a very corrupt country in a certain year according to lowest quartile of the Freedom from Corruption index of the Heritage Institute	0.17	0.38	MiDi data and Heritage Institute
placebo	dummy equals 1 if a parent firm has an affiliate in a non-corrupt country in a certain year according to the highest quartile of the WB Control of Courrption Index.	0.84	0.36	MiDi data and Kaufman et al. (2010)
hightaxfirm	dummy equals 1 if a parent firm has an affiliate in a high tax country Criterion: highest 25th percentile of the sample. Otherwise, it is zero	0.75	0.42	MiDi data and Mintz and Weichenrieder (2010)
log total sales	the logarithm of total sales of all affiliates aboard excluding those located in tax havens	10.4	1.7	MiDi data
sq(log total sales)	the sqaure of log total sales	113.1	38.1	
log No. of sectors	the logarithm of the number of sectors in which the parent firm is operating (a measure of the diversity of the firm)	0.48	0.52	MiDi data
size inv corru	the logarithm of 1+ sum of total balance sheets of all affiliates operating in corrupted countries	0.71	2.5	MiDi data

5.3 Empirical Results

Conditional logit estimates rely on time-varying parent-firm-specific variables. However, some firms do not operate at all in tax havens, while others do operate in tax havens during the entire sample period. Consequently, in order to exploit cross-sectional variation, we present in the first four columns of table 6 estimation results from a pooled logit with industry and year fixed effects. Robust standard errors are reported between brackets. The effect of $hc1$ on the probability of having an affiliate located in a tax haven is positive and significant at the 1 percent confidence level in all specifications with and without industry fixed effects. This result supports Hypothesis 1. Column (3) includes also control variables. Firms that operate in high-tax countries are more likely to operate also in tax havens. This is consistent with the notion that multinational firms use tax haven operations for tax planning purposes, especially under exemption regimes (Gumpert et al., 2011).

Further, we allow for a possible correlation between the size of the firm and its presence in a corrupt country. The estimated coefficient of the size of the parent firm, as captured by the log of its total sales around the world excluding revenues from its tax havens, is positive. We include also the square of the size of the firm. It enters with a significant negative effect. Since the model is not linear, the qualitative interaction effect of the size of the firm cannot be read directly from those estimates. Elasticities have to be computed for this variable. However, when we include only the size variable without its square, the effect is positive, suggesting that the larger the firm, the larger the probability of demanding tax havens' services (results are not reported). More importantly, the significance and the sign of the coefficient of $hc1$ are maintained. Additionally, in column (4), we re-estimate the model but exclude financial services firms from the sample. The results are maintained.

To allow for unobserved heterogeneity at the firm level, we present in columns (5) to (8) conditional logit estimates with parent firm fixed effects. This strategy also allows for industry-specific variables, since these are nested in the firm-specific effects. Standard errors are clustered at the parent firm level, allowing the error terms to be correlated within a group. The positive and highly significant estimated coefficient of hc_1 of 1.263 in column (1) also supports Hypothesis 1.

In addition, we include a measure of diversification of parent firm activities. It also, to some extent, reflects the size of the firm. The results suggest that it is positively associated with the probability of having an affiliate in a tax haven. Furthermore, the estimates indicate that operating in high-tax countries and diversification of the firm increase the probability of demanding tax havens' services. We obtain similar results in column (8) after we discard financial firms.

For further robustness checks, tables 7 and 8 provide additional results particularly regarding three aspects: (1) The choice of the list of tax havens. For this purpose, we use a new dependent variable y_2 based on the list of havens excluding Austria to ensure that the results are not driven by a special bordering country. Also, as listed in table (3), we define $y3$ based on the OECD (2009). (2) The choice of the list of corrupt countries. For this purpose, we use the Heritage Institute Freedom from Corruption index, instead of the World Bank Control of Corruption index, to identify highly corrupt countries. The corresponding variable is denoted by $hc2$. (3) The inclusion of a continuous corruption measure rather than a discrete one. We define "*size inv corru*" as the logarithm of (1+) the size of firms' operations in corrupt countries. Our results are maintained in all specifications. For instance, the first 5 columns in table 8 show that our variable of interest *size inv corru* is positive and significant together with the other two size variables and the diversification variable. This is reassuring that our results are not driven by a mechanical correlation between the size of the firm and operating in corrupted countries. Thus, over all, after controlling for operation in high-tax countries, size, and the diversity of the firm, the estimates are consistent with Hypothesis 1.

Finally, we end this section by stressing the caveat that our theoretical reasoning in the previous sections is not a model of firms' entry into foreign economies. Empirically, for the purposes of our study, we are essentially interested in establishing a formal correlation between operating in corrupt countries and in tax havens after controlling for size and other parent-firm characteristics. While our conditional logistic regression results suggest a causal relationship, sceptical readers may raise concerns about potential endogeneity in that firms invest in corrupt countries because they already have affiliates in tax havens, and not the other way around. However, the essential point to be made here is that there is empirical association, and this is in line with what our theoretical sketch posits. Namely, income will be transferred from corrupt countries to tax havens. Still, we run a placebo test as a simple check. We define a dummy for the presence of a firm in low-corruption country based on the highest quartile of the World Bank corruption index (*placebo*). The last three columns in table 8 show conditional logit estimates with parent firm fixed effects using $y1$, $y2$, and $y3$ as dependent variables. The variable *placebo* is insignificant in all specifications, and has no power in explaining the probability of establishing affiliates in tax havens. Another argument in supporting of our presentation is the notion that the cost of establishing a tax haven affiliate can be relatively low compared to investing in corrupt countries. For example, Sharman (2010) indicates that one can open a bank account in an offshore island for "only" 800 U.S. dollar.

Table 6: Estimation Results

	Pooled Logit Model				Conditional Logit			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Full Sample	Full Sample	Full Sample	No Financial Firms	Full Sample	Full Sample	Full Sample	No Financial Firms
hc1	0.685***	0.724***	0.464***	0.480***	1.263***	0.678***	0.616***	0.612***
	(.030)	(.031)	(.040)	(.040)	(.177)	(.198)	(.199)	(.201)
hightaxfirm			0.495***	0.483***		0.360***	0.371***	0.370***
			(.025)	(.025)		(.100)	(.100)	(.101)
log total sales			0.502***	0.517***		0.414***	-0.871**	-0.831**
			(.052)	(.053)		(.058)	(.375)	(.385)
sq(log total sales)			-0.015***	-0.016***			0.063***	0.062***
			(.002)	(.002)			(.019)	(.019)
log No. of sectors			1.791***	1.787***		2.928***	2.894***	2.880***
			(.026)	(.026)		(.156)	(.156)	(.158)
Sector dummies	no	yes	yes	yes	no	no	no	no
Year fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
Firm fixed effects	no	no	no	no	yes	yes	yes	yes
Sample period	1996-2008	1996-2008	1996-2008	1996-2008	1996-2008	1996-2008	1996-2008	1996-2008
Log likelihood	-61252.3	-59616.4	-31744.6	-31030.9	-6996.7	-4654.1	-4638.5	-4490.2
Number of Obs.	96794	96714	75111	73650	18047	15125	15125	14702

Note: *** indicates significance at 1 percent, ** indicates significance at 5 percent, and * indicates significance at the 10 percent level. Standard errors are robust for the pooled logit estimates, and are clustered at the parent firm level for the conditional logit estimates. The reader is referred to table (5) for a description of the variables.

Table 7: Robustness 1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	y2	y2	y1	y1	y3	y3	y3	y3
h1	1.296***	0.574***			0.661***	0.495**		
	(.170)	(.188)			(.104)	(.216)		
h2			0.894***	0.545***			0.661***	0.356***
			(.102)	(.107)			(.104)	(.111)
hightaxfirm		0.277**		0.371***		0.754***		0.754***
		(.111)		(.099)		(.102)		(.101)
log total sales		-0.555		-0.893**		-1.008**		-1.036**
		(.391)		(.373)		(.402)		(.403)
sq(log total sales)		0.046***		0.064***		0.077***		0.078***
		(.019)		(.018)		(.102)		(.020)
log No. of sectors		2.636***		2.900***		2.888***		2.893***
		(.154)		(.156)		(.165)		(.165)
Year fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
Firm-fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
Sample period	1996-2008	1996-2008	1996-2008	1996-2008	1996-2008	1996-2008	1996-2008	1996-2008
Log likelihood	-6233.5	-4050.5	-6991.4	-4630.0	-7172.9	-4630.0	-7172.9	-4590.3
Number of Obs.	15925	12841	18047	15125	18470	15125	18470	15566

Note: *** indicates significance at 1 percent, ** indicates significance at 5 percent, and * indicates significance at the 10 percent level. Standard errors are robust for pooled logit estimates, and are clustered at the parent firm level for the conditional logit estimates.The reader is referred to table (5) for a description of the variables.

Table 8: Robustness 2

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	y1	y1	y1	y2	y3	y1	y2	y3
size inv corru	0.046***	0.132***	0.073***	0.064***	0.061***			
	(.004)	(.018)	(.021)	(.020)	(.023)			
placebo						0.091	0.071	-0.252
						(.169)	(.204)	(.170)
hightaxfirm	0.497***		0.375***	0.279**	0.757***	0.364***	0.271**	0.780***
	(.026)		(.099)	(.111)	(.102)	(.100)	(.111)	(.102)
log total sales	0.507***		-0.844**	-0.534	-0.989**	-0.969**	-0.670*	-1.038**
	(.052)		(.375)	(.391)	(.402)	(.376)	(.396)	(.102)
sq(log total sales)	-0.015***		0.061***	0.045**	0.076***	0.068***	0.052***	0.080***
	(.002)		(.018)	(.019)	(.020)	(0.018)	(0.019)	(.20)
log No. of sectors	1.792***		2.890***	2.633***	2.887***	2.895***	2.648***	2.918***
	(.026)		(.155)	(.154)	(.165	(.157)	(.156)	(.165)
Sector dummies	yes	no	no	no	no	no	no	no
Year fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
Firm-fixed effects	no	yes	yes	yes	yes	yes	yes	yes
Sample period	1996-2008	1996-2008	1996-2008	1996-2008	1996-2008	1996-2008	1996-2008	1996-2008
Log likelihood	-31752.6	-7004.1	-4636.5	-4049.6	-4590.2	-4649.1	-4061.1	
Number of Obs.	75111	18047	15125	12481	15566	15125	12841	

Note: *** indicates significance at 1 percent, ** indicates significance at 5 percent, and * indicates significance at the 10 percent level. Standard errors are robust for pooled logit estimates, and are clustered at the parent firm level for the conditional logit estimates.The reader is referred to table (5) for a description of the variables.

6 Conclusion

Tax havens are often cited as components of sophisticated money laundering schemes employed by corrupt officials. On the other front, multinational firms can rely, in the words of Slemrod (2010), on "a mere stroke of the pen" to design and implement their tax and other related strategies. We have developed a theoretical model of the choice of optimal bribes by corrupt officials and the share of the proceeds of corruption that will be concealed in tax havens. Our sketch links firms' investment in corrupt countries and their demand for tax havens' services in order to escape higher bribes and expropriation. The model offers an explanation for the need of firms for tax havens' services even if the statutory tax rate is low. Furthermore, our model has indicated new welfare effects of eliminating tax havens. Tax havens may support investment in corrupt countries, but at the same time they provide a secure shelter for corrupt officials' earnings. Based on firm-level data on outbound FDI, we have found empirical support for one hypothesis implied by our model: firms' investment in highly corrupt countries is associated with a high probability of having affiliates in tax havens.

One policy implication of our study is that eliminating tax havens' operations must be considered from a global perspective. Tax havens in our model could flourish even if they were to stop providing services to firms in highly advanced ("non-corrupt") economies. A treaty or an arrangement that does not consider also developing and resource-rich countries may not be effective. Our theoretical model is static. A dynamic approach may reveal further welfare effects of shutting down tax havens by modelling the transition from a corrupt country to a non-corrupt country. While a tax haven can support investment (and corruption) in corrupt countries in view of their weak institutional setup, eradicating corruption can substantially enhance foreign direct investment. Such a framework can be a fruitful topic for future research.

7 Appendix

7.1 Second Order Condition

To simplify notations, in what follows, we skip the subscripts attached to s.

$$\left(1-\beta ds-sd\beta-\tilde{b}\frac{d\beta}{d\tilde{b}}ds-s\frac{d\beta}{d\tilde{b}}d\tilde{b}-s\tilde{b}\frac{d^2\beta}{d\tilde{b}^2}d\tilde{b}-\tilde{b}\frac{ds}{d\tilde{b}}d\beta-\beta\frac{ds}{d\tilde{b}}d\tilde{b}-\beta\tilde{b}\frac{d^2s}{d\tilde{b}^2}d\tilde{b}\right)Rk$$
$$+\left(d\tilde{b}\left(1-\beta s\right)-d\beta s\tilde{b}-ds\beta\tilde{b}\right)\left(k+Rk'(R)\right)\frac{dR}{d\tilde{b}}$$
$$+\left(\tilde{b}\left(1-\beta s\right)-\theta_g\right)\left(dk+dRk'(R)+Rdk'(R)\right)\frac{dR}{d\tilde{b}}$$
$$+\left(\tilde{b}\left(1-\beta s\right)-\theta_g\right)\left(k+Rk'(R)\right)\frac{d^2R}{d\tilde{b}^2}d\tilde{b}<0,$$

A necessary condition for interior equilibrium is

$$\left(1-\beta s-s\frac{d\beta}{d\tilde{b}}\left(1\right)-\beta\frac{ds}{d\tilde{b}}\left(1\right)\right)R+\left(1-\varepsilon\right)\left(\left(1-\beta s\right)-\theta_g\right)\frac{dR}{d\tilde{b}}\left(1\right)<0.$$

For zero-fixed costs, this expression simplifies to:

$$\left(1-s+\frac{s'^2}{s''}\right)\left(s-pc\right)+\left(1-\varepsilon\right)\left(1-s\right)^2<0.$$

7.2 Optimal Bribes with Pervasive Havens

From the optimality condition (7) with $\theta=\theta_g=0$ and $\beta=1$, $\frac{d\beta}{d\tilde{b}}=0$. We write:

$$\left(1-s-\tilde{b}\frac{ds}{d\tilde{b}}\right)R+\left(1-\varepsilon\right)\tilde{b}\left(1-s\right)\frac{dR}{d\tilde{b}}=0. \tag{18a}$$

We implicitly differentiate (9) and apply the envelope theorem to obtain:

$$\left(1-\tilde{b}\left(1-s\right)-pc\right)\frac{dR}{d\tilde{b}}=\left(1-s\right)R.$$

Since profits of the firms cannot go up as a result of an increase in bribes, the right-hand side of the above expression is positive. Since the left-hand side is positive as well, it must be that $\frac{dR}{d\tilde{b}}>0$.

Plugging this into (18a), we get:

$$\left(1 - s - \tilde{b}\frac{ds}{d\tilde{b}}\right) R + (1-\varepsilon)\,\tilde{b}\,(1-s)^2\, R\left(1 - \tilde{b}\,(1-s) - pc\right)^{-1} = 0. \quad \text{(19a)}$$

However, from the first order condition of the firms:

$$s'\tilde{b} = p,$$

and

$$\begin{aligned} s' d\tilde{b} + s''\tilde{b}dc &= 0, \\ \frac{dc}{d\tilde{b}} &= -\frac{s'}{s''\tilde{b}}. \end{aligned}$$

Hence,

$$\frac{ds}{d\tilde{b}} = s'\frac{dc}{d\tilde{b}} = -\frac{s'^2}{s''\tilde{b}}.$$

Plug $\frac{ds}{d\tilde{b}} = -\frac{s'^2}{s''\tilde{b}}$ into (19a):

$$\left(1 - s + \frac{s'^2}{s''}\right) R + (1-\varepsilon)\,\tilde{b}\,(1-s)^2\, R\left(1 - \tilde{b}\,(1-s) - pc\right)^{-1} = 0,$$

where $1 - s + \frac{s'^2}{s''} > 0$ (correspondingly, $(1-s)\,s'' + s'^2 < 0$). Otherwise, the equality does not hold because $\frac{dR}{d\tilde{b}} > 0$ and $\varepsilon > 1$. Simplifying with the use of FOC $s'\tilde{b} = p$, we get the expression (10).

7.3 Deriving Condition (11)

Start from a situation without a tax haven. The optimal bribe rate is just the inverse of capital demand elasticity, $\tilde{b} = \frac{1}{\varepsilon}$. Next, introduce a tax haven. Without the reaction of the corrupt government, firms will increase their profit from $\left(1 - \frac{1}{\varepsilon}\right) R$ to $\left(1 - \frac{1-s}{\varepsilon} - pc\right) R$. Naturally, the investment will then increase, driving the interest rate down to match the world net interest rate r. Faced with this higher capital, the government will want to raise the bribe rate, if $d\left[\tilde{b}\,(1-s)\,Rk\right]/d\tilde{b}|_{\tilde{b}=1/\varepsilon} > 0$; that is, the government revenue increases. The total effect of the bribe can be decompose into 3 effects: (1) The direct positive effect $(1-s)\,Rk$, (2) the negative effect of inducing avoidance $-\tilde{b}Rk\frac{ds}{d\tilde{b}}$, and (3) a negative effect of decreasing investment $\tilde{b}\,(1-s)\,\frac{d(Rk)}{d\tilde{b}}$ (because $\frac{dR}{d\tilde{b}} > 0$ and $\frac{d(Rk)}{dR} = k\,(1-\varepsilon) < 0$).

The condition for an increase in the bribe rate is

$$(1-s)\,Rk > \tilde{b}Rk\frac{ds}{db} - \tilde{b}\,(1-s)\,\frac{d\,(Rk\,(R))}{db},$$

all evaluated at $\tilde{b} = 1/\varepsilon$. Plug ζ and η into the previous expression to obtain the condition for an increase in the bribe rate in the presence of the tax haven:

$$\zeta + \eta < 1.$$

7.4 Proof of Proposition 2

With $\eta = \theta_g = 0$, consider a change in bribe rate that preserves the gross interest rate and hence investment. From (8) and (9) we get $\tilde{b}^{nh} = \tilde{b}^{h}\,(1-s_c) + pc$. The havens allocation is feasible, when no haven is available. Then the statement of the proposition follows by revealed preference argument with the government being strictly better off whenever $\tilde{b}s_c > pc$.

7.5 Proof of Proposition 3

Since g_0 is assumed to be sufficiently small (in fact, it can be normalised to zero), we have $g^* > g_0$. At the same time, R and k are the same regardless of whether η is exogenous or not. Since the utility $u(x,g)$ is increasing in g, the utility is higher with endogenous probability if there were no havens; in the case with pervasive havens, it is the same, whether the probability is exogenous or endogenous.

7.6 Proof of Proposition 4

The result for the non-corrupt country is proven in Slemrod and Wilson (2009). Regarding the corrupt country, introducing the tax haven puts downward pressure on R. In order to keep R unchanged, r has to increase as described in Proposition 1. Then we have $r^{nh} < r^{h} \Rightarrow x^{nh} < x^{h}$ and $u(x^{nh}, g_0) < u(x^{h}, g_0)$.

References

[1] Bardhan, P. (1997), Corruption and development: a review of issues. *Journal of Economic Literature* XXXV, pp. 1320-1346.

[2] Becker, J., and Fuest, C. (2010), Tax enforcement and tax havens under formula appointment, *International Tax and Public Finance* 17, pp. 217–235.

[3] Bucovetsky, S. (2010), Honor among tax havens, mimeo, University of York, Canada.

[4] Desai, M., Foley, F., and Hines, J. R. (2006), The demand for tax haven operations, *Journal of Public Economics* 90 (3), pp. 513-531.

[5] Dharmapala, D. (2008), What problems and opportunities are created by tax havens?, *Oxford Review of Economic Policy* 24 (4), pp. 661-679.

[6] Dharmapala, D., and Hines, J. R. (2009), Which countries become tax havens?, *Journal of Public Economics* 93 (9-10), pp. 1058-1068.

[7] Financial Action Task Force. (2011), Laundering the Proceeds of Corruption, FATF/OECD, Paris.

[8] Fisman , R., and Svensson, J. (2007), Are corruption and taxation really harmful to growth? firm level evidence, *Journal of Development Economic*s 83 (1), pp. 63-75.

[9] Fuest, C., and Riedel, N. (2010), Tax evasion and tax avoidance in developing countries: the role of intentional profit shifting, Oxford University Centre for Business Taxation.

[10] Gumpert, A., Hines, J., and Schnitzer, M. (2011), The use of tax havens in exemption regimes, mimeo.

[11] Hebous, S. (2011), Money at the docks of tax havens: a guide, mimeo, Goethe University Frankfurt.

[12] Hines, J. R. (2010), Treasure islands, *Journal of Economic Perspectives* 24 (4), 103-126.

[13] Hong, Q., and Smart, M. (2010), In praise of tax havens: International tax planning and foreign direct investment, *European Economic Review* 54 (1), pp. 82-95.

[14] Johannesen, N. (2010a), Imperfect tax competition for profits, asymmetric equilibrium and beneficial tax havens, *Journal of International Economics* 81 (2), 253-264.

[15] Johannesen, N. (2010b), Optimal fiscal barriers to international economic integration in the presence of tax havens, mimeo, University of Copenhagen.

[16] Kanbur, R., and Keen, M. (1993), Jeux sans frontieres: tax competition and tax coordination when countries differ in size, *American Economic Review* 83, 877-892.

[17] Kaufmann, D., Kraay, A., and Mastruzzi, M. (2010), The Worldwide Governance Indicators: Methodology and Analytical Issues. The Brookings Institution, Washington DC.

[18] Kesternich, I. and Schnitzer, M. (2010), Who is afraid of political risk? multinational firms and their choice of capital structure, *Journal of International Economics* 2: 208-218.

[19] Konrad, K., and Lommerud, K. (2001), Foreign direct investment, intra-firm trade and ownership structure, *European Economic Review* 45 (3), 475-494.

[20] Krautheim, S., and Schmidt-Eisenlohr, T. (2011), Heterogeneous firms, profit shifting FDI and international tax competition, *Journal of Public Economics* 95 (1-2), 122-133.

[21] Lipponer, A. (2008), Micro Database Direct Investment — MiDi. Deutsche Bundesbank, Frankfurt am Main.

[22] Los Angeles Times (2011), As Libya takes stock, Moammar Kadafi's hidden riches astound, October 21.

http://articles.latimes.com/2011/oct/21/world/la-fg-kadafi-money-20111022

[23] Maffini, G. (2009), Tax haven activities and the tax liabilities of lultinational groups, Oxford Centre for Business Taxation Working Paper No. 09/25.

[24] Mintz, J. and Weichenrieder, A. (2010), The Indirect Side of Direct Investment: Multinational Company Finance and Taxation. MIT press. Cambridge, Mass.

[25] Norwegian Ministry of Foreign Affairs, (2009), Tax Havens and Development, Commission on Capital Flights from Developing Economies, Oslo.

[26] OECD, (2009), A Progress Report on the Jurisdictions Surveyed by the OECD Global Forum in Implementing the Internationally Agreed Tax Standards, April 2009, OECD, Paris. Available at: www.OECD.org.

[27] Reinganum, J. F., and Wilde, L. (1986), Equilibrium verification and reporting policies in a model of tax compliance, *International Economic Review* 27, 739-60.

[28] Rose, A., and Spiegel, M. (2007), Offshore financial centres: parasites or symbionts?, *Economic Journal* 117, 1310-1335.

[29] Schjelderup, G. (2011), Secrecy jurisdictions, mimeo, NHH, Bergen.

[30] Sharman, J. C. (2010), Shopping for anonymous shell companies: an audit study of anonymity and crime in the international financial system, *Journal of Economic Perspectives* 24 (4), 127-140.

[31] Shleifer, A. and Vishny, R. (1993), Corruption, *Quarterly Journal of Economics* 108 (3), pp. 599-617

[32] Slemrod, J. (2008), Why is Elvis on Burkina Faso postage stamps? cross-country evidence on the commercialization of state sovereignty, *Journal of Empirical Legal Studies 5* (4), 683-712.

[33] Slemrod, J. (2010), Location, (real) location, (tax) location: an essay on mobility's place in optimal taxation, *National Tax Journal* 63 (4), 843-864.

[34] Slemrod, J., and Wilson, D. (2009), Tax competition with parasitic tax havens, *Journal of Public Economics* 93 (11-12), 1261-1270.

[35] Svensson, J. (2005), Eight questions about corruption. *Journal of Economic Perspectives* 19 (3), pp. 19-42.

[36] Schweizer Fernsehen (2011), Gaddafi, Mubarak und Ben Ali haben 830 Mio. Fr. in der Schweiz, May 2011. Available at:

http://www.tagesschau.sf.tv/Nachrichten/Archiv/2011/05/02/Schweiz/Gaddafi-Mubarak-und-Ben-Ali-haben-830-Mio.-Fr.-in-der-Schweiz

[37] Torvik, R. (2009), Why are tax havens more harmful to developing countries than to other countries?, Memorandum Written for the Commission to the Norwegian Government Commission on Tax Havens.

Oxford University Centre for Business Taxation Working Paper series

WP12/03 Neils Johannesen *Strategic line drawing between debt and equity*

WP12/02 Chongyang Chen, Zhonglan Dai, Douglas A. Shackelford and Harold H. Zhang, *Does Financial Constraint Affect Shareholder Taxes and the Cost of Equity Capital?*

WP12/01 Stephen R. Bond and Irem Guceri, *Trends in UK BERD after the Introduction of R&D Tax Credits*

WP11/23 Krautheim, Sebastian and Tim Schmidt-Eisenlohr *Wages and International Tax Competition*

WP11/22 Haufler, Andreas, Pehr-Johan Nörback and Lars Persson *Entrepreneurial innovation and taxation*

WP11/21 Mancini, Raffaele, Paolo M. Panteghini and Maria laura Parisi *Debt-Shifting in Europe*

WP11/20 Xing, Jing *Does tax structure affect economic growth? Empirical evidence from OECD countries*

WP11/19 Freedman, Judith *Responsive regulation, risk and rules: applying the theory to tax practice*

WP11/18 Devereux, Michael P. and Simon Loretz *How would EU corporate tax reform affect US investment in Europe?*

WP11/17 Vella, John, Clemens Fuest and Tim Schmidt-Eisenlohr *Response on EU proposal for a Financial Transaction Tax*

WP11/16 Loretz, Simon and Socrates Mokkas *Evidence for profit-shifting with tax sensitive capital stocks*

WP11/15 Weisenbach, david A. *Carbon taxation in the EU: Expanding EU carbon price*

WP11/14 Bauer, Christian, Davies, Ronald B. and Andreas Hauer *Economic Integration and the Optimal Corporate Tax Structure with Heterogeneous Firms*

WP11/13 Englisch, Joachim *National Measures to Counter Tax Avoidance under the Merger Directive*

WP11/12 de la Feria, Rita and Clemens Fuest *Closer to an Internal Market? The Economic Effects of EU Tax Jurisprudence*

WP11/11 Englisch, Joachim *EU Perspective on VAT Exemptions*

WP11/10 Riedel, Nadine and Hannah Schildberg-Hörisch *Asymmetric Obligations*

WP11/09 Böhm, Tobias and Nadine Riedel *On Selection into Public Civil Service*

WP11/08 Auerbach, Alan J. and Michael P. Devereux *Consumption and Cash-Flow Taxes in an International Setting*

WP11/07 Becker, Johannes and Clemens Fuest *Tax Competition: M&A versus Greenfield Investment*

WP11/06 Riedel, Nadine *Taxing Multinationals under Union Wage Bargaining*

WP11/05 Liu, Li and Rosanne Altshuler *Measuring the Burden of the Corporate Income Tax under Imperfect Competition*

WP11/04 Becker, Johannes and Clemens Fuest *The Taxation of Foreign Profits - The Old View, the New View, and a Pragmatic View*

WP11/03 Konrad, Kai *Search Costs and Corporate Income Tax Competition*

WP11/02 Hellerstein,Walter *Comparing the Treatment of Charities Under Value Added Taxes and Retail Sales Taxes*

WP11/01 Dharmapala, Dhammika and Nadine Riedel *Earnings Shocks and Tax-Motivated Income-Shifting: Evidence from European Multinationals*

WP10/23 Schmidt-Eisenlohr, Tim *Towards a Theory of Trade Finance*

WP10/22 Freedman, Judith and John Vella *HMRC's Management of the UK Tax System: The Boundaries of Legitimate Discretion*

WP10/21 de la Feria, Rita *Reverberation of Legal Principles: Further Thoughts on the Development of an EU Principle of Prohibition of Abuse of Law*

WP10/20 Hauer, Andreas and Frank Stähler *Tax competition in a simple model with heterogeneous firms: How larger markets reduce profit taxes*

WP10/19 Cnossen, Sijbren *Improving the VAT Treatment of Exempt Immovable Property in the European Union*

WP10/18 Grubert, Harry and Richard Krever *VAT and Financial Supplies: What should be taxed?*

WP10/17 Gendron, Pierre-Pascal *VAT Treatment of Public Sector Bodies: The Canadian Model*

WP10/16 Niepmann, Friederike and Tim Schmidt-Eisenlohr *Bank Bailouts, International Linkages and Cooperation*

WP10/15 Bond, Stephen and Jing Xing *Corporate taxation and capital accumulation*

WP10/14 Lockwood, Ben *How should financial intermediation services be taxed?*

WP10/13 Becker, Johannes, Fuest, Clemens and Nadine Riedel *Corporate tax effects on the quality and quantity of FDI*

WP10/12 Fuest, Clemens and Nadine Riedel *Tax Evasion and Tax Avoidance in Developing Countries: The Role of International Profit Shifting*

WP10/11 Wildasin, David E. *State Corporation Income Taxation: An Economic Perspective on Nexus*

WP10/10 Becker, Johannes and Marco Runkel *Corporate tax regime and international allocation of ownership*

WP10/09 Simpson, Helen *How do firms' outward FDI strategies relate to their activity at home? Empirical evidence for the UK*

WP10/08 Voget, Johannes, *Headquarter Relocations and International Taxation*

WP10/07 Devereux, Michael P. and Simon Loretz *Evaluating Neutrality Properties of Corporate Tax Reforms*

WP10/06 Davies, Ronald B. and Lourenço S. Paz, *Tarifs Versus VAT in the Presence of Heterogeneous Firms and an Informal Sector*

WP10/05 Finke, Katharina, Heckemeyer, Jost H., Reister Timo and Christoph Spengel *Impact of Tax Rate Cut Cum Base Broadening Reforms on Heterogeneous Firms - Learning from the German Tax Reform 2008*

WP10/04 Koh, Hyun-Ju and Nadine Riedel *Do Governments Tax Agglomeration Rents?*

WP10/03 Dischinger, Matthias and Nadine Riedel *The Role of Headquarters in Multinational Profit Shifting Strategies*

WP10/02 Vrijburg, Hendrik and Ruud A. de Mooij *Enhanced Cooperation in an asymmetric model of Tax Competition*

WP10/01 Bettendorf, Leon, van der Horst *Albert, de Mooij, Ruud A. and Hendrik Vrijburg, Corporate tax consolidation and enhanced cooperation in the European Union*

WP09/32 Bettendorf, Leon, Devereux, Michael P., van der Horst, Albert, Loretz, Simon and Ruud A. de Mooij *Corporate tax harmonization in the EU*

WP09/31 Karkinsky, Tom and Nadine Riedel *Corporate Taxation and the Choice of Patent Location within Multinational Firms*

WP09/30 Becker, Johannes and Clemens Fuest *Transfer Pricing Policy and the Intensity of Tax Rate Competition*