REGULATION AND THE LOCATION DECISION OF THE OFFSHORE FIRM

by

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ABSTRACT

Regulation is viewed as a major factor in the location decision of offshore firms. This study examines the location selection of these firms within a dynamic game-theoretic framework, where the firm first chooses its location, the jurisdiction sets it regulatory burden and then the firm makes it output and profit decisions.

***Keywords*:** Regulation; Offshore; Location
***JEL Classification*:** E61; F23; L2

1. Introduction

In an attempt to diversify their economies, and as a result of the loss of preferential access for their agricultural goods, many small island states have attempted to develop offshore financial centres (OFCs), internet gaming and other electronic services. OFCs provide services in private investments, asset protection and estate planning. The main financial vehicles in OFCs are: offshore banking, international business corporations, insurance companies, asset management and protection and tax planning (Suss, Williams and Mendis (2002).

Unfortunately, OFCs have also come to be associated with money laundering, where the proceeds from illegal activities pass through OFCs to mask their true source, due to lower regulatory (reporting) requirements (Errico and Musalem, 1999). As a result, many OFCs have voluntarily subjected their jurisdictions to assessments by the International Monetary Fund through the *Financial Sector Assessment Programme* and some have volunteered to provide structural and activity indicators for their banking, insurance sectors and collective investment schemes.[1] These voluntary schemes increase the regulator burden on offshore financial firms, resulting in the loss of some firms, but benefit the jurisdiction by enhancing its reputation for efforts to deter illegal financial flows.

This study presents a multistage game where firms face a location decision, after which the jurisdiction chooses the level of regulation which maximises national welfare, and production takes palce. Although this study is related to the international tax competition literature (see Wilson, 1999, for a survey), it makes a key departure from this field. In the international tax competition literature the firm faces a location decision between two countries, while the government attempts to maximise welfare by choosing a tax rate. This study, in contrast, examines the relocation decision from one OFC to another. Since tax rates across OFCs are almost the same, jurisdictions differ only in the regulatory burden imposed on the firm. The firm

[1] See Offshore Financial Centers, The Assessment Programme (Progress Report), February 8, 2006 available at http://www.imf.org/external/np/ofca/ofca.asp.

therefore has to decide whether to locate in the low regulation country of the high regulation country. To eliminate the trivial equilibrium, the author assumes that the firm cares about regulation, since it does not want to be associated with money laundering.

The rest of the paper is structured as follows. Section 2 provides a brief review of the international tax competition literature. Section 3 outlines the model and examines the case where the OFC commits to given level of regulation. Section 4, provides simulations of the model for reasonable parameter values and Section 5 concludes.

2. Brief Literature Review

Much of the theoretical literature on OFCs attempts to investigate how tax setting by countries affects the location decision of firms. Early contributions to this came from Zodrow and Mierzkowski (1986) and Wildasin (1988). Zodrow and Mierzkowski assume that countries play a single period game in capital tax rates. There are three sectors in each country: production, citizens and government. With imperfect capital mobility, the government maximizes the utility of the representative citizen subject to the government budget constraint, taxes will be raised until the marginal utility of public spending is higher than that of private spending. When the representative citizen can move capital abroad to benefit from low taxes, the government sets the tax rate where the marginal cost of increasing public spending is equal to the marginal utility of switching resources from private to public spending. Countries compete for the fixed amount of international capital by undercutting the tax rates of other states. Capital taxes are therefore set at a suboptimal level. Wildasin modifies the model by allowing countries to influence the after-tax return to capital with tax policy. However, the results are similar.

Both the Zodrow and Mierzkowski (1986) and Wildasin (1988) type models assume countries are similar. However, this is hardly the case in the real world. Bucovetsky (1991) and Wilson (1991) therefore attempt to incorporate asymmetry by assuming differences in the size of countries or the endowment of capital per worker, respectively. The main findings from this

literature are that since the elasticity of capital to the tax rate is lower in the large country, the small country would choose a lower tax rate than the larger country.

Many recent studies have attempted to test the predictions of these models using cross-country data. Devereux and Griffith (1998) investigate the strategic location decisions of US firms producing for the European market. The authors find that the average effective tax rate plays an important role in the choice of location within Europe, but not in the decision of whether or not to locate in Europe at all. Devereux and Griffith (2003) also examine the impact of taxation on the location decision of multinational firms. Following from Devereux and Griffith (1998), the authors develop a measure of the effective average tax rate, proxied by the weighted (depending on the profitability of investment) average of an effective marginal tax rate and an adjusted statutory tax rate. The benefits of harmonising tax policy in the European Union are investigated using data from 1999. Devereux and Griffith simulations show that these benefits depend on the underlying profitability of investments, since at low rates of profitability harmonisation has only small effects on the distribution of effect tax rates.

Devereux, Lockwood and Redoano (2002) develop two models: the first, where firms are mobile and countries compete over the statutory tax rate and second, with capital mobility and competition over the effective tax rate. The authors use observations from 21 Organisation for Economic Cooperation and Development (OECD) countries between 1983 and 1999. The authors find evidence for competition in both effective and statutory tax rates as well as note that countries react more strongly to changes in the tax rate in other states when their tax rate is above the average. These findings are in line with those of Haufler, Klemm and Schjelderup (2006), who also find evidence of tax competition, using a similar data set, but also note that tax competition would imply greater reliance on wage taxes.

3. The Basic Model

This section presents a three-stage model of government regulation and location decision of offshore financial service companies. For simplicity, the author assumes a single monopoly firm and no discounting over time. The sequence of moves in the game is as follows. First, the firm chooses its location, incurring the sunk costs of relocation. Second, the government (regulator) then chooses the stringency of its regulatory policy. One may also think of this decision as choosing the level of money laundering that the country would like to impede. Obviously, there is a balance between the benefits of preventing money laundering, in terms of the country's reputation, and cost that this regulation imposes on firms. The model assumes that firms would like to locate in a jurisdiction that has a 'good' reputation, since the firm does not want to be associated with money laundering. In the third, and final, stage the firm chooses its output. As is standard in multistage games, sub-game perfection is achieved through backwards induction (see Gibbons, 1992).

In the final stage of the game, the firm chooses an output level q , and face the linear inverse demand curve $p(q) = a - q$. The jurisdiction's reputation is a by-product of the production process, since the greater the amount of transactions, the higher the probability that some of these would be part of an international money laundering scheme. Therefore negative effects of the firm's reputation is given by $\theta(q,r) = \theta(q - r)$, where θ is the marginal effect, q is the negative effects of offshore activities on reputation and r denote the due diligence activities set by the regulator.

Due diligence activities (regulation) increase costs but also adds to profits due to the positive effects of the jurisdictions reputation. The firms' costs are assumed to be additively separable in production costs and regulation: $c(q,r) = cq + \frac{r^2}{2}$. This cost function implies that by investing $\frac{r^2}{2}$, the offshore firm can reduce the negative effects of its activities on the jurisdiction's reputation by r. The offshore firm's problem is therefore:

$$\max_{q}\left[(a-q)q - cq - \frac{r^2}{2} - \theta(q-r)\right] \tag{1}$$

The first-order conditions imply that the firm's optimal output and profits is given by

$$q(s) = \frac{M-\theta}{2} \text{ and } \pi(s) = q(s)^2 - \frac{r^2 - 2\theta r}{2} \tag{2}$$

where $M = a - c$ is a measure of market size. Equation (2) therefore shows that the offshore firm's output (profit) is decreasing (increasing) in the marginal effect of reputation and due diligence activities, respectively.

If the firm in stage 1 had decided to relocate to another jurisdiction that has no regulatory requirements, i.e. $r = 0$, the offshore firm would maximize its profits $(a-q)q - cq - \theta q - F$, where F is the fixed cost of relocation. Note that the offshore firm still faces the negative effect of operating in a bad jurisdiction (θq) but not the costs. Therefore the firm's output and profits would be:

$$q(g) = \frac{M-\theta}{2} \text{ and } \pi(g) = q(g)^2 - F \tag{3}$$

In stage two, the government chooses the level of due diligence. It is assumed that the damage done by the firm on the jurisdiction's reputation is quadratic in the firm's reputation: $\Omega(q,r) = \frac{\omega[\theta(q,r)]^2}{2} = \frac{\omega(q-r)^2}{2}$, where $\omega \geq 1$, so that some regulation should be in place. The jurisdiction also benefits from placing a small tax on the firm's revenues, t. The jurisdiction's welfare is therefore the (un-weighted) sum of tax revenues and the loss function[2]. The jurisdiction therefore attempts to:

$$\max_{r} W = t\pi(s) - \frac{\omega(q(s)-r)^2}{2} \tag{4}$$

The optimal level of due diligence is therefore:

$$r^* = \frac{\omega M + \theta(2t-\omega)}{2(t+\omega)} \tag{5}$$

[2] The author ignores consumer surplus since this accrues to the customers of the offshore firm, which by definition are located abroad.

The optimal due diligence is therefore increasing in market size, the weight the jurisdiction attaches to its reputation, but decreasing in the value the firm places in its reputation (when $t < 0.5$ as is the case in most OFCs). The first two effects are immediate. However, the last finding deserves further investigation. The last relationship implies that there is a trade-off between the level of due diligence required and the country's reputation. Substituting the optimal level of due diligence into the firm's profit and societal welfare function, one obtains:

$$\pi(r^*) = q(s)^2 - \frac{(r^*)(r^* - 2\theta)}{2} \text{ and } W(r^*) = t\pi(r^*) - \frac{\omega(q(s) - r^*)^2}{2} \quad (6)$$

In the first stage, the offshore entity decides whether to move to the low regulation country. The firm will remain if:

$$\pi(r^*) > \pi(F) \text{ or } F > \frac{(r^*)(r^* - 2\theta)}{2} \quad (8)$$

Using Equation (8) and (5), one therefore obtains the following result.

Proposition 1. If the government does not commit to a given level of due diligence regulation, the offshore firm is indifferent between relocating when:

$$r^* = \theta + \frac{\sqrt{4\theta^2 + 8F}}{2} \quad (9)$$

This result can be seen from Figure 1. The figure plots the no-relocation condition in (θ, F) space, which is separated into two regions. The firm only stays in the home jurisdiction to the right of the no-relocation constraint. Therefore, the only feasible region of regulation and production is in the area given by *A*. However, note that there exist values of F, where there is always an incentive for the firm to relocate, since the fixed costs of relocation are so low.

The government after the firm locates in the domestic country, has an incentive to raise the regulatory burden since this enhances the country's reputation and government still receives tax revenues. The offshore firm, being a rational investor, may therefore choose to relocate in the first stage, even for values of F above $\overline{F}$. This outcome occurs because the government does not take into account the location decision of the firm into its decision-making process in regards

to regulation. If the government can commit to a particular level of regulation it would be able to alter the relocation decision of the offshore firm.

4. Commitment by the Regulator

This section of the paper investigates the scenario where the regulator commits to a level of regulation that makes the offshore firm indifferent between relocating. The sequence of moves in the three-stage game is the same. However, the government now commits to some level of regulation prior to the location decision of the offshore firm. In stage 3, the offshore firm's problem is now:

$$\max_{q}\left[(a-q)q - cq - \theta q - F)\right] \tag{10}$$

The first-order conditions imply that the firm's optimal output and profits is given by

$$q(c) = \frac{M-\theta}{2} \text{ and } \pi(c) = q(c)^2 - F^c \tag{11}$$

where $F^c \leq \frac{(r^*)(r^*+2\theta)}{2} \leq F$. The jurisdiction therefore attempts to:

$$\max_{r} W = t\pi(c) - \frac{\omega(q(c)-r^c)^2}{2} \tag{12}$$

The optimal level of due diligence effort is $r^c = \theta + \frac{\sqrt{4\theta^2+8F}}{2}$ and the societal welfare function is given by

$$W(r^c) = t\pi(r^c) - \frac{\omega(q(c)-r^c)^2}{2} \tag{13}$$

Proposition 2. Welfare is higher when the government commits to a level of due diligence r^c. The government sets the regulatory burden on the firm at a level which provides the offshore firm no incentive to relocate.

If the government commits to some $r^* = \theta + \frac{\sqrt{4\theta^2+8F}}{2}$, the firm's profits rise since $\partial\pi/\partial r < 0$ enhances welfare, but is offset by the negative impact that the lower regulatory

requirements have on the firm's reputation. However, noting that $\partial W / \partial r < 0$ when $r \geq \frac{\omega q + \theta}{1+\omega}$, a condition which is fulfilled by the committed level of regulation, i.e. $r^c = -\theta + \frac{\sqrt{4\theta^2 + 8F}}{2} > \frac{\omega q + \theta}{1+\omega}$. Therefore welfare increases if the government pre-commits to a level of regulation r^c.

4. Simulations

The section examines the key predictions of the model for reasonable parameter values. The tax rate is set at 5 percent, $\omega = 1.1$, $\theta = 0.5$ and $M = 5$. The fixed costs of are set to ensure $\pi > 0$, which implies that for the given parameter values $\overline{F} \cong 2.4$, and the simulation sets the step value to 0.1.

Figure 2 plots the welfare and profit as a function of regulation and indicates that there is an inverted u-shape between the two variables. Therefore, welfare initially increases as regulation becomes more stringent, since it enhances the jurisdiction's reputation. After a point, however, as r rises, the negative effect that r has on profits starts to offset the benefits of increased regulation. The profit function given in Figure 2 also shows that profits are inversely related to regulation.

Figure 3, in contrast, considers the effects of the fixed cost of relocation on welfare and profit. The first figure, relating W and F, exhibits a similar inverted u-shape as that shown in Figure 2. However, it crosses the x-axis further to the right, which implies that for some values of F, $W \geq 0$: there are some values of F where welfare might be negative but profits are positive. There is also an inverse relationship between F and π, but the slope of the curve is steeper, suggest that small changes in the fixed cost of relocation have a greater effect than changes in regulation on profit.

5. Conclusions

The main results are as follows. Announcing the level of regulation allows the OFC to influence the firm's location decision. However, when the fixed costs of relocation are small, and the firm does not care about its reputation, the firm always relocates to the low regulation jurisdiction. When the jurisdiction commits to level of regulation that does not provide the offshore firm an incentive to relocate, welfare increases.

References

Devereux, M.P and R. Griffith (1998). "Taxes and the Location of Production: Evidence from a Panel of US Multinationals," *Journal of Public Economics*, Vol. 68, pp. 335-367.

Devereux, M.P. and R. Griffith (2003). "Evaluating Tax Policy for Location Decisions," *International Tax and Public Finance*, Vol. 10, pp. 107-126.

Devereux, M.P., Lockwood, B. and M. Redoano (2002). "Do Countries Compete Over Corporate Tax Rates?" CEPR Discussion Paper No. 3400, London, UK.

Errico, L. and W.E. Alexander (1999). "Offshore Banking: An Analysis of Micro- and Macro-Prudential Issues," IMF Working Paper No. WP/99/5, Washington, D.C.

Gibbons, R. *A Primer in Game Theory*. Prentice Hall, London, UK.

Haufler, A. Klemm, A. and G. Schjelderup (2006). "Globalisation and the Mix of Wage and Profit Taxes," CESinfo Working Paper No. 1678, Munich, Germany.

Suss, E.C., Williams, O.H. and C. Mendis (2002). "Caribbean Offshore Financial Centers: Past, Present, and Possibilities for the Future," IMF Working Paper No. WP/02/88, Washington, D.C.

Wildasin, D.E. (1988). "Nash Equilibria in Models of Fiscal Competition," *Journal of Public Economics*, Vol. 35, pp. 229-240.

Wilson, J.D. (1991). "Tax Competition with Interregional Differences in Factor Endowments," *Regional Science and Urban Economics*, Vol. 21, pp. 423-452.

Wilson, J.D. (1999). "Theories of Tax Competition," *National Tax Journal*, Vol. 52, pp. 269-304.

Zodow, G.R. and P. Mieszkowski (1986). "Pigou, Tiebout, Property Taxation, and the Underprovision of Local Public Goods," *Journal of Urban Economics*, Vol. 19, pp. 356-370.

Figure 1: Equilibrium without Commitment

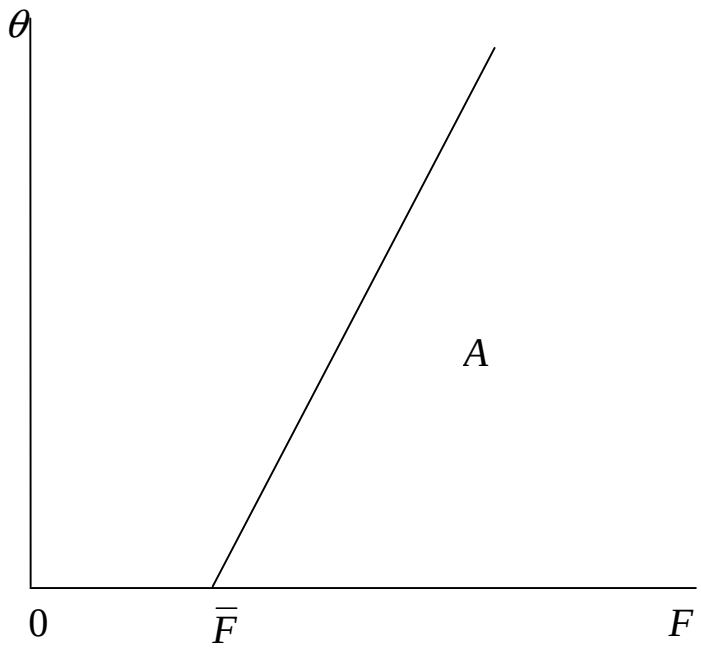
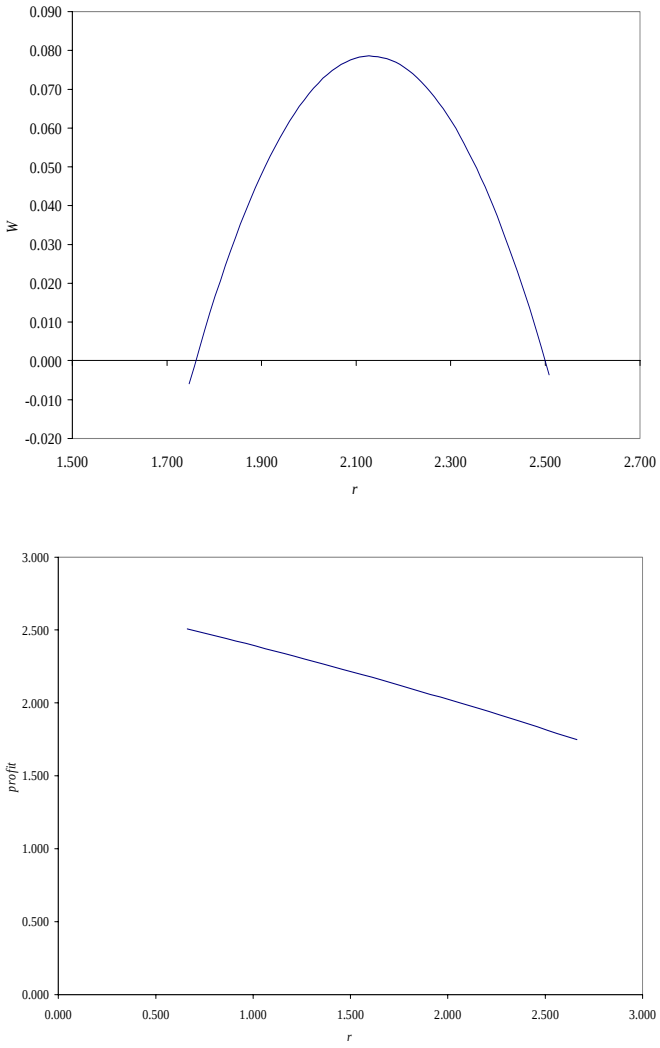
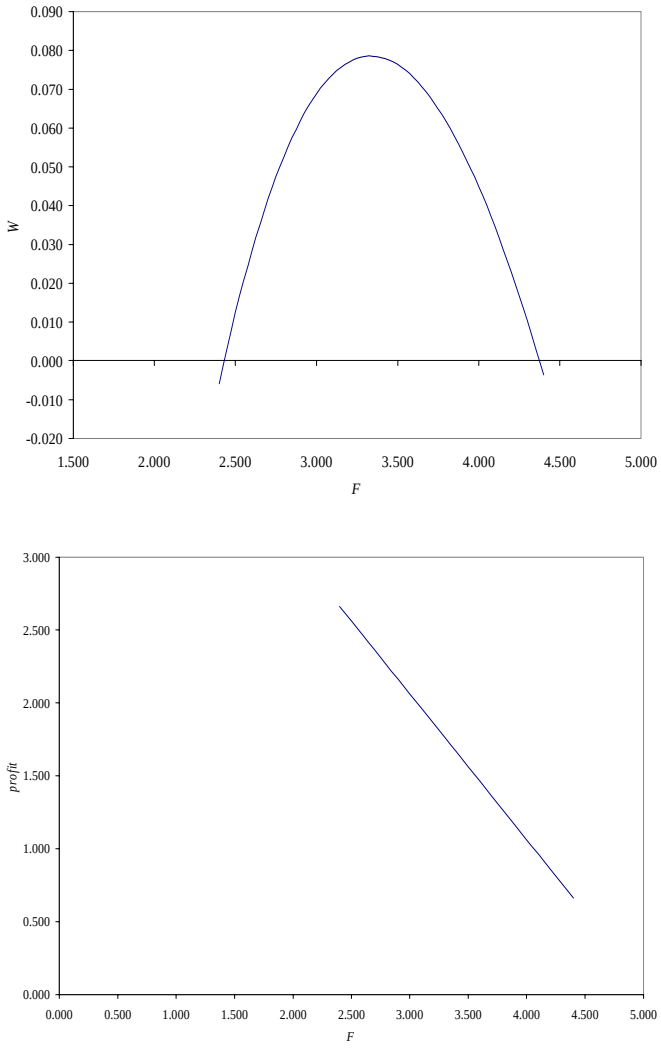


Figure 2: Welfare and Profit as a Function of Regulation



Note: Figures drawn for $\omega = 1.1$, $F = (2.4,4.4)$, $\theta = 0.5$, $M = 5$ and $t = 0.05$

Figure 3: Welfare and Profit as a Function of Relocation Costs



Note: Figures drawn for $\omega = 1.1$, $F = (2.4, 4.4)$, $\theta = 0.5$, $M = 5$ and $t = 0.05$