International Review of Economics and Finance 21 (2012) 292–301

Contents lists available at SciVerse ScienceDirect

International Review of Economics and Finance

journal homepage: www.elsevier.com/locate/iref

Country risk, country size, and tax competition for foreign direct investment

Yasuo Sanjo *

School of Economics, Nagoya University, Furo-cho, Chikusa-ku, Nagoya 464-8601, Japan

ARTICLE INFO

Article history:
Received 24 January 2011
Received in revised form 3 August 2011
Accepted 3 August 2011
Available online 10 August 2011

JEL classification:
F12
F23
L12
H25

Keywords:
Tax competition
Foreign direct investment
Country size
Country risk

ABSTRACT

This paper analyzes tax competition for foreign direct investment with country risk using a two-country model with different market sizes. We show that the trade-off between country size as a locational advantage and country risk as a locational disadvantage affects the location choice of a foreign firm. Given the circumstance in which the foreign firm faces the same probabilities of country risk in both potential host countries when deciding investment location, our analysis shows that if the market size of the high-risk country is sufficiently large relative to the low-risk country, the foreign firm benefits from choosing the high-risk larger country even if the host country's government imposes a lump-sum tax. Given the situation in which the foreign firm faces different probabilities of country risk in each host country, our results show that the important matter for the foreign firm is whether the host country is high-cost or low-cost, rather than whether the host country is high-risk.

1. Introduction

Globalization and economic integration have led to the increase of international economic activity such as foreign direct investment (FDI), which has in turn increased interest in theoretical analysis of tax competition for FDI. Reflecting this situation, a large number of papers have studied tax competition for FDI.[1] In a pioneering contribution to this field, Haufler and Wooton (1999) (as well as Haufler, 2001) developed a tax competition model for FDI. Their study employed a simple two-country model in which there were no domestic incumbent firms, using two potential host countries with asymmetric market sizes competing with each other to attract a foreign-owned monopolist. This study concluded that the foreign monopolist prefers to be located in a host country with a larger market, even if the government of that country imposes a positive tax rate when the market size is significantly large.

Several studies have attempted to elaborate on the model of Haufler and Wooton (1999).[2] For example, Fumagalli (2003) examined tax competition for FDI between two regions that differ in firm technology levels under the assumption that the regions had the same market sizes. Bjorvatn and Eckel (2006) analyzed tax competition for FDI between asymmetric countries by loosening the market structure of Haufler and Wooton's framework, and showed that differences in the market structure influence both the welfare implications of tax competition and the location choice of the foreign firm. They also showed that policy competition increases the attractiveness of a small country as an investment location. Haufler and Wooton (2006) analyzed unilateral and coordinated tax policy in a union of two regions which competes with a potential host region. Hao and Lahiri (2009) investigated passive and active governments in host countries in the location choice of the foreign firm by considering production

* Tel.: +81 52 789 2358; fax: +81 52 789 4921.
E-mail address: sanjo.yasuo@h.mbox.nagoya-u.ac.jp.

[1] For a review of theoretical models of FDI, see Faeth (2009). See Dembour (2008) for a review of tax competition for FDI.

[2] See also Barros and Cabral (2000). They investigated subsidy competition for FDI from the aspect of employment.

1059-0560/$ – see front matter
doi:10.1016/j.iref.2011.08.002

efficiency among the domestic and foreign firms. Mittermaier (2009) studied the role of firm ownership in tax competition for FDI under asymmetric market sizes in host countries and showed that in policy competition, the location choice of the foreign firm is affected by ownership conditions of incumbent firms in host countries.

None of the studies listed above were concerned with the country risk that foreign firms face when investing in host countries; these studies focused on country size differentials, the numbers of domestic firms, production cost differentials, the role of firm ownership, unemployment, the coordination of tax policy, and so on. However, in the real world, a great deal of risk accompanies FDI.[3] Indeed, any international investment project bears two types of risk: project-related risks and host country-related risks (Marjit, Broll, & Mallick, 1995).

Many empirical studies have investigated the relationship between FDI and country risk (e.g., Abadie & Gardeazabal, 2008; Asiedu, Jin, & Nandwa, 2009; Bevan & Estrin, 2004; Carstensen & Toubal, 2004; Fosfuri, 2004; Janicki & Wunnava, 2004; Mancuso, Dirienzo, & Das, 2010; Mody & Srinivasan, 1998; Wheeler & Mody, 1992; Yang, 2008), and some of them have shown a negative correlation between FDI and country risk.[4] In the literature on the theoretical analysis, several studies analyzed FDI by incorporating the concept of country risk into the model (e.g., Aizenman & Marion, 2004; Albuquerque, 2003; Broll & Zilcha, 1992; Marjit et al., 1995; Raff & Srinivasan, 1998; Schnitzer, 1999; Straub, 2008; Thomas & Worrall, 1994). These studies dealt with FDI and country risk, but did not examine competition between host countries (or regions). To our knowledge, there are no studies on tax competition for FDI that include country risk. That is, the existing works might have neglected to take into account country risk in analyzing tax competition for FDI. Therefore, by investigating tax competition for FDI with country risk from the point of view of the theoretical analysis, we might be able to provide additional insight into the literature in this field.

In this paper, we develop a simple tax competition model for FDI with country risk by using the two-country model in which there exists a high-risk country and a low-risk country. Our study analyzes how with the existence of country risk, tax competition by host countries' governments influences the location choice of the foreign monopolist (or foreign firm) who is a potential new entrant into the foreign market, focusing on market size and transportation costs. We consider two situations: first, we investigate a situation in which the probabilities that the foreign firm faces country risk are the same in both potential host countries when choosing an investment location. Second, we examine the situation in which the probabilities that the foreign firm faces country risk are not the same in both host countries. The difference between these situations is affected by whether the two countries are geographically close, or whether the various spatial factors of the host countries are similar.[5] In addition, the probabilities that the foreign firm faces country risk affect whether the host country is high-cost or low-cost.

We show that under the case that the foreign firm faces the same probabilities of country risk, if the market size of the high-risk country is sufficiently large relative to the low-risk country, the foreign firm benefits from settling within the high-risk larger country, in which the host country's government charges a lump-sum tax to the foreign firm. The foreign firm prefers to locate within the low-risk small country when the market sizes of the two host countries are approximately the same, and the foreign firm chooses to invest in the low-risk country if the unit trade cost is low. Under the case that the probabilities of country risk are different, we show that the foreign firm prefers to invest in the low-cost country if the trade cost is relatively small, while the foreign firm prefers to invest in the country with a large market if the trade cost is relatively large, even if the investment location is a more costly country. These results imply that the trade-off (the large market size of the country as a locational advantage versus country risk as a locational disadvantage), affects the location choice of a foreign firm wanting to invest in one of the potential host countries. However, under a situation in which the probabilities of country risk are different, our analysis shows that what is important for the foreign firm is not country risk, but whether the host country is high-cost or low-cost.

Our study adopts the framework of Haufler and Wooton (1999) in the sense that the foreign monopolist attempts to invest in one of the host countries where domestic incumbent firms do not exist. As we believe that country risk affects the productivity of the foreign firm, our study is nearer to those of Fumagalli (2003) and Hao and Lahiri (2009), who investigated tax competition for FDI by considering the productivity of firms.[6] However, they did not examine tax competition for FDI from the point of view of country risk; therefore, the present paper has a different viewpoint from their works. Moreover, our study might relate to that of Raff and Srinivasan (1998), who analyzed tax incentives as a signal by the government of the host country by considering country risk. They provided theoretical analysis as well as empirical results, but did not deal with tax competition between potential host countries. In contrast, we provide a more simple tax competition model without the signaling game to investigate the foreign firm's location choice for FDI.

This paper is organized as follows. Section 2 introduces the basic model. Section 3 analyzes the situation in which the probabilities that the foreign firm faces country risk are the same in both potential host countries when deciding investment location. Section 4 studies the circumstance that the probabilities of country risk for the foreign firm are not the same in both host countries when choosing an investment location. Section 5 concludes the paper.

[3] According to the International Country Risk Guide (ICRG) published by the Political Risk Services (PRS) Group, country risk includes political risk, financial risk, and economic risk (http://www.prsgroup.com). In the present paper, following the study of Mody and Srinivasan (1998), we define that country risk by the composite measure of economic, political, and social uncertainty in the potential host country. The specific elements of country risk include corruption, geographical issues, internal and external conflict, terrorism, alteration of the economic situation, rapid changes in the exchange rate, unstable infrastructure, and natural disasters.

[4] In Görg et al. (2009), the interaction between corporate taxation and FDI was analyzed by considering the role of social expenditure.

[5] Spatial factors used include industrial structures, social infrastructures, political policies, national characteristics, natural environments, natural resources, and climate. For the spatial factors of FDI, see also Chakrabarti (2003) that investigated the spatial distribution of FDI.

[6] Zhong and Lahiri (2009) developed a theoretical model of international joint ventures (IJVs) by incorporating the productivity of the domestic firms and the foreign firm into the model, and analyzed tax competition for an IJV between two host countries. For theoretical contributions on IJVs, see, for example, Al-Saadon and Das (1996), Asiedu and Esfahani (2001), Lee (2004), and Müller and Schnitzer (2006).

2. Model

Consider a simple tax competition model that consists of two countries, A and B, with country risk. These countries have no incumbent domestic firms, and compete for a foreign-owned monopolist (which we shall refer to as "the foreign firm"), which wants to invest in one of the two potential host countries. The foreign firm that supplies its product to both countries faces increasing returns to scale, so that it does not divide its plant between countries A and B.[7] Since the transaction costs involved in exporting from the foreign firm's home country (home base) to the two host countries A and B are assumed to be extremely high, the foreign firm does not export from its home base (e.g., Barros & Cabral, 2000; Bjorvatn & Eckel, 2006; Haufler & Wooton, 1999; Mittermaier, 2009). If the foreign firm invests in country A, therefore, it exports from country A to country B, incurring transportation costs (trade costs), and *vice versa*. Exports of the product accompany a per-unit trade cost, denoted by $t \geq 0$.

The foreign firm has an efficient technology, and its marginal production cost is assumed to be c_F when it produces the product in its home base. As there exists some country risk in both countries A and B, the actual marginal production cost that the foreign firm faces depends on its own location decision.[8] When the foreign firm invests in country $i(=A,B)$, the marginal production cost is given by $\phi_i c_i + (1-\phi_i)c_F$, where $\phi_i(\in[0,1])$ is the probability that the foreign firm faces country risk when investing in country i. If there is no country risk in countries A or B, i.e., $\phi_i = 0$, the marginal production cost of the foreign firm is c_F when the firm invests in either A or B. In contrast, if there is a full country risk in countries A and B, i.e., $\phi_i = 1$, the marginal production cost of the foreign firm is c_i when the firm invests in country i. FDI with country risk influences the marginal production cost of the foreign firm, but the motivation for investment by the foreign firm is still maintained because the foreign firm can save the aggregate transportation costs from the home base to the markets of the two countries by FDI.

Demand of country i is given by

$$Q_i = n_i(\alpha - p_i), \tag{1}$$

where Q_i represents the quantity demanded in country i, p_i is the market price in country i, and n_i is the market size of country i. In the following analysis, we assume $n_A = n \geq 1$ and $n_B = 1$ to consider the impact of the difference in country sizes; that is, we assume that country A has a larger market than country B. In addition, for notational convenience and to obtain reasonable results, throughout the paper, we impose $c_F = 0$ and suppose that country A is higher-risk than country B, i.e., $c_A > c_B$. Note that the high-risk country is not necessarily a high-cost country.[9]

When the foreign firm invests in country A and exports to country B, the profit of the foreign firm is given by

$$\pi^A = \frac{n(\alpha - \phi_A c_A)^2}{4} + \frac{(\alpha - \phi_A c_A - t)^2}{4} - F - \tau_A. \tag{2}$$

If the foreign firm invests in country B and exports to country A, then the profit of the foreign firm is given as

$$\pi^B = \frac{n(\alpha - \phi_B c_B - t)^2}{4} + \frac{(\alpha - \phi_B c_B)^2}{4} - F - \tau_B. \tag{3}$$

In these equations, F is the set-up fixed cost and τ_i is the lump-sum tax (or the lump-sum subsidy if negative) of country i. The set-up fixed cost F is assumed to be the same in both countries.

The welfare of country i consists of consumer surplus plus lump-sum tax (if any). If the foreign firm invests in country A, the welfare of country A is given as

$$W_A^A = \frac{n(\alpha - \phi_A c_A)^2}{8} + \tau_A, \tag{4}$$

and that of country B is

$$W_B^A = \frac{(\alpha - \phi_A c_A - t)^2}{8}. \tag{5}$$

[7] Fumagalli (2003) investigated the multinational's choice about whether to export from its home region or set up a plant in one of the two foreign regions. Bjorvatn and Eckel (2005) analyzed the two-plant model on FDI.

[8] To develop a simple model of tax competition for FDI with country risk, in the present paper, we assume that the country risk represents the marginal production cost with uncertainty. Hence, the production in the high-risk country costs more than that in the low-risk country because of uncertainty regarding the various factors of production. In addition, we assume that the foreign firm cannot use the tax incentive that is offered by the host country as a signal in advance. For a tax incentive as a signal, see Raff and Srinivasan (1998).

[9] If $c_A < c_B$, country B with a small market is more costly country than country A because it is high-risk. At this time, the foreign firm would not have an incentive to invest in country B since country B has no locational advantage and is not an ideal investment location for the foreign firm. Hence, we focus on the situation in which there exists a trade-off between country size as a locational advantage and country risk as a locational disadvantage; we consider that country A with a large market is more costly under the assumption of $c_A > c_B$. In Section 4, however, we deal with the case that country B is more costly than country A, with the probabilities of country risk for the foreign firm being different in countries A and B.

When the foreign firm invests in country B, the welfare of country A is given by

$$W_A^B = \frac{n(\alpha-\phi_B c_B-t)^2}{8}, \tag{6}$$

and that of country B is

$$W_B^B = \frac{(\alpha-\phi_B c_B)^2}{8} + \tau_B. \tag{7}$$

For an interior solution, we assume $\alpha-\phi_i c_i > t$.

The game structure is a two-stage decision-making process. In the first stage, the governments of the two countries simultaneously and non-cooperatively choose the levels of lump-sum tax. In the second stage, the foreign firm invests in either country A or country B in order to maximize its profit. We solve the game by using backward induction.

3. Symmetric probabilities of country risk

This section analyzes the situation in which the probabilities that the foreign firm faces country risk are the same whether it invests in country A or country B. This may reflect the situation in which the two countries are geographically close, or may imply that the various spatial factors in the two countries are analogous. For a simple analysis of this case, we assume $\phi_A = \phi_B = \phi$. Therefore, country A with high risk is more costly than country B in accordance with the assumption of $c_A > c_B$ under $\phi_A = \phi_B = \phi$.

3.1. The foreign monopolist's choice

First, we analyze the choice of the foreign firm in the second stage of the game. When $\pi^A = \pi^B$ under the tax instruments of the individual countries, the foreign firm is indifferent between investing in country A and country B. The tax premium, denoted by $\Gamma^{sy} \equiv \tau_A - \tau_B$, which the foreign firm is willing to pay to invest and locate in country A is given by

$$\Gamma^{sy} = \frac{[2\alpha-\phi(c_A + c_B)-t][(n-1)t-(n+1)\phi(c_A-c_B)]}{4}. \tag{8}$$

Since the market size of country A is the same as that of country B when $n = 1$, there is no locational advantage by market size, but there exists a locational disadvantage by country risk. The tax premium is not affected by trade cost t as given exogenously, and is negative because $c_A > c_B$. Given identically sized countries, therefore, country B, as the low-risk country, is able to set a higher tax level than the high-risk country A, and the foreign firm prefers to invest in country B.

When $n > 1$, country A has both larger country size as a locational advantage and country risk as a locational disadvantage. Under the assumption of $c_A > c_B$, we have the critical level of trade cost, denoted by $t_{\Gamma^{sy}}$, for which $\Gamma^{sy} = 0$ as

$$t_{\Gamma^{sy}} = \frac{(n+1)\phi(c_A-c_B)}{n-1} \geq 0. \tag{9}$$

If $t \geq t_{\Gamma^{sy}}$, then we have $\Gamma^{sy} \geq 0$. Although country A charges a higher lump-sum tax than country B, the foreign firm will benefit from investing in country A rather than in country B. If $0 \leq t < t_{\Gamma^{sy}}$, then we have $\Gamma^{sy} < 0$. While country B charges a higher tax level relative to country A, the foreign firm benefits from locating within country B.

Under the assumptions of $n > 1$ and $c_A > c_B$, from (9), we obtain the results of $\partial t_{\Gamma^{sy}}/\partial c_A > 0$, $\partial t_{\Gamma^{sy}}/\partial \phi > 0$ and $\partial t_{\Gamma^{sy}}/\partial n < 0$. Therefore, an increase in risk in the larger country induces a higher critical trade cost and the appeal of the larger country as an investment location decreases, while the small country becomes the more attractive location. An increase in the probability that the foreign firm faces country risk also brings about a higher critical trade cost. On the other hand, an increase in the market size of the larger country leads to a lower critical trade cost, and the larger country becomes the more attractive location.

Using the tax premium Γ^{sy}, Eq. (8), the comparative statics result for t shows

$$\frac{\partial \Gamma^{sy}}{\partial t} = \frac{(n-1)(\alpha-\phi c_B-t) + \phi(c_A-c_B)}{2} \geq 0, \quad \forall n \geq 1.$$

This indicates that an increase in the exogenous trade cost t always brings about a higher tax premium, and country A, the larger country with the higher risk, becomes the more attractive investment location for the foreign firm. That is, the concept of the home market effect (introduced by the new trade theory) is derived even if country risk exists for FDI.

3.2. Tax competition by the two governments

This subsection discusses the tax competition in which the governments of countries A and B determine the levels of the lump-sum tax (or subsidies if negative) in the first stage. If $W_A^A = W_A^B$, country A is indifferent between hosting the foreign firm and

importing the product from country *B*. To attract the foreign firm, country *A* is willing to offer the minimum level of the lump-sum tax (or the maximum subsidy if negative), denoted by $\tilde{\tau}_A$:

$$\tilde{\tau}_A = -\frac{n[2\alpha-\phi(c_A+c_B)-t][t-\phi(c_A-c_B)]}{8}. \tag{10}$$

The critical level of trade cost, denoted by $t_{\tilde{\tau}_A}$, is given as

$$t_{\tilde{\tau}_A} = \phi(c_A-c_B) \geq 0. \tag{11}$$

If $t \geq t_{\tilde{\tau}_A}$, then the government of country *A* is willing to offer the lump-sum subsidy to attract the foreign firm because $\tilde{\tau}_A \leq 0$. If $0 \leq t < t_{\tilde{\tau}_A}$, the government charges the lump-sum tax for the foreign firm since $\tilde{\tau}_A > 0$. However, since the foreign firm always has an incentive to invest in country *B* even if it pays the tax when $0 \leq t < t_{\Gamma^{sy}}$, this strategy is dominated because $t_{\Gamma^{sy}} > t_{\tilde{\tau}_A}$ from (9) and (11). Hence, the choice of country *A* does not make sense in equilibrium, and so the government of country *A* offers the subsidy under $t \geq t_{\Gamma^{sy}}$.

Next, we consider the decision of country *B*'s government. When $W_B^B = W_B^A$, country *B* is indifferent between being hosting the foreign firm and importing the product from country *A*. The government of country *B* is willing to offer the minimum lump-sum tax or maximum lump-sum subsidy, denoted by $\tilde{\tau}_B$, to be the host country of the foreign firm:

$$\tilde{\tau}_B = -\frac{[2\alpha-\phi(c_A+c_B)-t][t+\phi(c_A-c_B)]}{8}. \tag{12}$$

Since $2\alpha-\phi(c_A+c_B)-t>0$ and $t+\phi(c_A-c_B)>0$, we obtain $\tilde{\tau}_B<0$. Consequently, the government of country *B* is always willing to offer a lump-sum subsidy for the foreign firm.We compare the tax levels set by the governments of these two countries to determine whether country *A* offers a higher lump-sum subsidy than country *B*. We define $\Delta^{sy} \equiv \tilde{\tau}_A - \tilde{\tau}_B$, and have

$$\Delta^{sy} = -\frac{[2\alpha-\phi(c_A+c_B)-t][(n-1)t-(n+1)\phi(c_A-c_B)]}{8}. \tag{13}$$

In the situation of $n=1$, as country *A* is the high-risk country compared to country *B*, we obtain $\Delta^{sy}>0$. This result implies that country *A* charges a lump-sum tax or offers a lower lump-sum subsidy than country *B*. Thus, the foreign firm prefers to locate in country *B* when the market sizes of the two countries are identical. In the situation of $n>1$, on the other hand, we obtain the same critical level of trade cost as $t_{\Gamma^{sy}}$, as shown in (9) in the previous subsection. We have $\Delta^{sy} \leq 0$ if $t \geq t_{\Gamma^{sy}}$, while we obtain $\Delta^{sy}>0$ if $0 \leq t < t_{\Gamma^{sy}}$. Therefore, we find that if the trade cost is higher than the critical trade cost, country *A* is willing to offer a higher subsidy than country *B*.

Subsequently, we seek the optimal tax level of country *A* given that the government of country *B* always has an incentive to offer the lump-sum subsidy. This level is given as $\hat{\tau}_A \equiv \tilde{\tau}_B + \Gamma^{sy}$. Using Γ^{sy} and $\tilde{\tau}_B$, given by (8) and (12), we obtain

$$\hat{\tau}_A = -\frac{[2\alpha-\phi(c_A+c_B)-t][(3-2n)t+(3+2n)\phi(c_A-c_B)]}{8}. \tag{14}$$

If $n=3/2$, the government of country *A* has an incentive to offer the lump-sum subsidy, since $\hat{\tau}_A<0$. However, under $n \neq 3/2$, the critical trade cost, denoted by $t_{\hat{\tau}_A}$, is given as

$$t_{\hat{\tau}_A} = \begin{cases} 0 & \text{if} \quad 1 \leq n < 3/2, \\ \dfrac{(2n+3)\phi(c_A-c_B)}{2n-3} \geq 0 & \text{if} \quad n > 3/2. \end{cases} \tag{15}$$

When $1 \leq n < 3/2$, the difference in country size is relatively small. In this case, $\hat{\tau}_A<0$ is the optimal tax level of country *A* at all times because the critical trade cost is zero. If $n>3/2$, the difference in country size is relatively large. In the case of $n>3/2$, because we take $t_{\hat{\tau}_A} \geq 0$ as the critical trade cost, the optimal tax level of country *A* is $\hat{\tau}_A \geq 0$ if the trade cost is higher than the critical level of trade cost, i.e., $t \geq t_{\hat{\tau}_A}$. When the trade cost is lower than the critical level of trade cost, i.e., $0 \leq t < t_{\hat{\tau}_A}$, the optimal tax level of country *A* is given by $\hat{\tau}_A<0$.

From the above discussion, we can provide the following proposition.

Proposition 1. *Under the symmetric probabilities that the foreign firm faces country risk: (i) the foreign firm invests in the low-risk country and receives the lump-sum subsidy if* $0 \leq t < t_{\Gamma^{sy}}$*; (ii) the firm invests in the high-risk country and receives the lump-sum subsidy if* $t_{\Gamma^{sy}} \leq t < t_{\hat{\tau}_A}$*; (iii) the firm invests in the high-risk country and pays the lump-sum tax if* $t_{\hat{\tau}_A} \leq t$.

Intuitively, this result implies the following situation. When the market sizes of the host countries are almost the same or the unit trade cost is low, the foreign firm has an incentive to invest in the low-risk country and receives the subsidy because the home market effect does not work. However, in the case that the difference between the market sizes of the host countries is very large

and the unit trade cost is high, the foreign firm prefers to invest in the high-risk country even if the taxation is imposed, because it receives a locational advantage provided by the country's size differential.

4. Asymmetric probabilities of country risk

In the previous section, we analyzed the situation in which the probabilities of country risk for the foreign firm were the same for country A and country B. However, in the real world, a situation where the probabilities are the same, i.e., $\phi_A = \phi_B = \phi$, might be a rare case.

In this section, in order to investigate a more realistic situation, we consider the circumstance that the probabilities of country risk for the foreign firm are not the same in country A and country B. To ease comparability, we assume that $\phi_A = \phi$ and $\phi_B = 1-\phi$. If we exclude the case of $\phi = 1/2$, it may be that the two countries are not geographically close, or that various spatial factors in the two countries are different. Therefore, by depending on the value of ϕ, it is uncertain whether the investment location of the foreign firm is the high-cost country.

Before we conduct this analysis, we must confirm the following. If country A is a more costly country than country B, i.e., $\phi c_A > (1-\phi)c_B$, we obtain $\phi \in (\xi, 1]$, where $\xi \equiv \frac{c_B}{c_A + c_B}$. In this case, the foreign firm will invest in either country depending on the degree of ϕ. Inversely, if country B is more costly country than country A, i.e., $\phi c_A \leq (1-\phi)c_B$, we obtain $\phi \in [0, \xi]$, and the foreign firm has no incentive to invest in country B because country B is more costly and has a small market. From the assumption of $c_A > c_B$, $0 < \xi < 1/2$.

Using the same procedure as in the previous section, the equilibrium outcomes are obtained.

4.1. The foreign monopolist's choice

This subsection derives the choice of the foreign firm in the second stage. When $\phi_A = \phi$ and $\phi_B = 1-\phi$, using (2) and (3), the tax premium, denoted as $\Gamma^{as} \equiv \tau_A - \tau_B$, is given by

$$\Gamma^{as} = \frac{[2\alpha - \phi c_A - (1-\phi)c_B - t]\{(n-1)t - (n+1)[\phi c_A - (1-\phi)c_B]\}}{4}. \tag{16}$$

When $n = 1$, the following result is obtained:

$$\Gamma^{as} = -\frac{[2\alpha - \phi c_A - (1-\phi)c_B - t][\phi c_A - (1-\phi)c_B]}{2} \begin{cases} \geq 0 & \text{if} \quad \phi \in [0, \xi], \\ < 0 & \text{if} \quad \phi \in (\xi, 1], \end{cases}$$

which is not affected by trade cost t. This implies that the foreign firm prefers to invest in country A when the probability that it faces country risk there is low, while it invests in country B when it is high. That is, when the two countries are the same size, the foreign firm has an incentive to invest in not the low-risk country, but the low-cost country depending on the degree of ϕ because there is not a locational advantage.

If $n > 1$, we obtain the critical level of trade cost, denoted by $t_{\Gamma^{as}}$, as

$$t_{\Gamma^{as}} = \begin{cases} 0 & \text{if} \quad \phi \in [0, \xi], \\ \dfrac{(n+1)[\phi c_A - (1-\phi)c_B]}{n-1} & \text{if} \quad \phi \in (\xi, 1]. \end{cases} \tag{17}$$

From (16) and (17), we have

$$\Gamma^{as} \begin{cases} < 0 & \text{if} \quad 0 \leq t < t_{\Gamma^{as}} \text{ and } \quad \phi \in (\xi, 1], \\ \geq 0 & \text{if} \quad t \geq t_{\Gamma^{as}} \quad \text{ and } \quad \phi \in [0, 1]. \end{cases}$$

If $t \geq t_{\Gamma^{as}}$ and $\phi \in [0,1]$, then country A tries to impose a higher tax level relative to country B, yet the foreign firm will benefit from locating in country A even if country B offersa lower tax level. If $0 \leq t < t_{\Gamma^{as}}$ and $\phi \in (\xi, 1]$, then country B has an incentive to impose a higher tax level than country A, but the foreign firm prefers to invest in country B because it can earn more profit. In other words, in the case that ϕ is large and trade cost t is small, the foreign firm invests in country B, while the foreign firm invests in country A if ϕ is small and t is large. Where trade cost t is relatively large, the foreign firm prefers to invest in the small country B if ϕ is sufficiently large. This implies that the foreign firm invests in a small country without large production costs to avoid country risk that may arise in a large country. This result is different from existing works' results, in which the foreign firm prefers to invest in the country with a large market in order to save the aggregate transportation costs when the unit trade cost is large. Therefore, in this case, the home market effect brought about by the existence of a trade cost is not realized.

4.2. Tax competition by the two governments

In this subsection, tax competition between the governments in the first stage is investigated. First, we examine the decision of the government of country *A*. From $W_A^A = W_A^B$ with $\phi_A = \phi$ and $\phi_B = 1-\phi$, we obtain

$$\tilde{\tau}_A = -\frac{n[2\alpha-\phi c_A-(1-\phi)c_B-t][t-\phi c_A+(1-\phi)c_B]}{8}. \tag{18}$$

Since $2\alpha-\phi c_A-(1-\phi)c_B-t>0$, the critical level of the trade cost, denoted by $t_{\tilde{\tau}_A}$, is given as

$$t_{\tilde{\tau}_A} = \begin{cases} 0 & \text{if} \quad \phi\in[0,\xi], \\ \phi c_A-(1-\phi)c_B & \text{if} \quad \phi\in(\xi,1]. \end{cases} \tag{19}$$

From (18) and (19), if $t \geq t_{\tilde{\tau}_A}$ and $\phi\in[0,1]$, we find that country *A* has an incentive to offer the lump-sum subsidy in order to attract the investment of the foreign firm. In contrast, if $0\leq t < t_{\tilde{\tau}_A}$ and $\phi\in(\xi,1]$, country *A* has an incentive to impose the lump-sum tax for the foreign firm. However, from the foreign firm's choice in the second stage and (19), under the conditions of $0\leq t < t_{\tilde{\tau}_A}$ and $\phi\in(\xi,1]$, $\tilde{\tau}_A > 0$, the choice of country *A*'s government, does not make sense in equilibrium since country *A* is the high-cost country; the foreign firm will invest in country *B*, the low-cost country. Therefore, in equilibrium, country *A* must be willing to offer the lump-sum subsidy under $t\geq t_{\tilde{\tau}_A}$ and $\phi\in[0,1]$.

Next, we consider the decision of the government of country *B*. From $W_B^B = W_B^A$, we obtain

$$\tilde{\tau}_B = -\frac{[2\alpha-\phi c_A-(1-\phi)c_B-t][t+\phi c_A-(1-\phi)c_B)]}{8}. \tag{20}$$

From (20), we obtain the critical level of trade cost, denoted by $t_{\tilde{\tau}_B}$, as

$$t_{\tilde{\tau}_B} = \begin{cases} -\phi c_A+(1-\phi)\ c_B & \text{if} \quad \phi\in[0,\xi), \\ 0 & \text{if} \quad \phi\in[\xi,1]. \end{cases}$$

If $0\leq t < t_{\tilde{\tau}_B}$ in the range of $\phi\in[0,\xi)$, then the government of country *B* has an incentive to impose the lump-sum tax against the foreign firm because $\tilde{\tau}_B > 0$, while country *B*'s government offers the subsidy if $t > t_{\tilde{\tau}_B}$. However, this strategy does not make sense in equilibrium since the foreign firm always invests in country *A* even if it is required to pay the tax at the level of ϕ in this range. In contrast, in the range of $\phi\in[\xi,1]$, country *B*'s government is willing to offer the lump-sum subsidy since $\tilde{\tau}_B < 0$. Therefore, the government of country *B* always offers the lump-sum subsidy for the foreign firm in order to attract the investment.

From (18) and (20), since the governments of the two countries are willing to offer the lump-sum subsidy, we compare the levels of subsidy. We define the difference between the lump-sum tax levels as $\Delta^{as} \equiv \tilde{\tau}_A - \tilde{\tau}_B$, which gives

$$\Delta^{as} = -\frac{[2\alpha-\phi c_A-(1-\phi)c_B-t]\{(n-1)t-(n+1)[\phi c_A-(1-\phi)c_B]\}}{8}. \tag{21}$$

When $n=1$, the result is given as

$$\Delta^{as} = \frac{[2\alpha-\phi c_A-(1-\phi)c_B-t][\phi c_A-(1-\phi)c_B]}{4} \begin{cases} \leq 0 & \text{if} \quad \phi\in[0,\xi], \\ > 0 & \text{if} \quad \phi\in(\xi,1]. \end{cases}$$

Hence, the government of country *A* offers a higher subsidy than country *B* if country *A* is not the more costly country (i.e., $\phi\in[0,\xi]$). However, country *A*'s government offers a lower subsidy than country *B* if country *A* is the more costly country (i.e., $\phi\in(\xi,1]$).

If $n>1$, using (21), the critical level of trade cost, denoted by $t_{\Delta^{as}}$, is given by

$$t_{\Delta^{as}} = \begin{cases} 0 & \text{if} \quad \phi\in[0,\xi], \\ \dfrac{(n+1)[\phi c_A-(1-\phi)c_B]}{n-1} & \text{if} \quad \phi\in(\xi,1]. \end{cases} \tag{22}$$

From (21) and (22), the following result is obtained:

$$\Delta^{as} \begin{cases} > 0 \quad \text{if} \quad 0\leq t < t_{\Delta^{as}} \quad \text{and} \quad \phi\in(\xi,1], \\ \leq 0 \quad \text{if} \quad t\geq t_{\Delta^{as}} \quad \text{and} \quad \phi\in[0,1]. \end{cases}$$

When $t\geq t_{\Delta^{as}}$ and $\phi\in[0,1]$, the government of country *A* offers a higher lump-sum subsidy than country *B* because $\Delta^{as}\leq 0$. When $0\leq t < t_{\Delta^{as}}$ and $\phi\in(\xi,1]$, the government of country *A* has an incentive to offer a lower subsidy than country *B*.

Next, we seek the optimal tax level of country *A*. This level is given as $\hat{\tau}_A \equiv \tilde{\tau}_B + \Gamma^{as}$. From (16) and (20), we obtain

$$\hat{\tau}_A = -\frac{[2\alpha-\phi c_A-(1-\phi)c_B-t]\{(3-2n)t + (3+2n)[\phi c_A-(1-\phi)c_B]\}}{8}. \tag{23}$$

Using (23), we analyze the four cases regarding the range of *n*.

1. When $n=1$, the size of country *A* is the same as that of country *B*. Thus, there is no locational advantage. The critical trade cost is given as

$$t_{\hat{\tau}_A} = \begin{cases} -5[\phi c_A-(1-\phi)c_B] & \text{if} \quad \phi \in [0,\xi), \\ 0 & \text{if} \quad \phi \in [\xi,1]. \end{cases}$$

From this result and (23), we obtain the optimal tax level as follows.

$$\hat{\tau}_A \begin{cases} >0 \quad \text{if} \quad 0 \le t < t_{\hat{\tau}_A} \quad \text{and} \quad \phi \in [0,\xi), \\ \le 0 \quad \text{if} \quad t \ge t_{\hat{\tau}_A} \quad \text{and} \quad \phi \in [0,1]. \end{cases}$$

2. When $1<n<3/2$, the difference in the market sizes of countries *A* and *B* is relatively small. The critical trade cost is given as

$$t_{\hat{\tau}_A} = \begin{cases} \dfrac{(2n+3)[\phi c_A-(1-\phi)c_B]}{2n-3} & \text{if} \quad \phi \in [0,\xi), \\ 0 & \text{if} \quad \phi \in [\xi,1]. \end{cases}$$

Therefore, we have

$$\hat{\tau}_A \begin{cases} >0 \quad \text{if} \quad 0 \le t < t_{\hat{\tau}_A} \quad \text{and} \quad \phi \in [0,\xi), \\ \le 0 \quad \text{if} \quad t \ge t_{\hat{\tau}_A} \quad \text{and} \quad \phi \in [0,1]. \end{cases}$$

3. When $n=3/2$, the optimal tax level of country *A* is given as

$$\hat{\tau}_A = -\frac{3[2\alpha-\phi c_A-(1-\phi)c_B-t][\phi c_A-(1-\phi)c_B]}{4} \begin{cases} >0 & \text{if} \quad \phi \in [0,\xi), \\ \le 0 & \text{if} \quad \phi \in [\xi,1]. \end{cases}$$

Note that in this case there is not a critical trade cost. Therefore, the optimal tax level of country *A* is determined depending on the value of ϕ.

4. When $n>3/2$, the size of country *A* is relatively large. The critical trade cost is given as

$$t_{\hat{\tau}_A} = \begin{cases} 0 & \text{if} \quad \phi \in [0,\xi], \\ \dfrac{(2n+3)[\phi c_A-(1-\phi)c_B]}{2n-3} & \text{if} \quad \phi \in (\xi,1]. \end{cases}$$

The optimal tax level is given by

$$\hat{\tau}_A \begin{cases} <0 \quad \text{if} \quad 0 \le t < t_{\hat{\tau}_A} \quad \text{and} \quad \phi \in (\xi,1], \\ \ge 0 \quad \text{if} \quad t \ge t_{\hat{\tau}_A} \quad \text{and} \quad \phi \in [0,1]. \end{cases}$$

Using these four results, the equilibrium outcomes considering the optimal tax level of country *A* ($\hat{\tau}_A$) are briefly reported in Table 1. From these results, we provide the following proposition.

Proposition 2. *Under the asymmetric probabilities that the foreign firm faces country risk: (i) when the market sizes of the two countries are the same, the foreign firm prefers to invest in the low-cost country; (ii) when there exists a market size difference between the two countries, the foreign firm tends to invest in the low-cost country if the trade cost is relatively small, but in the country that has a large market if the trade cost is relatively large, even if the investment location is the more costly country.*

The intuition behind these results is as follows. If the market sizes of the host countries are the same, then there is no home market effect. Since it is not possible for the foreign firm to save the aggregate trade costs, the foreign firm has an incentive to invest in the country where the total cost is lower, that is, the low-cost country. However, if the foreign firm locates within the country that has the larger market when the market sizes are different, the foreign firm can reduce its aggregate trade costs

Table 1
Equilibrium outcomes under asymmetric probabilities of country risk.

Size	Investment location	Tax/Subsidy	Conditions
$n=1$	Country A	Tax payment	$0 \le t < t_{\hat{\tau}_A}$ and $\phi \in [0, \xi)$
		Subsidy received	$t_{\hat{\tau}_A} \le t$ and $\phi \in [0, \xi)$
	Country B	Subsidy received	$t_{\hat{\tau}_A} \le t$ and $\phi \in [\xi, 1]$
$1<n<3/2$	Country A	Tax payment	$0 \le t < t_{\hat{\tau}_A}$ and $\phi \in [0, \xi)$
		Subsidy received	$t \ge t_{\hat{\tau}_A}$ and $\phi \in [0, \xi)$ *or* $t \ge t_{\Gamma^{us}}$ and $\phi \in [\xi, 1]$
	Country B	Subsidy received	$0 \le t < t_{\Gamma^{us}}$ and $\phi \in [\xi, 1]$
$n=3/2$	Country A	Tax payment	$t > t_{\Gamma^{us}}$ and $\phi \in [0, \xi)$
		Subsidy received	$t > t_{\Gamma^{us}}$ and $\phi \in [\xi, 1]$
	Country B	Subsidy received	$0 \le t < t_{\Gamma^{us}}$ and $\phi \in [\xi, 1]$
$n>3/2$	Country A	Tax payment	$t > t_{\hat{\tau}_A}$ and $\phi \in [0, 1]$
		Subsidy received	$t_{\Gamma^{us}} \le t < t_{\hat{\tau}_A}$ and $\phi \in [\xi, 1]$
	Country B	Subsidy received	$0 \le t < t_{\Gamma^{us}}$ and $\phi \in [\xi, 1]$

because of the market size differential between the two countries. The larger the market size differential, the more this effect appears. This is because the foreign firm is able to receive the benefit from the market size that compensates for the high-cost market structure of the large country even if the large country is the high-cost country. This effect might induce the foreign firm to invest in the large country whether the country with the larger market is the high-cost country. Given that the probabilities of country risk are not the same in the two countries, when the unit trade cost is at a sufficiently low level, the foreign firm prefers to invest in the low-cost country (the small country in this case) because the degree of savings of aggregate trade costs is low even if the foreign firm invests in the large country. In contrast, when the unit trade cost is sufficiently high, the foreign firm prefers to invest in the large country even if the investment location is high-cost because the foreign firm can save on aggregate trade costs.

In any case, since the cost structures of host countries are influenced by both own-country risk and the production efficiency of the foreign firm, country risk has a significant impact on the location choice of a foreign firm. It is important for the foreign firm to consider whether the host country is a high-risk or low-risk country (i.e., country risk) in choosing an investment location, although a more important matter for the foreign firm is whether the host countryis a high-cost or low-cost country.

5. Conclusion

We have developed a simple tax competition model for FDI with country risk using the two-country model with different market sizes. From the point of view of the theoretical analysis, we have analyzed how under the existence of country risk, tax competition by host countries' governments affects the location choice of the foreign monopolist as a potential new entrant into the foreign market. We have investigated two situations: the situation in which the foreign firm faces the same probabilities of country risk in both potential host countries when deciding investment location and the situation in which the foreign firm faces different probabilities of country risk in each host country when choosing an investment location.

In both situations, our analysis has shown that the trade-off due to the large market size of a country as a locational advantage and country risk as a locational disadvantage affect the location choice of the foreign firm. Under the case that the foreign firm faces the same probabilities of country risk in both potential host countries, we have shown that, if the market size of the high-risk country is sufficiently large relative to the low-risk country, the foreign firm benefits from settling within the high-risk larger country even if the host country's government charges a lump-sum tax to the foreign firm. However, under the situation that the foreign firm faces different probabilities of country risk in each host country when choosing an investment location, we have shown that what is important for the foreign firm is whether the host country is high-cost or low-cost, rather than whether the host country is a high-risk (i.e., country risk).

In our study, by focusing on country size and unit trade cost given the existence of country risk, the foreign firm's decision of investment location was analyzed. Of course, in the real world, the foreign firm's location choice for FDI does not depend only on these factors. However, while the existing studies examined tax competition for FDI without taking country risk into account, the present study incorporated country risk into the model and analyzed tax competition for FDI. Hence, we believe that our research is the first step in studying tax competition for FDI with country risk, and may contribute to analysis in this field. Indeed, our results show that given the existence of country risk, the foreign firm prefers to invest in the low-cost country whether the potential host country has a large market or not. This implies that there exists the possibility that even a small country becomes an appealing investment location for the foreign firm if the small country is the low-cost country. This result differs from that of existing works (e.g., Haufler & Wooton, 1999); rather, our results might be closer to the results of Bjorvatn and Eckel (2006) in the sense that we have shown that the smaller country can become the more attractive investment location given certain circumstances.

The results of our study may help remedy the lack of theoretical analysis of tax competition for FDI with country risk. However, the results derived in our study might depend on the simple tax competition model for FDI with country risk that we adopted. The incorporation of the risk-reduction investment by the government into the model may provide an interesting result. In addition, in order to confirm the results of our study, it might be necessary to estimate the correlation between distance and size, or between distance and risk, from the aspect of empirical study. These issues constitute potential considerations for future research.

Acknowledgements

The author would like to acknowledge the valuable comments from Hikaru Ogawa and the anonymous referees and from the editor, Hamid Beladi. The author gratefully acknowledges financial support from the Japan Society for the Promotion of Science through Grant-in-Aid for Scientific Research (C) (No. 22530306) and the Matsushita International Foundation.

References

Abadie, A., & Gardeazabal, J. (2008). Terrorism and the world economy. *European Economic Review*, *52*, 1–27.
Aizenman, J., & Marion, N. (2004). The merits of horizontal versus vertical FDI in the presence of uncertainty. *Journal of International Economics*, *62*, 125–148.
Albuquerque, R. (2003). The composition of international capital flows: risk sharing through foreign direct investment. *Journal of International Economics*, *61*, 353–383.
Al-Saadon, Y., & Das, S. P. (1996). Host-country policy, transfer pricing and ownership distribution in international joint ventures: a theoretical analysis. *International Journal of Industrial Organization*, *14*, 345–364.
Asiedu, E., & Esfahani, H. S. (2001). Ownership structure in foreign direct investment projects. *The Review of Economics and Statistics*, *83*, 647–662.
Asiedu, E., Jin, Y., & Nandwa, B. (2009). Does foreign aid mitigate the adverse effect of expropriation risk on foreign direct investment? *Journal of International Economics*, *78*, 268–275.
Barros, P. P., & Cabral, L. (2000). Competing for foreign direct investment. *Review of International Economics*, *8*, 360–371.
Bevan, A. A., & Estrin, S. (2004). The determinants of foreign direct investment into European transition economies. *Journal of Comparative Economics*, *32*, 775–787.
Bjorvatn, K., & Eckel, C. (2005). Technological spillovers and export platform FDI. In E. M. Graham (Ed.), *Multinationals and foreign investment in economic development* (pp. 85–93). Palgrave Macmillan.
Bjorvatn, K., & Eckel, C. (2006). Policy competition for foreign direct investment between asymmetric countries. *European Economic Review*, *50*, 1891–1907.
Broll, U., & Zilcha, I. (1992). Exchange rate uncertainty, futures markets and the multinational firm. *European Economic Review*, *36*, 815–826.
Carstensen, K., & Toubal, F. (2004). Foreign direct investment in Central and Eastern European countries: a dynamic panel analysis. *Journal of Comparative Economics*, *32*, 3–22.
Chakrabarti, A. (2003). A theory of the spatial distribution of foreign direct investment. *International Review of Economics & Finance*, *12*, 149–169.
Dembour, C. (2008). Competition for business location: a survey. *Journal of Industry, Competition and Trade*, *8*, 89–111.
Faeth, I. (2009). Determinants of foreign direct investment ? A tale of nine theoretical models. *Journal of Economic Surveys*, *23*, 165–196.
Fosfuri, A. (2004). Determinants of international activity: evidence from the chemical processing industry. *Research Policy*, *33*, 1599–1614.
Fumagalli, C. (2003). On the welfare effects of competition for foreign direct investments. *European Economic Review*, *47*, 963–983.
Görg, H., Molana, H., & Montagna, C. (2009). Foreign direct investment, tax competition and social expenditure. *International Review of Economics & Finance*, *18*, 31–37.
Hao, Q., & Lahiri, S. (2009). Competition for foreign direct investment: the role of technology and market structure. *International Review of Economics & Finance*, *18*, 680–690.
Haufler, A. (2001). *Taxation in a global economy: theory and evidence.* New York: Cambridge University Press.
Haufler, A., & Wooton, I. (1999). Country size and tax competition for foreign direct investment. *Journal of Public Economics*, *71*, 121–139.
Haufler, A., & Wooton, I. (2006). The effects of regional tax and subsidy coordination on foreign direct investment. *European Economic Review*, *50*, 285–305.
Janicki, H. P., & Wunnava, P. V. (2004). Determinants of foreign direct investment: empirical evidence from EU accession candidates. *Applied Economics*, *36*, 505–509.
Lee, T. (2004). Determinants of the foreign equity share of international joint ventures. *Journal of Economic Dynamics and Control*, *28*, 2261–2275.
Mancuso, A. J., Dirienzo, C. E., & Das, J. (2010). Assessing terrorist risk and FDI using relative information measures. *Applied Economics Letters*, *17*, 787–790.
Marjit, S., Broll, U., & Mallick, I. (1995). A theory of overseas joint ventures. *Economics Letters*, *47*, 367–370.
Mittermaier, F. (2009). The role of firm ownership in tax competition. *FinanzArchiv*, *65*, 297–312.
Mody, A., & Srinivasan, K. (1998). Japanese and US firms as foreign investors: do they march to the same tune? *Canadian Journal of Economics*, *31*, 778–799.
Müller, T., & Schnitzer, M. (2006). Technology transfer and spillovers in international joint ventures. *Journal of International Economics*, *68*, 456–468.
Raff, H., & Srinivasan, K. (1998). Tax incentives for import-substituting foreign investment: does signaling play a role? *Journal of Public Economics*, *67*, 167–193.
Schnitzer, M. (1999). Expropriation and control rights: a dynamic model of foreign direct investment. *International Journal of Industrial Organization*, *17*, 1113–1137.
Straub, S. (2008). Opportunism, corruption and the multinational firm's mode of entry. *Journal of International Economics*, *74*, 245–263.
Thomas, J., & Worrall, T. (1994). Foreign direct investment and the risk of expropriation. *The Review of Economic Studies*, *61*, 81–108.
Wheeler, D., & Mody, A. (1992). International investment location decisions: the case of U.S. firms. *Joumal of Intemational Economics*, *33*, 57–76.
Yang, D. (2008). Coping with disaster: the impact of hurricanes on international financial flows, 1970–2002. *The B.E. Journal of Economic Analysis & Policy*, *8* Article 13.
Zhong, L. T., & Lahiri, S. (2009). International joint ventures and tax competition in an integrated market. *International Review of Economics & Finance*, *18*, 38–44.