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Competition between Tax Havens: Does Proximity Matter?

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(Running head: Tax Haven Competition)

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Abstract

We study whether proximity to the nearest tax haven affects FDI and the number of American affiliates in a tax haven. Our results show that distance to the nearest tax haven is positively related to FDI inflows and the number of American affiliates in tax havens. These findings suggest that there is a harmful competition between tax havens. We also find evidence of positive spillovers: the number of American affiliates in a tax haven is positively related to the number of in its closest neighboring tax haven. This suggests the presence of agglomeration benefits given there is an affiliate in a nearby tax haven.

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1. Introduction

Over the past decade, economic globalization has led to a significant increase in capital mobility and a corresponding increase in demand for tax haven operations. For example, Kudrle (2008) reported a 154 percent growth in total liabilities from 1998 to 2006 for a sample of 20 tax havens. Attracting foreign direct investment (FDI) is considered to be an important factor for stimulating economic growth for both developed and developing countries (Dash and Sharma, 2011; Lee, 2005; Nissan and Niroomand, 2010). Fearing the harmful impacts of tax haven policies, OECD countries launched the 1998 Harmful Tax Competition (HTC) initiatives. Following the policy focus, research has investigated the impact of tax haven policies on non-tax havens.

The implication of tax competition for tax havens, themselves, is also important for the international dialogue. To the extent that competition is a race to the bottom, tax haven countries would have reason to support calls for international tax policy coordination. If competition is a race to the top, then tax havens would have little reason to seek international tax harmonization. Although the related literature has addressed the efficacy of tax haven policies, it has largely ignored the dynamics of tax competition *between* tax havens.

We address this omission in the literature by analyzing tax competition between tax havens paying special attention to physical proximity of countries. On one hand, increased distance to the nearest tax haven acts as a buffer against competitive pressure. On the other hand, closer proximity increases the potential for capital agglomeration and spillovers between tax havens. Recent empirical studies by Desai, Foley, and Hines (2007a,b), Rose and Spiegel (2007), and Blanco and Rogers (2009) find proximity to tax

havens to be beneficial for *non*-tax haven countries.[1] To our knowledge, however, no research investigates the influence of proximity on other tax havens.

In this article, we postulate that tax havens compete with other tax havens for foreign investment and that spatial proximity affects the nature of the competition. Our objective is to empirically evaluate the extent to which geographic proximity to other tax havens influences multinational investment flows. Using a panel data estimation framework, we consider two outcome measures: FDI inflows and the number of America affiliates. We build off of previous literature by adding spatial proximity measures to the group of factors found to be related to these measures of foreign investment.[2] Our analysis provides evidence regarding the extent of competition and spillover effects among tax havens.

Using panel data for tax haven countries, we find that FDI inflows and the number of American affiliates are positively related to the distance to the closest tax haven.[3] Combined these findings imply that tax competition has negative (beggar-thy-neighbor type) effects on tax havens in terms of competing for mobile capital. Turning to analysis of the location of American affiliates, we find evidence of agglomeration and spillover effects. The number of American affiliates in a tax haven is positively related to the number in the closest neighboring tax haven. This is consistent with the spatial patterns we find when we investigate the location decisions of the top 500 American firms. Namely, there is a positive relationship between the number of American affiliates

[1] Rose and Spiegel (2007) investigate impacts of off-shore financial centers while Desai, Foley, and Hines (2007a,b) and Blanco and Rogers (2009) evaluate tax havens more generally.
[2] Lee (2005) discusses the more prominent factors found in the extensive literature on the determinants of FDI.
[3] As described below, tax havens included in the sample vary slightly across specifications. We include annual observations for 18 tax havens during the period 1991-2005 in the analysis of FDI and observations for 19 tax havens during the period 1999-2005 for the analysis of American affiliates.

in a tax haven and the number in its nearest tax haven neighbor. This supports the argument that agglomeration benefits are important when firms are deciding where to locate subsidiaries. From the perspective of tax havens, these results suggest that there is a benefit to being closer to another tax haven that already has an American subsidiary.

This paper is organized as follow: Section 2 reviews the literature on tax havens and tax competition, Section 3 presents the data and methodology used to study competition between tax havens, Section 4 discusses the results obtained from the empirical analysis, and Section 5 concludes.

2. Current Understanding of Tax Havens and Tax Competition

According to the OECD, a sufficient and necessary condition for a country to be a tax haven is that it has little or no tax on relevant income (Ambrosanio and Caroppo, 2005). Under the HTC initiative, tax haven countries are characterized as countries that are unlikely to share information with other countries for the purpose of taxes, lack transparency, or have firms that do not have substantial activity in the jurisdiction (Kudrle, 2008).

Hines (2007a), on the other hand, uses a more general (and perhaps more generous) characterization of tax havens: tax havens are small, well governed countries with low tax rates.[4] Besides tax advantages, tax havens offer multinational corporations (MNCs) access to good infrastructure and offshore financing activities (Hines, 2005). These countries also offer a relaxed regulatory system allowing firms and individuals access to business and bank secrecy (Palan, 2002).

[4] Dharmapala and Hines (2006) present empirical evidence supporting the argument that tax havens have good institutions such as voice and accountability, rule law, government effectiveness, political stability and control of corruption.

Tax haven regimes are manifested in many different varieties reflecting the heterogeneity of countries and firms that seek tax haven opportunities. Kudrle (2008) highlights notable differences in geographic location and income. Desai et al. (2006a) note the relevance of size differences among tax havens in that American MNCs use large and small tax havens for different purposes. Tax havens strategically develop tax regimes to target specific sectors and to distinguish themselves from each other.

Preferential tax regimes fall into several categories (Ambrosanio and Caroppo, 2005; Palan, 2002): tax havens may have no income or corporate taxes, low taxes, no taxes on income of foreign sources, or special tax privileges for certain industries or companies. The main service provided across tax havens also varies (Kudrle and Eden, 2003). Production havens have low corporate taxes and grant special privileges so as to encourage foreign firms to produce in the country. Headquarters havens allow foreign firms to lower corporate tax earnings in the home jurisdiction. Sham havens allow corporations and individuals to take advantage of the lack of regulation. Secrecy havens are used by individuals and corporations to evade taxes through secrecy laws.

From a theoretical standpoint, the impact of tax competition on tax havens is ambiguous. In the basic models of tax competition, introduced by Oates (1972) and developed by Zodrow and Mieszkowski (1986) tax competition has a negative effect (See Wilson and Wildasin (2004) and Wilson (1990) for recent literature reviews). Countries lower their tax rates to attract capital, which leads to a decrease in government spending and the underprovision of public goods. In contrast, tax competition in a Tiebout (1956) world can bring positive effects. Governments compete for mobile individuals who vote with their feet by locating in jurisdictions with the most favorable combination of taxes

and public goods provision. Such fiscal competition leads to an efficient provision of public goods and places pressure on governments to keep taxes low.

Related models of tax competition promote the idea that tax competition "tames the leviathan" and leads to a more efficient allocation of resources (Wilson and Wildasin, 2004). For example, Honkapohja and Turunen-Red (2007) argue that tax competition creates a strong incentive to expand output. Hong and Smart (2006) posit that tax planning can be socially optimal. Eggert and Sorensen (2008) use a theoretical model to show that the efficiency of the public sector increases with more tax competition.

Agglomeration models, in contrast, suggest that tax competition does not necessarily lead to lower taxes. According to Baldwin and Krugman's (2000) model, some countries do not need to reduce taxes since high taxes will be offset by the benefits of industrial agglomeration. In these models, tax competition leads to a "race to the top" and not to a "race to the bottom".

Empirical evidence shows that tax revenues have not declined with the fall in corporate taxes over time due to the broadening of tax bases (Hines, 2007c; Devereux et al., 2002). It is argued that tax competition and levels of FDI are related, where countries with lower taxes tend to attract more FDI (Hines, 2007b). In addition, higher taxes are associated with lower levels of affiliate assets and output (Desai et al., 2006a). Mutti (2003) argues that FDI inflows resulting from lowering tax rates have significant positive externalities on the economy, such as technology transfers and greater capital accumulation. These positive spillovers allow the economy to grow at a faster rate. In contrast, Lee (2005) suggests that there is only anecdotal evidence regarding the impact of tax incentives on foreign investment.

The impact of proximity to tax haven activity has also been investigated. Desai, Foley, and Hines (2007a,b) argue that increased activity in tax havens spills over to the benefit of nearby non-tax havens. Rose and Spiegel (2007) present evidence that proximity to tax havens serving as offshore financial centers (OFCs) leads to greater financial depth and competitiveness in the financial sector of a non-OFC country. Furthermore, Blanco and Rogers (2009) show that proximity to tax havens has a positive impact on the level of FDI of less developed countries. The impact of proximity to a tax haven may be different for tax havens which directly compete for FDI than for non-tax havens.

To summarize, the literature review highlights three main points. First, the impact of tax competition on heterogeneous tax havens is ambiguous. Second, there is an established link between tax haven policies and FDI inflows. Third, there is evidence that proximity to competing tax haven countries may influence FDI inflows.

Empirical Hypotheses

Based on the literature review, we analyze the impacts of tax competition on tax havens using two approaches, both of which consider proximity of a tax haven and its closest tax haven neighbor. Specifically, we investigate how distance between a tax haven and its closest tax haven neighbor affects (i) FDI inflows and (ii) the presence of American MNCs. The empirical hypotheses that we study are the following:

Hypothesis 1: Proximity to the nearest tax haven will influence FDI inflows in a tax haven country.

Hypothesis 2: Proximity to the nearest a tax haven will influence the level of American Affiliates in a tax haven country.

The predicted impact of proximity is ambiguous. Geographical distance is commonly used as a proxy for transportation costs in trade flow models (e.g., Mullen and Williams, 2011). Agglomeration and spillover effects are more likely when a country is closer to a neighboring tax haven due to lower costs associated with trade. The ability to attract foreign investment, however, may be difficult when other tax haven competitors are in closer proximity. If investors first select a favorable region in which to invest based on location factors (Nissan and Niroomand, 2010), then tax policies become more important and competitive on the margin. Thus, the net impact of proximity will depend on which influences are more important in driving foreign investment outcomes for our sample of tax haven countries.

3. Research Methodology

We define countries to be tax havens according to the classification used in Dharmapala and Hines (2006).[5] To investigate tax competition effects on FDI inflows, we use annual FDI observations between 1991 and 2005 for a sample of 18 tax havens.[6] Our baseline specification is as follows:

$$(1) \qquad FDI_{it} = \alpha_{1it} TH\_\text{proximity} + \beta' X_{it} + \varepsilon_{it}$$

[5] Appendix 1 shows the countries identified as tax havens by Dharmapala and Hines (2006).
[6] See Appendix 2 for a list of countries included in our analysis. Some countries in Dharmapala and Hines (2006) are not included because of data unavailability. We include 15 observations per country for a total of 270 observations.

The dependent variable is the natural logarithm of annual FDI inflows. FDI inflows were obtained from the United Nations Conference on Trade and Development. The tax haven proximity variable (*TH_proximity*) is the inverse of the natural logarithm of the distance to the nearest tax haven. It is constructed using distances calculated by Mayer and Zignago (2006) for 31 of the 35 the tax havens identified in Appendix 1.[7] A positive estimated coefficient on *TH_proximity* would indicate that FDI inflows are larger in tax havens that are closer to the nearest neighboring tax haven. Therefore, a positive (negative) coefficient implies that being closer to another tax haven is beneficial (harmful) and that tax havens are good (bad) neighbors for other tax havens.

The vector X represents a set of control variables identified in previous empirical analyses as important determinants of FDI.[8] In the baseline model, the control variables include the natural logarithm of population, exchange rate, and openness to trade. The natural logarithm of the initial level of real GDP per capita is also included as control variable.[9] Furthermore, time fixed effects are considered in the estimation.[10] A description of the variables and their sources is presented in Table 1 and summary statistics are given in Table 2.

We also analyze competition between tax havens by looking at the impact of tax haven proximity on the activity of American multinational corporations (MNCs) located in tax havens. For this part of the analysis, the baseline specification in equation 1 is

[7] Mayer and Zignago (2006) use the great circle formula to calculate the distance from the most important cities and agglomerations of one country to another. See their note on the calculations at http://www.cepii.fr/distance/noticedist_en.pdf. Distance is missing for 4 of the tax haven countries identified in Appendix 1. Our approach to determine the impact of proximity to a tax haven is similar to Rose's and Spiegel (2006) approach.

[8] Blonigen (2005) presents a comprehensive literature review on the determinants of FDI.

[9] Although several empirical analyses use the current level of GDP as a control variable, we use the initial level of GDP because FDI and GDP may be simultaneously determined.

[10] Time fixed effects are eliminated by subtracting the mean of each variable calculated for each country-year. Country fixed effects could not be included since the distance to a tax haven is time invariant.

estimated using the number of American MNCs affiliates in a tax haven as the dependent variable. Annual observations include the years 1999 to 2005 for 19 countries.[11] The number of affiliates of American MNCs was obtained from the US Bureau of Economic Analysis (BEA).[12] A description of these variables is presented in Table 1, and summary statistics for this sample are shown in Table 3.

Assumptions and Spatial Error Model

We investigate whether a spatial error model is appropriate for our investigation. The spatial error model corrects for the potential bias that would result if the FDI inflows in one country is correlated with the FDI inflows of nearby countries.[13] When spatial dependence is expected in the disturbance term in an OLS estimator is not efficient and produces biased standard errors (Anselin, 1999). Following convention, we use the Wald test to find evidence of a spatial correlation in the error term.[14]

The error term in the spatial error model is specified as follows:

$$(2) \qquad \varepsilon_{it} = \lambda W\varepsilon + u_{it}$$

where λ represents the coefficient for the spatially correlated error, and W is a NxN weighting matrix. W is constructed following Blonigen et al. (2007), where W consist of TxT matrices of dimension IxI (T represents the number of periods and I the number of countries). The diagonal matrices are symmetric matrices of the ratio of the shortest bi-

[11] The sample period and included countries were selected based on data availability. 19 countries were included for a total of 133 observations (7 observations per country) . See Appendix 2 for a list of countries included

[12] The BEA website provides data for foreign affiliates in all countries in which investment was reported (name of excel worksheet online, link provided in the references section).

[13] See Anselin (1999) and Anselin et al. (2008) for reviews of spatial econometric models. Elhorst (2003) discusses fixed effects spatial error models.

[14] See LeSage (1999) for a helpful review of how to test for the presence of spatially correlated errors.

lateral distance in the sample and the bi-lateral distance from country j to country k, where the weight for the countries with the shortest distance is equal to 1.[15] The other matrices that compose W are matrices of zeros of dimensions IxI.

The spatial error model is estimated with the maximum likelihood estimator (MLE) and W is normalized so that each row sums to unity.[16] If errors are spatially correlated, the assumption that the error term is normally distributed is rejected. Given the potential for structural instability in the form of non-constant error variances, we estimate the spatial error model with robust standard errors. To check that we are using an adequate model, we employ the Variance Inflation Factors (VIFs) which indicates no evidence of multicollinearity.[17]

4. Findings and Discussion

Table 4 shows the estimation results using total FDI inflows as the dependent variable. In all the estimations shown in Table 4, the Wald statistic (and the significance of lambda) provides strong evidence that the error term is spatially correlated. Accordingly, we focus our discussion on the spatial error model estimates because the presence of spatial correlation implies that OLS estimator is no longer efficient and provides biased standard errors.[18]

[15] The non-diagonal terms in the diagonal matrices of the W matrix represent the distance between the most important cities and agglomerations across counties (provided by Mayer and Zignago, 2006). In the estimates using total FDI as dependent variable, the W matrix is composed of 225 matrices of dimension 18x18. In the estimates using the affiliates of American MNCs as dependent variable, the W matrix is composed by 49 matrices of dimension 19x19.
[16] Our estimates show robust standard errors since the estimator of variance uses the Huber/White estimator instead of the traditional calculation.
[17] VIFs for all variables in the models were less than 7 (there is evidence of multicolinearity when the largest VIF is greater than 10). See Baum (2006, p.85) for information about this test in Stata.
[18] The OLS estimates are not included for brevity but are available upon request.

Column 1, in Table 4, shows the estimates from the baseline specification using the spatial error model. The estimated coefficient for tax haven proximity is negative and statistically significant at the 1 percent level. This indicates that being closer to the nearest tax haven is predicted to be associated with lower FDI inflows. A one standard deviation increase in proximity to the closest tax haven would lead to an estimated .5 (or approximately .04 million US dollars) decrease in the natural log of FDI inflows.

We explore the potential nonlinear effect of tax haven proximity by including the tax haven proximity variable as well as its squared value in the basic specification. Estimates are shown in column 2 of Table 4. According to the Bayesian Information Criterion (BIC), the model with the squared term is preferred over the model with the only the linear term.[19] The coefficient on the proximity variable remains negative and of the same order magnitude and the squared proximity terms is positive and significant. This suggests that the competition effect (represented by the linear term) is mitigated by the square of the inverse of the distance term. Combined, the coefficients suggest that closer proximity to the nearest tax haven is associated with greater FDI inflows. We interpret this as an indication of spillover effects from tax havens to nearby tax havens.

To further explore the nature of competition between tax havens we include a variable that accounts for FDI inflows to the closest tax haven (in natural log), and these estimates are shown in column 3 of Table 4. While the coefficient of the FDI inflows to the closest tax is negative, it is not significantly related to total FDI inflows.

[19] We explored also a nonlinear form including the cubed of the tax haven proximity variable. According to the BIC, the model with the squared term is preferred. The difference between the BICs of the models with only the linear form of tax haven proximity and the one with the squared term is equal to 10.33, which is indicative of very strong support for the model with the squared term because it is greater than 10. The difference of the BICs between the model with the squared term and cubed term is only equal to 1.08. We do not include results of the model that includes tax haven proximity to the cube for purpose of space, but these results are available upon request.

Next, we explore whether our results are robust to excluding those countries that are outliers. In our sample, Hong Kong and Luxemburg have levels of FDI inflows that are more than one standard deviation above the mean. Estimates excluding Hong Kong and Luxemburg as independent observations and using only the linear tax haven proximity term are shown in column 4 of Table 4.[20] When we explore the nonlinear form of tax haven proximity using this restricted sample, we find that the model with just the linear term is preferred to the model with the linear and the squared term.[21] Estimates using this sample also support the hypothesis that there is competition between tax havens. Combined, with our previous results (c.f. Table 4, column 2), it appears that the inclusion of Hong Kong and Luxemburg drives the apparent spillover effects found in the non-linear specification of proximity. Thus, while Hong Kong and Luxemburg enjoy the benefit of spillovers from the nearby tax havens, the other tax havens are more influenced by tax competition pressure.

Table 5 presents the estimates of the spatial error model using the number of American MNCs affiliates in tax havens as dependent variable. In all the estimations shown in Table 5 we reject the hypothesis of no spatially correlated error terms at the 1 percent level. As shown in column 1, the estimated coefficient on tax haven proximity is negative and significant at the 1 percent level. Increasing the tax haven proximity variable by one standard deviation results in an estimated increase in the natural log of number of affiliates by 0.34; representing a predicted increase of one affiliate (approximately 0.06). Estimates including the squared term of tax haven proximity are

[20] Hong Kong and Luxemburg are still present in the model in that they are the closest tax haven for some of the tax havens included in the sample. Thus, we don't simulate a world without their FDI flows.
[21] We consider the models with the squared of tax haven proximity and with the cubed term. Looking at the BICs, the linear model is preferred over the other models because it has a lower BIC. Estimates not included for purpose of space, but available upon request.

shown in column 2 of Table 5. According to the BICs for the two models, shown in columns 1 and 2 of Table 5, there is strong support for the model with the squared term.[22] Once again, there is evidence of spillover effects among tax havens.[23]

Column 3 of Table 5 show the estimates when the natural log of affiliates in closest tax haven is included as an explanatory variable instead of the tax haven proximity variable. The estimated coefficient for the affiliates variable is positive and significant at the 1 percent level. Notably this finding seemingly contradicts the previous findings, where being closer to the nearest neighboring tax haven was associated with less economic activity in a tax haven. According to agglomeration models of tax competition, however, firms tend to concentrate in specific areas. Estimates from column 3 suggest that as if there is a one standard deviation increase in the natural log of the number of affiliates in the closest tax haven, then the number of affiliates in a tax haven increases by 0.3; which represents an increase of one half affiliate (approximately 0.5).

We also explore whether there is a nonlinear effect of the number of tax haven affiliates in the closest tax haven, and find support for a model that includes the square and the cube of the number of affiliates of American MNCs.[24] Estimates for the model that considers the cubed term of the number of American MNCs affiliates in the closest tax haven as shown in column 4 of Table 5 is similar to previous results. Including the cubed proximity term, we observe a positive impact when the closest tax haven has between 0 to 10 affiliates. If the number of affiliates in the closest tax haven is greater

[22] Absolute difference between BICs is equal to 7.18.
[23] We also explore with a model that included the cubed term of tax haven proximity variable, but find no support for this model since it had higher BIC than the model with the squared term of tax haven proximity.
[24] We evaluate the BICs of three models: 1) with the linear term of the number of affiliates in the closest tax haven, 2) with the squared term, and 3) with the cubed term. According the BICs, there is very strong support for the model that includes the cube term. Estimates for the model with the squared term not included for purpose of space, but are available upon request.

than 10, then we observe a negative relationship between the number of affiliates in a tax haven and the number of its closest tax haven neighbor. Thus, this nonlinear model shows that the spillover effect is limited and not indefinite.

To check for robustness, we estimate our model excluding those countries with the largest number of American MNCs affiliates. Specifically, we exclude Hong Kong, Ireland, and Switzerland because they show a very high number of American affiliates relative to the other countries in our sample. Estimates using this restricted sample are shown in columns 5 and 6 of Table 5. Excluding these countries from the sample, the linear models have a better fit. The results suggest that being nearer to the closest tax haven leads to an estimated decrease in the number of American MNCs affiliates. On the other hand, as the number of American MNCs affiliates increases in the closest tax haven, we observe an increase in American MNCs affiliates in a specific country.

Geography plays an important role in reconciling the different impacts of American affiliates. The combined results suggest that tax havens compete with each other to attract MNCs in the first place (the negative impact of proximity of nearest tax haven on affiliate levels in the linear model that excludes Hong Kong and Luxemburg). When making a decision concerning where to locate in a specific region, MNCs evaluate the tax haven options, which results in observed competition between tax havens. However, there are positive agglomeration effects: tax havens with higher levels of affiliates in the closest tax haven neighbor have higher levels themselves (the positive effect of the number of American affiliates in the nearest tax haven). Thus, if a firm is already in a tax haven and it wants to expand, then it is likely that the firm will be interested in having an affiliate in nearby low tax jurisdictions (i.e. tax haven).

To study these opposing forces in more depth, we investigate the presence of the top 500 American companies in tax havens as specified by the Forbes 500 list of 2008. We investigate the number of affiliates that each of these companies has in a tax haven according to the directory of American firms operating in foreign countries.[25] Forty-six percent of the top 500 American firms have at least one affiliate in a tax haven, and 36 percent have an affiliate in more than one tax haven. In fact, the probability of having more than one tax affiliate, given that the firm has one tax haven affiliate, is equal to 77 percent. The tax haven countries with the highest number of American subsidiaries are Hong Kong, Singapore, Switzerland, and Ireland (in descending order).[26] There is an apparent synergy between tax haven subsidiaries in these locations. Given that a firm has a subsidiary in Singapore, there is a 79 percent probability of having a subsidiary in Hong Kong; and given that the firm has a subsidiary in Hong Kong, there is a 77 percent of probability that the firm has a subsidiary in Singapore. In the case of Ireland and Switzerland, we find similar results. Given that a firm has a subsidiary in Ireland, there is a 66 percent of probability of having a subsidiary in Switzerland; and given that a firm has a subsidiary in Switzerland, there is a probability of 58 percent that the firm has a subsidiary in Ireland.

4. Conclusion

There are two main empirical findings from this analysis. First, proximity to the closest tax haven is negatively related to FDI inflows and the number of American

[25] This directory is provided by the Uniworld Business Publications, where the 19th edition published in 2007 was the latest edition available at the time this study was undertaken.
[26] In Hong Kong there are 158 firms that have an affiliate, in Singapore 154, in Switzerland 125, and Ireland 111. These four destinations are important since in the next most attractive destination, Luxemburg, there is only presence of 37 firms.

subsidiaries in a tax haven. These results suggest that there is race to the bottom between tax havens, where they all compete for mobile capital and geographic location relative to other countries matters. The policy implication is that as a group, tax haven countries experience potentially harmful impacts from tax competition and have reason to support initiatives aimed at international tax harmonization between themselves.

Our second main finding is that agglomeration benefits are evident for firms when they decide where to locate subsidiaries. As the number of American affiliates in the closest tax haven increases, there is an increase in the number of affiliates in a tax haven. This result suggests that there are positive spillovers among neighboring tax havens. Given that a firm is already located in a tax haven, there is a higher probability that it will expand operations to a nearby tax haven. Accordingly, tax havens may benefit by being nearer to other tax havens with high presence of American firm affiliates. This agglomeration benefit is likely to be observed once a MNC has already settled in the nearby tax haven. This effect contrasts with the competition effect, where tax havens compete for the initial capital investment and future capital inflows. In sum, our findings suggest that agglomeration benefits are important for firms and that the nature of the competition between tax havens changes once there is a subsidiary in the nearby tax haven. In addition, the pressure of tax competition appears to be less distinct for the countries that attract a disproportionate amount of FDI (Hong Kong and Luxemburg).

Our analysis provides important insights related to the global economy and how tax havens interact with each other. We find that tax havens compete with each for capital flows, which is consistent with Dash and Sharma's (2011) finding for developing countries. The evidence provided by this study tells us that government policy in tax

havens is likely to be shaped by the competition they face, where these countries will find ways to make themselves more attractive than the nearby tax haven. There is likely to be strategic behavior across tax havens in relation to taxation and other incentives to FDI.

Our analysis also shows that there are significant spillovers in nearby tax havens once a MNC has chosen to locate in a specific tax haven. This suggests that tax havens would likely benefit by marketing themselves to corporations who have operations in nearby tax havens. Agglomerations effects are evident from our analysis, where tax havens can benefit from activity in nearby tax havens if they are able to make themselves appealing. We might observe that tax havens nearby have incentives that target specific industries with the purpose to take advantage of agglomeration.

There are many fruitful avenues for further research. In particular, extensions should explore the implications of tax competition between tax haven regimes with different characteristics. As discussed in the literature review, the group of tax havens is a heterogeneous group and determining the relevance of location for competition between these countries is important. In addition, future research might evaluate not only the location of American MNCs but also their level of sales, employment or assets in tax havens. Such factors are undoubtedly important for gaining a better understanding of the role of tax competition and geography among tax havens. Finally, looking at whether nearby tax havens have a tendency to offer similar incentives might be a way to learn more about the existent competition and spillovers effects.

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Table 1. Variable description and source

Variable name	Variable description and source
Ln(FDI)	Natural log of the inflow of foreign direct investment (US dollars, millions). Source: UNCTAD.
Ln(Affiliates)	Natural log of the number of affiliates of American MNCs. Source: BEA.
TH_proximity	Inverse of the natural log of the distance (in kilometers) to the closest tax haven (as defined by Dharmapala and Hines, 2006, see Appendix 1). We use the distance calculated with the latitudes and longitudes of the most important cities and agglomerations. Source: Mayer and Zignago (2006).
Ln(FDI in closest TH)	Natural log of the inflow of foreign direct investment in closest tax haven (US dollars, millions). Source: UNCTAD.
Ln(Affiliates in closest TH)	Natural log of number of affiliates of American MNCs in closest tax haven. Source: BEA.
Ln(exchange rate)	Natural log of exchange rate. Source: WDI.
Ln(GDP initial)	Natural log of the initial level of real GDP per capita (constant 2000 US dollars). Source: WDI.
Ln(openness)	Natural log of exports plus imports divided by real GDP. Source: WDI.
Ln(population)	Natural log of population. Source: WDI.
Institutions	Average of six different indicators of governance (rule of law, control of corruption, voice and accountability, government effectiveness, political stability, and regulatory quality). Source: Kaufmann, Kraay, and Mastruzzi (2007).

Table 2. Summary statistics – Sample: FDI inflows (from all countries) in tax havens

	Mean	Std. Dev.	Min	Max
Ln(FDI)	5.038	2.652	0.000	11.693
TH_proximity	0.186	0.039	0.126	0.243
Ln(FDI in closest TH)	4.979	3.436	-3.114	11.693
Ln(GDP initial)	8.667	0.969	7.134	10.458
Ln(population)	13.145	1.684	10.600	15.822
Ln(exchange rate)	1.149	1.976	-1.143	7.462
Ln(openness)	4.887	0.363	3.924	5.953
Institutions	0.649	0.590	-0.369	1.796

All variables have 270 observations

Table 3. Summary statistics – Sample: American MNCs activity in tax havens

	Mean	Std. Dev.	Min	Max
Ln(Affiliates)	2.353	2.165	0.000	6.314
TH_proximity	0.183	0.041	0.123	0.243
Ln(Affiliates in closest TH)	3.233	2.468	0.000	6.314
Ln(GDP initial)	9.602	2.228	4.958	15.773
Ln(population)	13.298	1.694	10.652	15.822
Ln(exchange rate)	1.311	2.021	-1.065	7.318
Ln(openness)	4.841	0.413	3.860	5.953
Institutions	0.559	0.784	-1.596	1.830

All variables have 133 observations

Table 4. Spatial Error Model Estimates: FDI inflows[1]

Independent variable	(1)	(2)	(3)	(4)
TH proximity	-12.922***	-12.868***		-11.665***
	(4.607)	(4.020)		(4.385)
TH proximity(sq)		499.485***		
		(142.223)		
Ln(FDI in closest TH)			-0.017	
			(0.048)	
Ln(GDP initial)	0.447	0.712**	0.315	0.677***
	(0.305)	(0.298)	(0.324)	(0.254)
Ln(population)	0.511***	0.465***	0.637***	0.408***
	(0.090)	(0.090)	(0.100)	(0.092)
Ln(exchange rate)	0.241***	0.291***	0.167*	-0.044
	(0.093)	(0.091)	(0.088)	(0.103)
Ln(openness)	2.021***	2.813***	1.861***	-0.628
	(0.466)	(0.505)	(0.457)	(0.758)
Institutions	1.569***	0.928	1.639**	0.296
	(0.599)	(0.593)	(0.659)	(0.553)
Constant	-0.035	-0.790***	-0.028	0.412*
	(0.173)	(0.247)	(0.169)	(0.221)
Lambda ($\lambda W\varepsilon$)	0.444***	0.408***	0.415***	0.381***
	(0.074)	(0.075)	(0.079)	(0.093)
Observations	270	270	270	240
Log-likelihood	-515.70	-507.70	-521.60	-454.90
Wald statistic (Chi-square)	35.73	29.45	27.77	16.78
BIC	1081.81	1071.48	1093.67	959.05

[1]Robust standard errors are in parenthesis. Dependent variable: FDI inflows (natural log)
*, **, and *** indicate significance at 10, 5 and 1 percent level, respectively.

Table 5. Spatial Error Model Estimates: Annual American Affiliates[1]

Independent variable	(1)	(2)	(3)	(4)	(5)	(6)
TH proximity	-8.315***	-10.065***			-11.022***	
	(2.462)	(2.456)			(2.531)	
TH proximity(sq)		320.541***				
		(105.487)				
Ln(Affiliates in closest TH)			0.124***	0.822***		0.082**
			(0.034)	(0.134)		(0.033)
Ln(Affiliates in closest TH)^2				-0.108**		
				(0.051)		
Ln(Affiliates in closest TH)^3				-0.103***		
				(0.019)		
Ln(GDP initial)	-0.408***	-0.243**	-0.490***	-0.425***	0.031	-0.135
	(0.111)	(0.099)	(0.114)	(0.087)	(0.119)	(0.113)
Ln(population)	1.044***	1.017***	1.148***	1.018***	0.645***	0.908***
	(0.064)	(0.056)	(0.055)	(0.054)	(0.109)	(0.110)
Ln(exchange rate)	0.527***	0.249*	0.562***	0.477***	-0.088	0.06
	(0.169)	(0.142)	(0.173)	(0.130)	(0.158)	(0.149)
Ln(openness)	1.084***	0.312	0.982***	1.657***	-0.284	-0.452
	(0.200)	(0.325)	(0.222)	(0.253)	(0.605)	(0.623)
Institutions	2.472***	2.404***	2.373***	1.899***	1.011***	1.344***
	(0.413)	(0.331)	(0.426)	(0.311)	(0.382)	(0.439)
Constant	-0.007	-0.544**	-0.007	0.719**	-0.344	-0.182
	(0.175)	(0.264)	(0.189)	(0.326)	(0.259)	(0.250)
Lambda ($\lambda W\varepsilon$)	0.554***	0.602***	0.583***	0.584***	0.687***	0.673***
	(0.104)	(0.095)	(0.101)	(0.097)	(0.091)	(0.098)
Observations	133	133	133	133	112	112
Log-likelihood	-178.60	-172.50	-181.00	-163.80	-134.70	-143.50
Wald statistic (Chi-square)	28.41	39.93	33.54	36.14	56.92	47.21
BIC	401.12	393.94	405.97	381.34	311.91	329.38

[1]Robust standard errors are in parenthesis. Dependent variable: Number of affiliates (natural log)
*, **, and *** indicate significance at 10, 5 and 1 percent level, respectively

Appendix 1. Countries Classified as Tax havens by Darmaphala and Hines (2006)

Andorra	Channel Islands*	Lebanon	Netherlands Antilles
Anguilla	Cook Islands	Liberia	Panama
Antigua and Barbuda	Cyprus	Liechtenstein*	St. Kitts and Nevis
Bahamas	Dominica	Luxembourg	St. Lucia
Bahrain	Gibraltar	Macao	St. Vincent and Gren.
Barbados	Grenada	Maldives	Singapore
Belize	Hong Kong	Malta	Switzerland
Bermuda	Ireland	Marshall Islands	Turks and Caicos
British Virgin Islands	Isle of Man*	Monaco*	Vanuatu
Cayman Islands	Jordan	Montserrat	

*Distance data from Mayer and Zignago (2006) is not available.

Appendix 2. Sample of Tax Havens use in Estimates*

Antigua and Barbuda	Hong Kong	Luxembourg	St. Lucia
Bahrain	Ireland	Macao	St. Vincent and Gren.
Belize	Jordan	Malta	Switzerland
Dominica	Lebanon	Panama	Vanuatu
Grenada	Liberia[i]	St. Kitts & Nevis	

[i] Not included in estimates of FDI inflows

*Sample for total FDI includes 18 countries and sample for American MNC affiliate includes 19 countries.