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Ronald B. Davies
Amélie Guillin

CESIFO WORKING PAPER NO. 3599
CATEGORY 8: TRADE POLICY
SEPTEMBER 2011

CESifo *Working Paper No. 3599*

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Abstract

Foreign direct investment (FDI) in services has grown significantly in recent years. Evidence of spatial relationships in FDI decisions have been provided for goods manufacturing by utilizing physical distance-based measures of trade costs. This paper investigates spatial interactions for services FDI using several distance measures, including physical distance, genetic distance, and transport time. Across different measures of distance, the traditional determinants of outbound FDI activity remain valid for services. We also find spatial interdependence for services FDI that is generally supportive of complex vertical motivations.

JEL-Code: F210, F230.

Keywords: foreign direct investment, services, spatial econometric techniques.

Ronald B. Davies
University College Dublin
School of Economics
Ireland - Belfield, Dublin 4
ronbdavies@gmail.com

Amélie Guillin
Paris School of Economics
University of Paris 1
Paris / France
amelie.guillin@univ-paris1.fr

January, 2011
First Draft
This paper is produced as part of the project "Globalization, Investment and Services Trade (GIST) Marie Curie Initial Training Network (ITN)" funded by the European Commission under its Seventh Framework Programme - Contract No. FP7-PEOPLE-ITN-2008-211429. We thank seminar participants at the 2011 European Trade Study Group Meeting, the 2011 European Economics Association, the 2011 Globalisation and Economic Policy Annual Postgraduate Conference and the 2011 Irish Society for New Economists Conference.

1. Introduction

According to the Bureau of Economic Analysis (BEA) data, services supplied abroad through the foreign affiliates of US multinational enterprises (MNEs) has grown from less than $100 billion in 1989 to over $1 trillion in 2007. Similar to foreign direct investment (FDI) in goods, Europe and in particular the United Kingdom represents the largest market for services FDI. In addition, Canada and Japan are key destinations contributing to this explosive growth. Although it is recognized that there are many motivations for FDI, a goal of the empirical literature has been to identify the key motivations for MNE activity. Early work utilized purely bilateral country information to do so, however more recent work utilizes spatial regression techniques that account for third country effects, that is, the impact of nations outside of the parent and host countries on FDI activity. These third country effects are particularly important in the most recent theoretical models of FDI, including export-platform FDI (Ekhom, et al, 2007) and complex-vertical FDI (Bergstrand and Egger, 2007). In these techniques, physical distance plays a key role in the estimation because, as a proxy for trade barriers, it allows the researcher to account for which third countries matter the most. Although physical distance may well be a reasonable proxy for the cost of trading goods, it is not clear that it works as well in capturing barriers inhibiting trade in intangibles like services. The goal of this paper is to examine the spatial patterns in US outbound FDI in services. In doing so, not only do we contribute to the literature by examining services FDI instead of goods FDI, but also by employing distance measures beyond physical proximity.

Two main motives have been provided to explain FDI: horizontal or market-seeking FDI (Markusen, 1984) and vertical or input-seeking FDI (Helpman, 1984). In each of these, the role of distance is immediately clear. When a market is far away, it becomes desirable to serve it locally through horizontal FDI. However, when a country is distant, even if it has low-cost inputs, the cost of bringing that output back to the parent country inhibits vertical FDI. Although both of these models utilize a two-country framework, implicitly assuming that third countries do not matter for FDI, more recent extentions have included third country effects. On the horizontal side, Ekholm et al. (2007) model export-platform FDI in which a location is chosen not only to access its own market, but also the markets of proximate countries. Thus, distance from the parent increases export-platform FDI but distance from third countries reduces it. Furthermore, FDI in proximate countries acts as a substitute, reducing the need for export-platform FDI in the country in question. Complex vertical FDI, as the name suggests, expands the idea of vertical FDI into a production chain across many countries. As discussed by Bergstrand and Egger (2007), when a country has neighbors that themselves host FDI, the small distance to these third countries increases the attractiveness of a given host as part of the production chain. Thus, in contrast to export-platform FDI, FDI in neighboring countries acts as a complement to FDI in a given host. However, since the finished product for complex vertical FDI is still shipped back to the parent, the proximity to third country markets plays no role. These various estimated results are summarized in Table 1.

By utilizing information on distances from third countries, is then possible to begin to identify whether one of these models best describes FDI patterns. In particular, the focus has been on two variables: market potential (typically measured as the sum of distance-weighted third country GDPs) and the spatial lag (typically measured as the sum of distance-weighted third country FDI). Market potential is therefore attempting capture the importance of third country markets whereas the spatial lag controls for the effect of third country FDI. An early example of this is Coughlin and Segev (2000) who are the first to bring spatial econometric methods to FDI data.[1] The rationale for using a spatial econometric approach is that if the FDI in location i depends on that in locations j and k, the reverse is also true. As a result, the spatial lag variable is endogenous. Spatial econometrics correct for this by employing the distance weighted sum of third country exogenous variables as instruments. Using this approach, Coughlin and Segev (2000) find a positive coefficient for the spatial lag, which is consistent with complex vertical FDI. However, they do not control for market potential which, since bigger markets attract more FDI, likely biases the estimates. More recent work, including that of Blonigen, et al. (2007), Baltagi, et al. (2007), Garretsen and Peeters

[1] In addition to the spatial approach, there is a concurrent stream of literature using conditional or nested logit estimations. Examples of these include Head and Mayer (2004), Head et al. (2005) and Amiti and Javorcik (2008). These studies, however, estimate the location of an affiliate and not its size. Further, most do not account for the location of other affiliates of the same parent. Thus, while these provide useful understanding of where a parent locates an affiliate, the interpretation of their estimates is quite different from those in the spatial literature.

(2009), and George and Ryan (2010) includes market potential (although Baltagi, et al. do not estimate a spatial lag). The results across these papers are generally mixed. Blonigen, et al. (2007), Baltagi, et al. (2007) and George and Ryan (2010) generally find a significantly negative market potential effect whereas Garretson and Peters (2009) obtain the reverse. Of those that estimate spatial lags, on the whole a positive effect is found. However, all of these results are sensitive to the inclusion of host fixed effects and the countries in the sample, with some specifications bucking these trends. Of particular note for our purposes are the results of Blonigen et al. (2007) that are specifically for services. There, utilizing only data on European OECD members, they find a positive market potential effect and a negative, although insignificant, coefficient on the spatial lag.

All of these studies, however, focus on FDI in goods. Our goal is to examine the swiftly-growing services sector.[2] When doing so, however, it is natural to ask whether it is sufficient to simply employ the methodologies used elsewhere. In particular, one might be concerned that using physical distances to proxy for trade costs presents difficulties for intangibles. Although there is no denying that some services are best provided through face-to-face interaction others are easily provided via the internet and other telecommunication technologies where physical distance is of secondary concern. Further, for both types of services, the ability to communicate may trump physical issues. Thus, if physical distance is a crude proxy for international barriers in services, this might help to explain the insignificant spatial lag for services in Blonigen, et al. (2007). With this in mind, we explore three alternative measures of distance. The first is the genetic distance between countries which measures the differences in 120 allele frequencies.[3] Genetic distance has been used as a trust proxy or cultural proxy elsewhere (see Desmet et al. (2007), Guiso et al. (2009) and Spolaore and Wacziarg (2009)) under the expectation that if two countries share biological similarities, this is likely because they are compatible along other dimensions. This might be a particularly useful measure if communication barriers are critical. Alternatively, travel time may

[2]Services refer to various activities ranging from informational services to retailing each of which can require different modes of delivery (hence the different distance measures we use in our estimation). The WTO's General Agreement on Trade in Services divides services into four delivery modes: cross-border trade, consumption abroad, commercial presence and temporary movement of natural persons.

[3]Allele frequencies are the proportion of a gene that are made of a particular genetic variant, known as an allele.

be the key measure of distance for services, especially when service provision requires face-to-face contact. Although this is certainly correlated with physical distance, if one of two equally distant countries is better served by faster and more frequent transport connections, its economic distance may be lower than the harder to reach nation. With this in mind, we collected data on the time it takes the United Parcel Service (UPS) to deliver a package between locations. In a similar vein, rather than UPS travel time, we use the cost of UPS shipping. Although not a distance measure like the others, this monetary cost represents yet another way of proxying for the barriers to international business. Thus, our first contribution is to compare the results from physical distance to three alternative measures of distance that are arguably more appropriate for services.

To do so, we utilize data on the level of US outbound FDI data between 1983 and 2007 to estimate a spatially augmented gravity equation. In contrast to the results on services in Blonigen, et al. (2007) we do not restrict our sample to European OECD countries (although we do undertake comparable sample restrictions in robustness checks). For the full sample, we find a significantly negative effect for market potential and a positive spatial lag. This is robust across our four measures of distance. Although no model suggests a negative market potential effect, the positive spatial lag is consistent with complex vertical FDI in services. Note that these estimates contrast sharply with Blonigen, et al. (2007) where a positive market potential and a negative (albeit insignificant) spatial lag were found. We go on to show that this difference is due to our inclusion of American and Asian countries. When restricting ourselves to the OECD or to Europe, we find results more in line with theirs that suggest weak evidence for export platform FDI in services. For America and Asia, however, we find results comparable to the full sample ones that are most suggestive of complex vertical FDI. These differences are also robust to our alternative distance measures, suggesting that physical distance does not overly miss the mark when describing international barriers for intangibles. This indicates that services FDI has quite different motivations depending on whether one considers the more or less developed parts of the world. Further, it is notable that this significance also persists when we include host fixed effects, something not found in Blonigen, et al (2007). This suggests that although it may be sufficient to include host fixed effects to account for third country effects when utilizing data on FDI into developed countries, this is not the case when considering FDI into developing countries which, as of 2009, received the majority of FDI inflows (United Nations, 2010).

The paper is structured as follows. In the next section, we present the gravity framework and the empirical strategy, and describe the data. Results are found in Section 3. Finally, Section 4 concludes.

2. Empirical strategy

In the empirical FDI literature, the gravity specification has become the standard.[4] This specification uses a set of host and parent country variables to estimate the (logged) level of FDI activity. Included in the standard set of controls are factors accounting for the size of the local market such as population and GDP. In addition, in response to the proximity-concentration tradeoff highlighted by Brainard (1997), it is standard practice to control for trade and investment costs. For this reason, physical distance between the parent and host (often measured as the distance between capitals) has become a de rigueur control in FDI regressions. Building on the knowledge capital framework of Markusen (2002), it has now become standard to also account for factor endowments with a particular emphasis on the availability of skilled labor with Carr, et al. (2001) providing an early example. Although this specification was initially atheoretically adopted from the empirical literature on trade flows, the recent work of Kleinert and Toubal (2010) has given it a theoretical underpinning. In addition, it is useful to note that Ramasamy and Yeung (2010) find that these determinants, which are typically used to explain FDI in goods, also work for explaining FDI in services.

With this history in mind, our baseline specification for the level of affiliate sales by US firms in country i in year t is:

$$\begin{aligned} FDI_{i,t} = \quad & \beta_i + \beta_1 HostVariables_{i,t} + \beta_2\ SurroundingMarketPotential_{i,t} + \\ & \lambda\ SpatialLag_{i,t} + Trend_t + Trend_t^2 + \varepsilon_{i,t} \end{aligned} \tag{1}$$

[4] As but a small sample, see Eaton and Tamura (1994); Brainard (1997), ; Blonigen and Davies (2004); Egger and Pfaffermayr (2004); Braconier et al. (2005); Blonigen and Wu (2005); Blonigen, et al. (2007) or Baltagi, et al. (2007).

This is the typical gravity model with four modifications. First, although it is typical to include both host and parent country variables, since the US is always the parent country in our data, we follow Blonigen and Davies (2004) and Blonigen, et al. (2007) and omit these. Second, we include host specific fixed effects. Note that this negates the need to control for time invariant trade costs variables such as distance to the USA or dummy variables denoting a common language or shared colonial history. Third, we control for a quadratic time trend.[5] Finally, and most importantly, we include two third country variables, one for market potential and the other for the spatial lag.

The market potential of host country i is the inverse-distance weighted sum of other countries GDPs, that is:

$$SurroundingMarketPotential_{i,t} = \sum_{j \neq i} \frac{1}{d_{i,j}} GDP_{j,t} \tag{2}$$

Note that this is weighted by the distance between country i and the other host country j, not by i's distance to the US. Following Blonigen et al. (2006), we do not include the GDP of the host country in the calculation of market potential (in contrast to Head and Mayer, 2004). We do this for two reasons. First, it allows us to compare our results to theirs. Second, it permits us to distinguish between the effect of neighbouring markets and that of the host market. Indeed, since the difference between horizontal and export platform FDI is that although host GDP increases FDI for both, neighboring GDP increases FDI only for the latter. Thus doing so is necessary to distinguish between FDI motivations.

The spatial lag is defined as:

$$SpatialLag_{i,t} = \sum_{j \neq i} \omega_{i,j} FDI_{j,t} \tag{3}$$

where

$$\omega_{i,j} = \frac{1/d_{i,j}}{\sum\limits_{k \neq i} 1/d_{i,k}} \tag{4}$$

This is similar to market potential in that it is a distance weighted sum of the FDI

[5]Although it is desirable to include year fixed effects, when utilizing spatial variables, this is generally infeasible. See Devereux, Lockwood, and Redoano (2008) for a complete discussion.

in other countries. A key difference, however, is that following standard practice we row standardize so that the weights country i assigns to the other countries sum to one.[6] Also, note that the spatial lag does not include the FDI in country i. The key issue with including the spatial lag is that since FDI in i depends on that in j and vice versa, it is endogenous. As a result, as discussed by Blonigen et al. (2006) and Arraiz et al. (2008), OLS estimates give inconsistent results. Thus, following Anselin (1988) we employ an instrumental variables approach using the same weights as the spatial lag to construct weighted averages of our host control variables.

Our dependent variable is the sales of US majority-owned foreign affiliates in the services sector in host country i in year t. These were obtained from the Bureau of Economic Analysis and are available from 1983 to 2007.[7] In Figure 1, we map US outbound FDI in services in 1983 and in 2007. Sales have significantly grown between the beginning and the end of the period we consider. These data were converted to millions of constant 2000 dollars using the chain-type price index for gross domestic investment obtained from the 2008 Economic Report of the President.

These data cover up to 57 countries (see Table 2) for details. Note that due to data availability and political factors including the dissolution of the USSR, our panel is unbalanced. Data on population, real GDP and openness (the sum of exports and imports over GDP) are from the Penn World Tables version 6.3.[8] Following Blonigen and Davies (2004) among others, we utilize the inverse of openness as our measure of trade costs. As a proxy for host investment costs, we use the Economic Freedom Index (EFI), developed by the Fraser Institute.[9] The EFI variable is a combination of government size, the legal structure, the freedom to trade internationally and regulations of credit, labor and business. This measure is reported every 5 years between 1970 and 2000 after which it is reported annually. We use a linear interpolation of the EFI for unreported years. Following Blonigen, et al. (2007),

[6] Some weighting schemes use the minimum distance in the construction of the weight. This normalized the distance assigned to the nearest neighbor pair to one. When row standardizing, however, this falls out of the numerator and the denominator in the weight.

[7] Only preliminary data are available for the year 2008.

[8] The current version of the Penn World Tables, which covers the period 1950-2007, can be found at http://pwt.econ.upenn.edu/php_site/pwt63/pwt63_form.php.

[9] http://www.freetheworld.com/release.html

we use Barro and Lee's data on the average years of total schooling for those over 25 as a proxy for skill. We apply a linear interpolation of these data, which are recorded in five year intervals from 1950 to 2010, to create annual observations.

As discussed above, we utilize four measures of distance. For physical distance, we use the distance between capital cities in kilometers, provided by *Cepii*. This is the same measure used by other spatial studies. Our first alternative to this is genetic distance. These data were constructed by Spolaore and Wacziarg (2009) who matched the coancestors coefficients from Cavalli-Sforza et al. (1994) with country ethnic data from Alesina et al. (2003) to obtain genetic distance by country.[10] Those coefficients are based on the differences in 120 allele frequencies between two given populations, and are available for 42 ethnic population groups (which are distributed across our 57 sample countries). Alesina et al. (2003) provide country-ethnic composition data based on 1120 different ethnic group categories. To understand this measure, consider the example of Italy, where 95% of the population is comprised of two ethnic groups: Italians and Rhaetians of which Italians are the larger group. To obtain the genetic distance between Italy and another country, this is differenced from the share of the genetic population of Italians in the other country.[11] The genetic distance is thus positively correlated with the time that two populations have been separated from each other. The genetic measure between two countries is equals to zero if the alleles distribution of both countries is exactly the same. A higher genetic distance reflects larger differences across countries, i.e. a low degree of genealogical relatedness.

Several studies have used the genetic distance as a successful proxy for cultural proximity (Desmet et al., 2007), trust (Guiso et al., 2009), and other barriers between two populations (Spolaore and Wacziarg, 2009). In our context, genetic distance is meant to represent the idea that when two nations tend to share genes with one another, this is because communication, culture, and other similarities make such exchanges easier. Our contention is that these similarities also ease more business-minded exchanges.

[10] Genetic distance data are available online at http://www.tufts.edu/~espola01/

[11] As the FST measure, which allows differences only through genetic drift, is more common in the literature, we run the estimations using this genetic distance. There is an alternative measure, the NEI which allow for differences from both mutation and genetic drift. The two are highly correlated with one another (93%). The results using the NEI are qualitatively identical and are available on request.

Our third distance measure is intended to capture the difference in travel times between locations. This can differ from physical distance due to the difficulty in obtaining transport connections and the like. For this, we collected data from UPS on the estimated the time in days and to ship a package between capital cities (except for New Zealand), for all countries in the sample.[12] Finally, we also collected data on the cost in US dollars for UPS to ship a package between capital cities.[13]

In constructing our UPS measures, we obtained information on freight time and cost from *UPS Worldwide Expedited*.[14] Since there are several shipping options and these options vary by source and destination, we used air freight as this was the most widely available choice.[15] With this in mind, we obtained shipment information for a 5 kilo, 10 centimeter cubic package leaving the same day for all destinations (Monday, October, 4th, 2010), with a customs value of €50 (to avoid a declared value surplus).[16] When multiple air shipping options were were available, we chose the lowest cost one. Finally, when multiple departures were available we chose the earliest departure. Therefore, these measures capture the level of transportation infrastructure of the source and destination countries as well as physical distance. Further, since the frequency of connections is influenced by common borders, shared languages, and historical ties, they include other common controls for trade barriers.[17]

An important distinction between these two measures and the physical and genetic distance measures is that the UPS data are not symmetric. This is because, due to differences in arrivals and departures, it can take longer to get from country i to j than from j to i.

As one might expect, there is a significantly positive correlation between these four measures. Nevertheless, clear differences can be found. For example, Figure 2A plots physical

[12] We utilize Auckland, the largest city in New Zealand, as the capital rather than Wellington due to availability of some UPS data.

[13] This was done using https://wwwapps.ups.com/ctc/request as well as direct communication with UPS. These data, as well as the UPS cost data, are available on request.

[14] Data was unavailable from this source for the Barbados, Jamaica, Nigeria, Russia and South Africa. In these cases, we used the estimated quote provided by UPS at *UPS Exress Saver*.

[15] Less frequent options include ocean shipping which itself is available sometimes with a full container load and sometimes with less than a full container load.

[16] For Australia and surprisingly for Italy, even ordering a departure for the chosen day, the package could only leave the day after.

[17] As an example, it takes less time to ship a package from Australia to Great Britain than to Germany while Australia is 16562.72 km away from Germany and 17011.27 km away from Great Britain.

distance from the UK against genetic distance. As one might well expect, former colonies such as New Zealand and Australia are much closer genetically than their physical distance would suggest. In contrast South Africa is quite the opposite. In a similar way, Figure 2B plots physical distance from the UK against travel time. Here, the South American countries of Brazil and Venezuela are more difficult to reach than their distance would suggest. This does not, however, always translate into a more expensive shipment. As shown in Figure 2C, which compares physical distance to the UPS cost, it is instead the Caribbean nations who are surprisingly expensive to ship to relative to their physical distance. Figures 3A through 3C and 4A through 4C plot these values for Japan and Brazil. As can be seen, there are marked differences between physical distance and the alternative distance measures across countries. Thus, although there is a clear correlation among the distance measures, they do tell somewhat different stories.

Summary statistics for all of our data can be found in Table 3.

3. Results

Table 4 presents the results using the entire sample for each of our four distance measures. For our baseline controls, we find results that are overall consistent with those found elsewhere for FDI in goods production. These indicate that services FDI is greatest in countries with large GDPs but small populations (i.e. wealthier countries). FDI is impeded by host trade and investment costs (although investment costs are only significant when we use either of the UPS distance measures). Somewhat surprisingly, we find that FDI in services is generally lower when host skill is higher. This may be due to high skill workers commanding higher wages. As shown below, this result is sensitive to the countries included in the data.

Turning to our two variables of interest, we find a significantly negative market potential and a significantly positive spatial lag.[18] These results are thus comparable to those found elsewhere in the literature for goods FDI suggesting that, of the motivations put forward,

[18] Note that for market potential, there is both a direct effect (i.e. the estimated coefficient) and an indirect effect which comes about because a change in market potential for country i affects its FDI, changing the spatial lag for the other countries and their FDIs, which in turn changes the spatial lag for j. Nevertheless, in this, as well as the subsequent regressions, the net effect has the same sign as the direct effect with the net effect generally somewhat larger in absolute value than the direct effect. See Elhorst (2010) for details on how to calculate these indirect effects.

the data is most consistent with complex vertical FDI although that model does not provide an explanation for a negative effect from market potential. It is worth recognizing that this significance holds even though we include host fixed effects, something not found in some other studies. This, however, is potentially due to the shorter time horizons in those papers (for example, our data runs from 1983 to 2007 whereas Blonigen, et al. (2007)'s data end in 1998).[19] When using shorter time horizons we too often find no significant third country effects. Finally, these results are robust across the different distance measures and the confidence intervals for the variables overlap. This suggests that previous results relying on physical distance are not widely off the mark when considering FDI in services.

As Blonigen and Davies (2004), Blonigen and Wang (2005) and Blonigen et al. (2007) demonstrate, the determinants and motivations of FDI are sensitive to the sample considered. Consequently, examining sub-samples can yield additional insights. With this in mind, following Blonigen, et al. (2007) we consider OECD- and European-only subsamples. Columns 1 and 2 of Table 5 do so for genetic distance. Looking first at the standard gravity variables, we find very similar results here as in the full sample. Note that following others, we do not recalculate market potential since the purpose of this variable is to proxy for access to world markets. In addition, we keep the spatial lag the same as in the full sample. Thus, our subsample regressions are considering whether FDI in a given region responds to worldwide FDI differently from that in another region.[20]

Turning to the third country variables, we find that comparable to Blonigen, et al. (2007) when they include host fixed effects, we no longer find a significant role for market potential.[21] The same is true when we use physical distance (Columns 5 and 6 of Table 5) and for the UPS measures (Columns 1, 2, 5 and 6 of Table 6). For the OECD, we only find one significant spatial lag where, when using genetic distance, the coefficient is negative. For the European

[19] In unreported results using shorter time horizongs, we find comparable signs to our reported results although, as in Blonigen, et al. (2007) we generally find insignificant results. The alternative regressions are available on request.

[20] In unreported results, we did recalculate the spatial lag using only the countries in the subsample, i.e. giving those outside the sample zero weights. The primary difference is that the significance of the spatial lag fell for the European subsample where only one significantly negative spatial lag was found. These alternative results are available on request.

[21] When restricting the OECD sample to those countries used in Blonigen, et al. (2007) we find a positive and significant surrounding market potential and a negative and significant spatial lag even with host fixed effects.

sample, we find significantly negative spatial lags for all four distance measures. Thus, at least within Europe, our estimates are suggestive of export platform FDI an in line with theirs.

Unlike Blonigen, et al. (2007), we also utilize sub-samples for Asia and the Americas, which consist primarily of developing countries. For these subsamples, we find rather different results from those for the OECD or Europe. First, in each case, surrounding market potential is significantly negative. Second, in each case we find a significantly positive spatial lag. This is suggestive of complex vertical FDI, a marked difference from the results from Europe of the OECD. These differences suggest two things. First, the difference in significance levels suggests that the time variation in the more developing parts of the world results in greater significance when including host fixed effects. Second, and more importantly, it suggests that the motivation for US services FDI differs considerably between the developed and the developing world with the first being driven by market-seeking motivations and the latter resulting from access to low-cost inputs. A final item of interest is that, in contrast to the other samples, host skill is an attractor for FDI into Asia. This may result from the relatively low wages for a skilled worker in Asia as compared to her European counterpart, implying that the productivity effect dominates for that subsample whereas the higher cost of skill dominates in the OECD sample.

Thus, as a whole our results identify the importance of third country effects in US outbound services FDI. These seem to be particularly important for developing countries as compared to OECD members. Further, they suggest that the motivation for FDI differs between developed hosts and developing hosts. In addition, as in the literature on FDI in goods, we tend to find a surprising negative impact of market potential. In unreported specifications, we utilized a specification that also included the square of GDP, specifications that did not include the largest and/or smallest countries in the data, and specifications that recalculated market potential so that only nations within the region were counted when calculating market potential. In all of these alternatives, we found results that were comparable to those reported here, i.e. a generally negative market potential (especially for the developing nations) and spatial lags that were positive in the full and developing country samples but negative in the developed country samples.

4. Conclusion

The literature on foreign direct investment has been steadily moving from its bilateral genesis to more realistic models with many countries. This is important for understanding FDI because it highlights additional motivations for investment that cannot be found in bilateral models. In particular, the importance of a host's proximity to third markets and the FDI in those locations gives insight into the different market seeking and cost reduction motivations behind FDI. Although there is a growing body of literature on these third country effects for goods FDI, there is relatively little for the swiftly growing services FDI. We fill this gap by not only focusing on services FDI but also by considering alternative distance measures that may be more relevant to the tradeoffs service providers face.

On the whole, our estimates are indicative of complex vertical FDI in which the production chain is split across hosts. However, as in Blonigen et al. (2006) or Baltagi et al; (2007) the results depends on the sample considered. In particular, while complex vertical FDI may best describe US investment in developing countries, market-seeking export platform FDI appears to be a better fit for FDI into OECD or European countries. In addition to this, we demonstrate the standard set of control variables in FDI gravity models perform similarly here. Furthermore, we find that the easily obtainable physical distance measure performs very similarly to alternative distance measures. This then helps to confirm the existing literature using physical distances as well as validate the use of the empirical approaches for FDI in the production of physical goods for the estimation of FDI in services.

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Table 1: Expected signs of the spatial lag and of the surrounding market potential

FDI motivation	Sign of spatial lag	Sign of surrounding-market potential variable
Pure horizontal	0	0
Export-platform	-	+
Pure vertical	-	0
Vertical specialization	+	0

Source: Blonigen et al. (2007)

Table 2: Samples

All countries			
Argentina^{Am}	Egypt	Japan^{*As}	South Africa
Australia^{*As}	Finland^{*E}	Luxembourg^{*E}	South Korea^{*As}
Austria^{*E}	France^{*E}	Malaysia^{As}	Spain^{*E}
Barbados^{Am}	Germany^{*E}	Mexico^{*Am}	Sweden^{*E}
Belgium^{*E}	Greece^{*E}	Netherlands^{*E}	Switzerland^{*E}
Brazil^{Am}	Guatemala^{Am}	New Zealand^{*As}	Taiwan^{As}
Canada^{*Am}	Honduras^{Am}	Nigeria	Thailand^{As}
Chile^{*Am}	Hong Kong^{As}	Norway^{*E}	Trinidad-and-Tobago^{Am}
China^{As}	Hungary^{*E}	Panama^{Am}	Turkey*
Colombia^{Am}	India^{As}	Peru^{Am}	United Arab Emirates
Costa Rica^{Am}	Indonesia^{As}	Philippines^{As}	United Kingdom^{*E}
Czech Republic^{*E}	Ireland^{*E}	Poland^{*E}	Venezuela^{Am}
Denmark^{*E}	Israel*	Portugal^{*E}	
Dominican Republic^{Am}	Italy^{*E}	Russia^{As}	
Ecuador^{Am}	Jamaica^{Am}	Singapore^{As}	

*:countries included in OECD sample; ^{E} in European sample;
^{Am} in American sample; ^{As} in Asian sample.

Table 3: Summary Statistics

	Mean	Standard deviation	Min	Max
Sales of services	5003	12812	7	140190
Host population	70770	195471	261	1321852
Host real GDP	492	881	4	11942
Host skill	7.927	2.412	1.771	13.086
Host Investment Cost	41.549	31.614	1	138
Host trade cost	0.195	0.013	0.002	0.097
Spatial lag geographic distance	5450	4130	635	24626
Spatial lag genetic distance	5703	3862	263	23819
Spatial lag UPS cost	5941	3848	1031	19234
Spatial lag UPS time	5803	3690	1026	16896
Surrounding Market Potential geographic distance	1235	984	148	5788
Surrounding Market Potential genetic distance	110	166	3	1256
Surrounding Market Potential UPS cost	3062	1808	509	13791
Surrounding Market Potential UPS time	5995	3211	1293	26481

Table 4: Spatial analysis of US outbound FDI for Services

Full Sample	Geographic distance	Genetic distance	UPS Time	UPS Cost
Host Population	-0.677[a]	-0.524[b]	-0.850[a]	-0.728[a]
	(0.208)	(0.244)	(0.211)	(0.211)
Host Trade Cost	-1.103[a]	-0.994[a]	-1.089[a]	-1.014[a]
	(0.092)	(0.101)	(0.093)	(0.090)
Host Skill	-0.621[a]	-0.609[a]	-0.730[a]	-0.656[a]
	(0.174)	(0.190)	(0.187)	(0.176)
Host Investment Costs	-0.029	-0.065	-0.068[c]	-0.021
	(0.038)	(0.041)	(0.041)	(0.038)
Host GDP	1.859[a]	1.737[a]	1.823[a]	2.017[a]
	(0.122)	(0.122)	(0.116)	(0.112)
Surrounding Market Potential	-1.306[a]	-1.683[a]	-1.536[a]	-1.887[a]
	(0.177)	(0.221)	(0.155)	(0.181)
Spatial Lag	0.687[a]	1.032[a]	0.949[a]	1.008[a]
	(0.121)	(0.151)	(0.110)	(0.111)
Country Dummies	Yes	Yes	Yes	Yes
Trend/Trend^2	Yes	Yes	Yes	Yes
No. Observations	1269	1269	1269	1269
R-squared	0.95	0.94	0.95	0.95

Standard errors in parentheses. [a] significant at 1%, [b] significant at 5%, [c] significant at 10%.

Table 5: Spatial analysis of US outbound FDI for Services using Genetic and Geographic distance

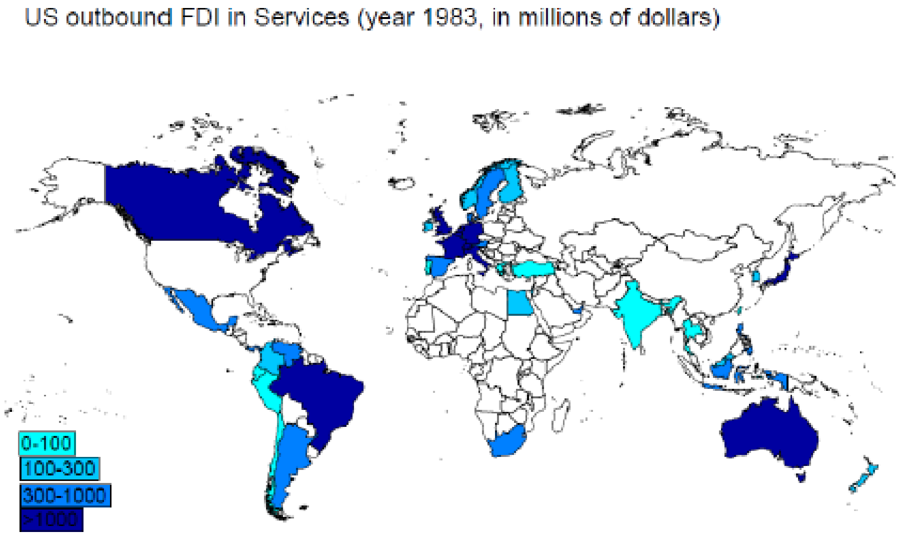
	Genetic distance				Geographic distance			
	OECD (1)	Europe (2)	America (3)	Asia (4)	OECD (5)	Europe (6)	America (7)	Asia (8)
Host Population	-0.961[a]	6.019[a]	2.613[a]	-2.727[a]	-0.769[b]	8.026[a]	3.941[a]	-2.849[a]
	(0.346)	(1.220)	(0.976)	(0.678)	(0.340)	(1.271)	(0.821)	(0.657)
Host Trade Cost	-0.814[a]	0.208	-1.080[a]	-0.897[a]	-0.823[a]	0.216	-1.100[a]	-0.983[a]
	(0.127)	(0.193)	(0.162)	(0.276)	(0.133)	(0.214)	(0.151)	(0.248)
Host Skill	-0.525[a]	-0.029	-0.850[c]	4.448[a]	-0.549[a]	0.204	-0.466	3.825[a]
	(0.202)	(0.219)	(0.493)	(0.633)	(0.209)	(0.214)	(0.452)	(0.572)
Host Investment Costs	0.011	-0.241[a]	-0.246[a]	-0.328[a]	0.021	-0.337[a]	-0.243[a]	-0.312[a]
	(0.058)	(0.065)	(0.072)	(0.060)	(0.055)	(0.055)	(0.064)	(0.060)
Host GDP	2.341[a]	2.251[a]	1.236[a]	1.100[a]	2.485[a]	2.148[a]	1.160[a]	1.227[a]
	(0.162)	(0.196)	(0.178)	(0.202)	(0.177)	(0.202)	(0.198)	(0.209)
Surrounding Market Potential	-0.028	0.311	-3.557[a]	-1.217[a]	-0.284	0.079	-2.456[a]	-1.151[a]
	(0.227)	(0.192)	(0.372)	(0.231)	(0.197)	(0.245)	(0.288)	(0.285)
Spatial Lag	-0.261[c]	-0.449[a]	1.982[a]	0.750[a]	-0.216	-0.386[b]	0.923[a]	0.663[a]
	(0.149)	(0.115)	(0.236)	(0.184)	(0.136)	(0.183)	(0.192)	(0.227)
Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Trend/Trend^2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. Observations	674	451	348	328	674	451	348	328
R-squared	0.97	0.98	0.95	0.94	0.97	0.98	0.95	0.94

Standard errors in parentheses. [a] significant at 1%, [b] significant at 5%, [c] significant at 10%.

Table 6: Spatial analysis of US outbound FDI for Services using UPS Time and UPS Cost distance

	UPS Time distance				UPS Cost distance			
	OECD	Europe	America	Asia	OECD	Europe	America	Asia
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Host Population	-0.859^a	8.121^a	3.125^a	-3.339^a	-0.843^a	8.410^a	2.401^a	-3.458^a
	(0.326)	(1.213)	(0.969)	(0.599)	(0.215)	(1.183)	(0.871)	(0.579)
Host Trade Cost	-0.741^a	-0.049	-1.267^a	-0.916^a	-0.831^a	-0.038	-1.128^a	-0.951^a
	(0.131)	(0.216)	(0.157)	(0.232)	(0.128)	(0.211)	(0.159)	(0.240)
Host Skill	-0.418^b	0.150	-1.142^b	3.039^a	-0.420^b	0.101	-0.722	2.988^a
	(0.212)	(0.211)	(0.474)	(0.576)	(0.201)	(0.213)	(0.496)	(0.534)
Host Investment Costs	-0.007	-0.288^a	-0.255^a	-0.357^a	-0.011	-0.302^a	-0.219^a	-0.275^a
	(0.055)	(0.054)	(0.068)	(0.058)	(0.052)	(0.055)	(0.067)	(0.053)
Host GDP	2.382^a	2.251^a	1.076^a	1.591^a	2.495^a	2.169^a	1.288^a	1.471^a
	(0.167)	(0.190)	(0.188)	(0.239)	(0.167)	(0.193)	(0.177)	(0.209)
Surrounding Market Potential	-0.447^a	-0.054	-2.799^a	-1.886^a	-0.843^a	0.067	-3.401^a	-1.877^a
	(0.172)	(0.155)	(0.285)	(0.327)	(0.215)	(0.241)	(0.346)	(0.290)
Spatial Lag	-0.017	-0.452^a	1.585^a	1.066^a	0.103	-0.468^a	1.864^a	1.216^a
	(0.116)	(0.123)	(0.185)	(0.190)	(0.121)	(0.143)	(0.215)	(0.183)
Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Trend/Trend^2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. Observations	674	451	348	328	674	451	348	328
R-squared	0.97	0.98	0.95	0.94	0.97	0.98	0.95	0.95

Standard errors in parentheses. ^{a} significant at 1%, ^{b} significant at 5%, ^{c} significant at 10%.



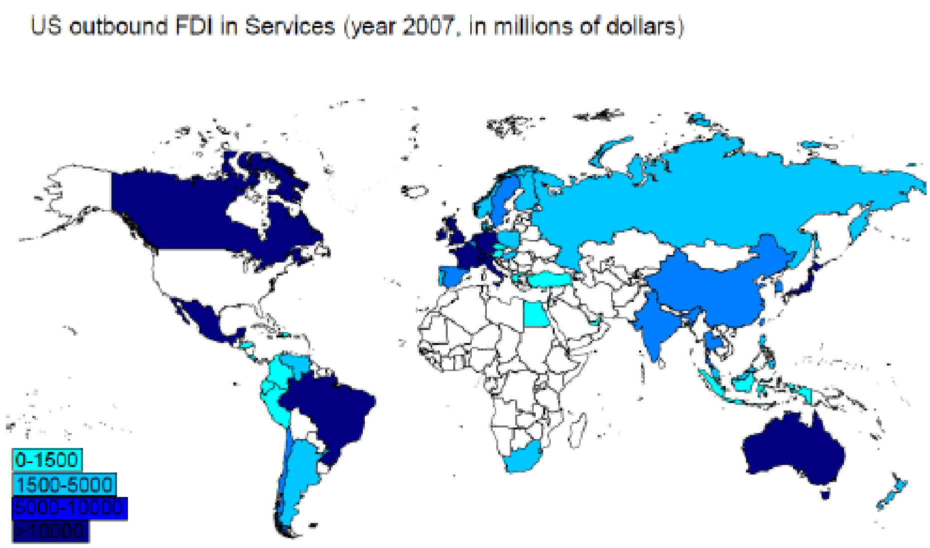


Figure 1: US outbound FDI in Services

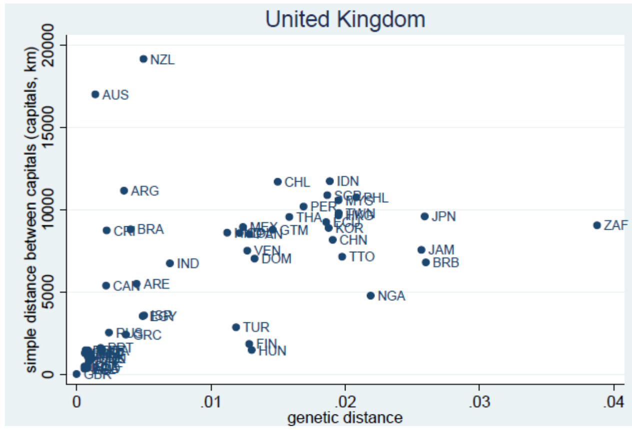


Figure 2A: How far is the United Kingdom? Comparaison between geographic distance and genetic distance

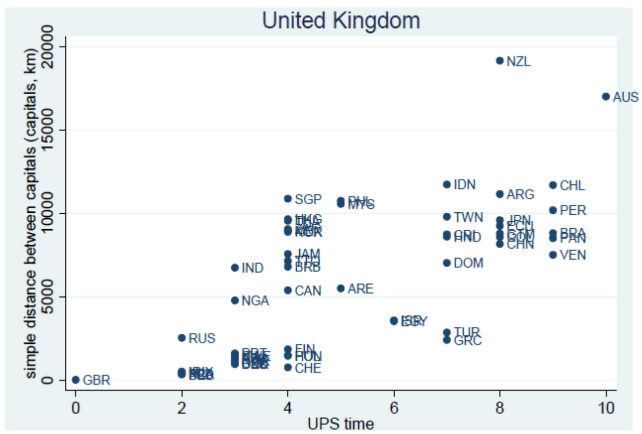


Figure 2B: How far is the United Kingdom? Comparaison between geographic distance and UPS time

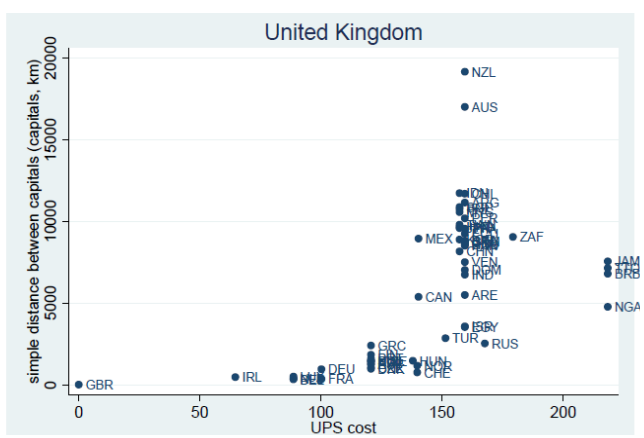


Figure 2C: How far is the United Kingdom? Comparaison between geographic distance and UPS cost

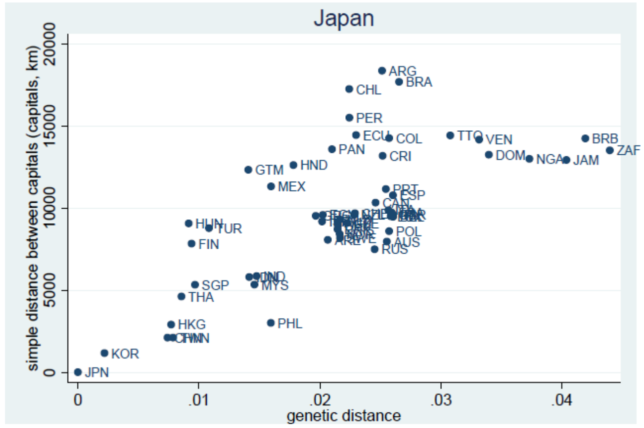


Figure 3A: How far is Japan? Comparaison between geographic distance and genetic distance

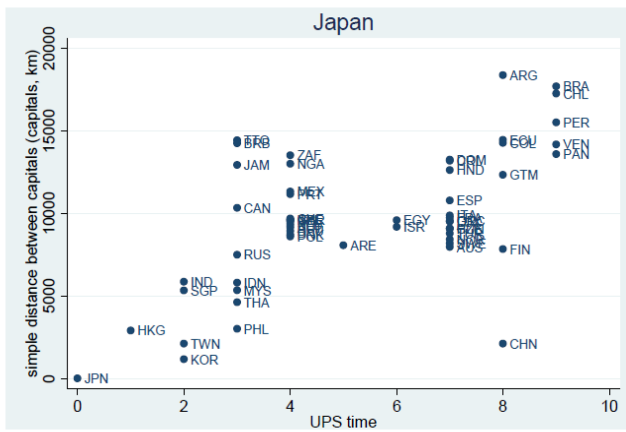


Figure 3B: How far is Japan? Comparaison between geographic distance and UPS time

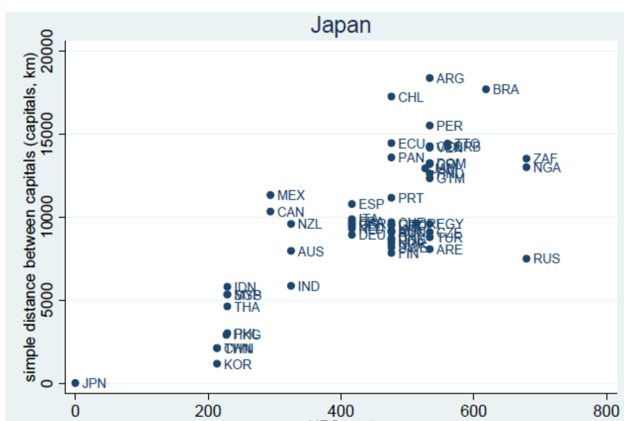


Figure 3C: How far is Japan? Comparaison between geographic distance and UPS cost

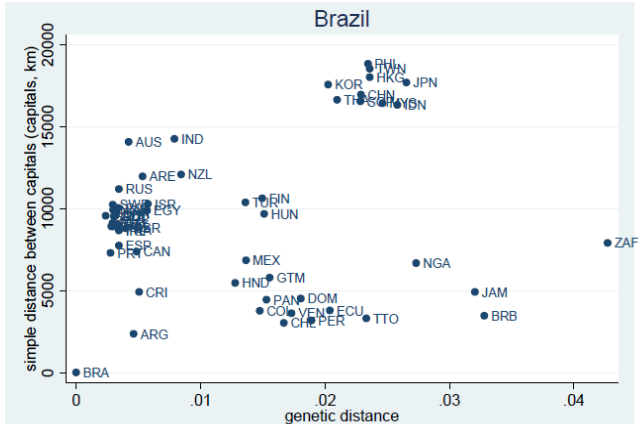


Figure 4A: How far is Brazil? Comparaison between geographic distance and genetic distance

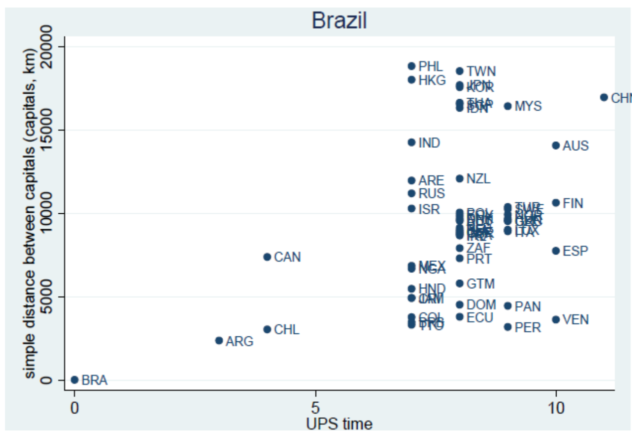


Figure 4B: How far is Brazil? Comparaison between geographic distance and UPS time

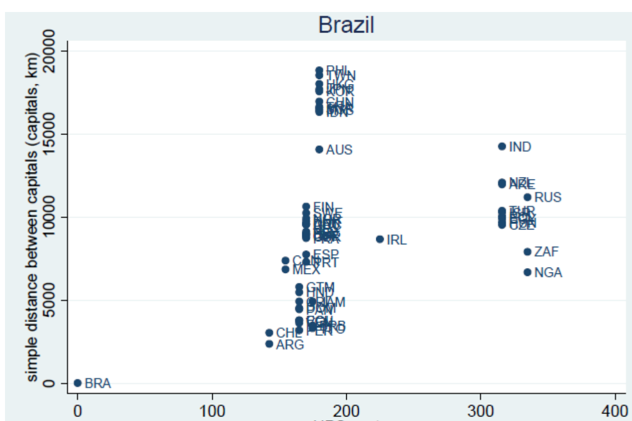


Figure 4C: How far is Brazil? Comparaison between geographic distance and UPS cost