GROWTH, FOREIGN DIRECT INVESTMENT AND URBAN CONCENTRATIONS: UNBUNDLING SPATIAL LAGS[#]

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Abstract

Cross-country regressions suggest that urbanization and FDI are important drivers of growth. However, it is not clear that primacy eventually hurts growth performance. Since it is notoriously difficult to interpret cross-country growth regressions, we provide detailed evidence on the determinants of outward FDI from the US. FDI is higher in countries that are close to the US and have good institutions, well developed financial systems, a high road density, a high income per capita and substantial natural resource exports. Countries also attract more FDI if they have more medium-sized cities and primacy is not too large. We unbundle spatial lags and show that good institutions in neighbouring countries are important drivers of FDI, but primacy, the number of cities, openness and high income per capita in surrounding countries depress FDI. We tentatively conclude that cities are important drivers of FDI and growth. Robustness of our results is verified by re-estimating our regressions with fixed effects and for the sample of OECD countries.

Keywords: growth, foreign investment, cities, urbanization, primacy, spatial lags, spatial autoregression, surrounding market potential, fragmentation, export-platform
JEL codes: C31, F21, F23, F43, O47, R11

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1. Introduction

More than half the global population now lives in cities. There are more than three hundred city regions with a population greater than a million and at least twenty city regions with a population in excess of ten million. The world is not getting flatter, but if anything the world population and economic activity are more and more concentrated in mega cities.[1] Many policy makers argue that cities are or should be the key drivers of growth performance of their countries and it is cities rather than countries that bend over backwards to try to attract foreign direct investment (FDI) and skilled labour in order to improve the welfare of their citizens. Are cities successful because they attract lots of investment including FDI and skilled labour and because they have reliable institutions? Or do cities attract economic activity and skilled labour because they are successful? Are cities booming because they are more conducive to international trade and have better financial centres than rural districts? Are there significant growth-enhancing effects of cities driven by agglomeration advantages? Or can cities become too large, suffer from congestion, pollution and other negative externalities and thus become a drag on growth? Reliable answers to these important policy questions are crucial before one could argue that cities are engines of growth for individual countries and design policies to enhance growth.

To tackle these issues, we first investigate empirically with the aid of cross-country regressions whether urbanization and FDI boost growth performance and whether primacy indeed harms growth after allowing for the usual controls. We find that FDI, especially of the vertical specialization/fragmentation variety, and urbanization are important engines of growth. We then use detailed data on outward FDI for the US to explain the determinants of FDI. We find that FDI is higher in host countries that are close to the US and have good institutions, well developed financial systems, a high road density, a high income per capita and substantial natural resource exports. Countries also attract more FDI if they have more medium-sized cities, but primacy has the opposite effect. We unbundle spatial lags and show that good institutions in neighbouring countries are important drivers of FDI, but urbanization as measured by both primacy and the number of cities, openness and high income per capita in surrounding countries depress FDI.

The first part of our paper on the urban determinants of national growth performance is closely related to earlier work by Henderson (2003), who empirically addresses the question of whether there is some optimal level of urbanization or urban concentration and indeed finds evidence for a non-linear effect of primacy on growth performance. More precisely, cross-country evidence is presented which suggests that there is a best degree of urban concentration in tem of maximizing growth in income per capita and that this best degree is varies with the size and level

[1] Some general discussion of the advent of mega cities can be found in Scott et al. (2001), van der Ploeg and Poelhekke (2008) and in much more detail in World Bank (2008).

of development of the country. The key message appears to be that over- or under-urbanization can be very costly in terms of productivity growth.

Section 2 of our paper re-examines this cross-country evidence on urbanization and other drivers of growth performance in sec. In contrast to Henderson (2003), we find no empirical evidence for an optimal degree of urban concentration. If anything, we find the opposite. The share of the biggest city in the total urban population first has a moderately declining and then a moderately increasing effect on annual growth in GDP per capita after controlling for initial GDP per capita, population growth, investment as a fraction of GDP, human capital and openness. The best we can say is that urbanization has a positive effect on growth. We also find that FDI is a driver of national growth performance. Since cross-country regressions are notoriously difficult to interpret, we prefer to investigate more detailed empirical evidence on the urban and other determinants of FDI.

The second part of our paper therefore gives detailed empirical evidence on spatial lags and other determinants of FDI. This part follows up and extends the path-breaking work of Blonigen et al. (2007) on the spatial determinants of outward FDI for the US and subsequent work by Garretsen and Peeters (2008) on outward FDI for the Netherlands. Blonigen et al. (2007) uses both national and sector data on outward FDI to find evidence that trade costs, skills, investment costs, distance from the US, GDP, population size and surrounding market potential as well as spatially weighted FDI in neighbouring countries are key determinants of FDI. Their emphasis is on spatial weights to distinguish between four motives for FDI: pure horizontal, export platform, pure vertical and vertical specialization/fragmentation. Their evidence for these motives is mixed and depends on the specific sample of countries and the sectors that are considered. They also offer evidence of additional border effects. Garretsen and Peeters (2008) replicate and extend Blonigen et al. (2007) with Dutch data on FDI and estimate both a spatial lag and a spatial error model to assess the importance of spatial linkages for Dutch FDI to 18 host countries. They find that spatial effects and third-country effects are still significant after controlling for country fixed effects, but that the results are sensitive to sample selection.

Inspired by Acemoglu and Johnson (2005) who find evidence that property rights institutions protecting citizens against expropriation by the government does affect growth while contracting institutions enabling private contracts between citizens do not, we attempt to unbundle spatial lags in our empirical analysis of urban and other determinants of FDI.

The main difference of our approach with earlier literature is that, instead of spatial lags of FDI, we use spatially weighted measures of surrounding determinants of FDI. This corresponds to unbundling spatial lags and has the advantage that endogeneity problems and numerical problems encountered when one has to handle a large number of countries do not

occur. This allows us to almost double the number of countries included in the analysis and diminishes the bias that arises from arbitrarily excluded countries. Since each of the characteristics of neighbouring countries potentially have different effects on FDI, it is important to unbundle spatial lags. We also distinguish between the effects of the largest city, the distance-weighted size of cities in addition to the number of cities in the host country. We argue that a city is a more attractive market than a dispersed population and we therefore suggest that, even though *overall* GDP per capita has a positive effect, a more relevant determinant of FDI is *accessible* GDP in the form of easy-to-reach agglomerations. To allow for the efficiency of cities and the host country, we account for the effects of primacy, quality of institutions and road density (internal infrastructure) on FDI. Spatially weighted surrounding versions of these variables help to discriminate between the various motivations of FDI. Section 3 sets out how economic, urban and institutional characteristics of the host and neighbouring countries affect the various types of FDI (purely horizontal, export platform, purely vertical, and vertical specialization/fragmentation).

Section 4 first reproduces the spatial autoregressive relationships in FDI of Blonigen et al. (2007) and examines the results by extending the sample to a larger group of countries. The evidence suggests that most outward FDI is of the vertical specialization/fragmentation or complex vertical variety. Section 5 then offers detailed empirical evidence which suggests that FDI is not only higher in host countries and that are close to the US and have good institutions, well developed financial systems, a high road density, a large number of medium-sized cities, not too much primacy, a high income per capita and substantial natural resource exports, but FDI also depends on characteristics of neighbouring countries. Our evidence suggests that good institutions in neighbouring countries boost FDI, but primacy, number of cities, openness and high income per capita in surrounding countries depress FDI. We thus show that urban characteristics of both the host and the neighbouring countries matter for FDI. Furthermore, the urban attributes of neighbouring countries have very different effects than other economic and institutional characteristics of neighbouring countries on FDI in the host country. A better understanding of FDI thus requires one to unbundle spatial lags. Section 6 checks the robustness of our results by first re-estimating our FDI regressions with fixed effects and then also re-estimating them for the narrower sample of OECD countries.

Section 7 wraps up our arguments that cities and urbanization matter for growth performance by examining the evidence that FDI under the right conditions helps host countries to catch up with the world technology frontier and improve growth performance. In that case, urbanization in host and neighbouring countries will affect growth through its effect on FDI. We prefer this indirect evidence for the effects of cities and urbanization on growth, since the

empirical evidence on the determinants of FDI seems more reliable than the cross-country evidence on the urban determinants of growth. Section 8 summarizes our results and concludes tentatively that cities are important engines of FDI and growth. We then speculate what these conclusions imply for the potential benefits of regional integration in terms of attracting FDI and enhancing growth performance.

2. Do Urbanization and Primacy Affect Economic Growth?

Urbanization and economic growth feed on each other. The transformation from a rural agricultural economy into an industrialized service-based economy typically spurs economic development and is associated with urbanization in order to take advantage of localized economies of scale in manufacturing and services, pooled labour markets and other agglomeration advantages. Many governments facilitate and spur the process of urbanization by using trade protection, capital market subsidies, public infrastructure and caps on agricultural prices to encourage rural workers to move to cities. Other governments do the opposite and attempt to arrest the process of urbanization. Much more relevant is that many governments become concerned about cities becoming too big or too small. On the one hand, if one or two mega-cities in their country become too big and suffer from congestion, over-population, crime, social inequality, pollution and other negative externalities, this can stifle growth and become a concern for government. This so-called primacy problem can also be induced by trade restrictions and government support for nationalised industries that benefit domestic manufacturing and services sectors in urban sectors and by political favouritism in efforts to direct resources to the seat of government. [2] The problem of primacy may encourage the government to develop other urban centres. On the other hand, if there are not enough cities and the rural sectors are too big, this may mean that countries are not able to enjoy the fruits of all kinds of agglomeration advantages and thus growth and economic development would not take off. There thus appears to be some trade-off between low and high degrees of city concentration. Primacy is bad but too many small cities may also lead to sub-optimal growth in income per capita.

To test some of these hypotheses about the effects of urban concentration on growth performance, Henderson (2003) uses a panel dataset covering 70 countries over the period 1960-90 and provides cross-country econometric evidence for a significant quadratic effect of primacy and a negative interaction effects of primacy with initial GDP per capita on growth in GDP per

[2] Venables (2005) argues that spatial inequality is due to natural advantages of some regions and due to agglomeration forces leading to clustering of economic activity, but increasing returns to scale in cities can lead to sub-optimally sized urban structures. This may depress job creation and retard development. More on primacy can be found in Davis and Henderson (2003), Henderson (2004), Duranton (2007) and van der Ploeg and Poelhekke (2008). Dual housing markets may give rise to urban slums and the primacy problem. The argument that political favouritism can induce primacy is highlighted by Ades and Glaeser (1995).

capita, natural land area and national urban population after controlling for the effects of changes in the capital-labour ratio and education on growth in GDP per capita. This suggests that there is an optimal level of primacy in terms of maximizing growth in GDP per capita and that the optimal level of primacy is estimated to be lower in countries with a high national land area and a high output per worker. Over- or under-concentration of urban centres thus harms productivity growth. Urbanization per se does not harm growth, but it does boost growth in the transient phase of development (in line with the Williamson (1965) hypothesis) while primacy stifles growth.

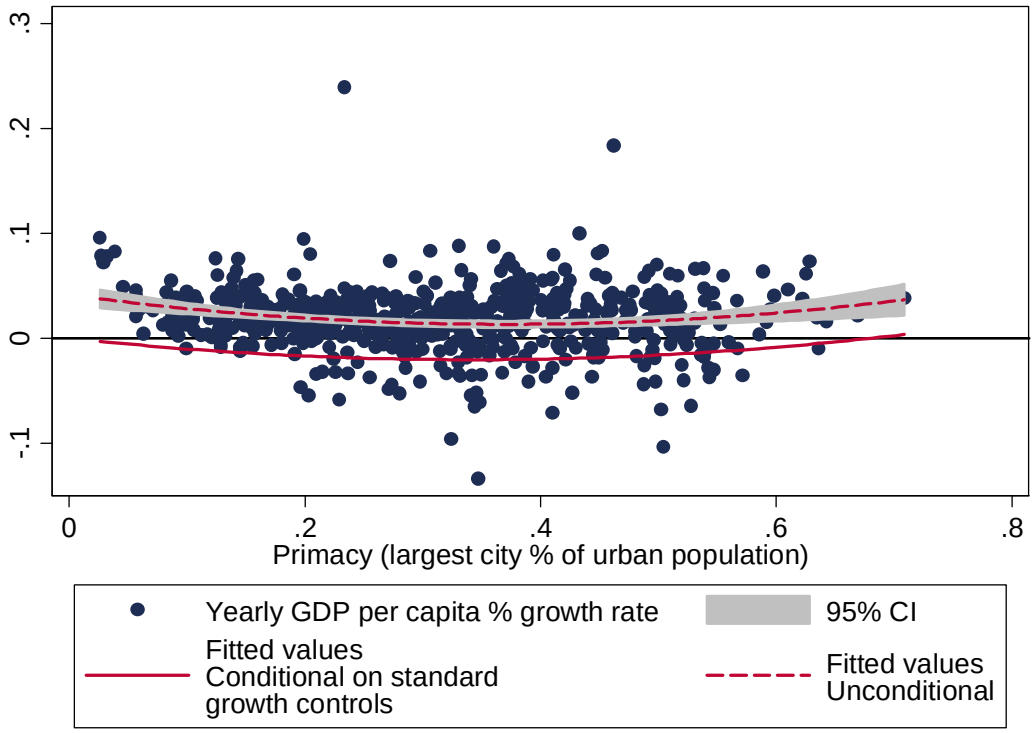
Table 1: Effects of Urban Concentration on Economic Growth, 1960-2000

	(1) OLS	(2) OLS	(3) OLS	(4) DGMM	(5) SGMM	(6) OLS
5-year average yearly growth in GDP per capita	d_gdppc	d_gdppc	d_gdppc	d_gdppc	d_gdppc	d_gdppc
Investment share of GDP	0.083***	0.088***	0.072***	0.076	0.042	0.082***
	(0.015)	(0.014)	(0.015)	(0.053)	(0.040)	(0.014)
Average years of total schooling	-0.001	0.000	-0.000	-0.003	0.001	-0.000
	(0.001)	(0.000)	(0.001)	(0.008)	(0.003)	(0.001)
Primacy (largest city % of urban population)	-0.195***	-0.130***	-0.334***	0.624	-0.182	-0.121***
	(0.059)	(0.033)	(0.078)	(1.606)	(0.292)	(0.033)
Primacy squared	0.195***	0.187***	0.239***	-0.216	0.032	0.177***
	(0.049)	(0.049)	(0.051)	(0.522)	(0.197)	(0.049)
Primacy * GDP per capita	0.007		-0.001	-0.108	-0.010	
	(0.005)		(0.006)	(0.072)	(0.026)	
Primacy * ln urban population			0.011***	0.002	0.011	
			(0.003)	(0.045)	(0.015)	
Primacy * land area			0.002	0.023	0.004	
			(0.003)	(0.068)	(0.008)	
log GDP per capita						-0.005**
						(0.002)
Openness to trade (Sachs & Warner)						0.012***
						(0.003)
Average yearly population growth rate						-0.322**
						(0.141)
Constant	0.036***	0.031***	0.039***		0.032	0.074***
	(0.007)	(0.006)	(0.007)		(0.025)	(0.017)
Observations	630	630	621	550	621	630
R-squared	0.19	0.18	0.20	.	.	0.22
year dummies	yes	yes	yes	yes	yes	yes
Sargan test, p-value				0.064		
Hansen test, p-value					0.984	
Number of countries	71	71	70	70	70	71
Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1						

To examine the robustness of the empirical results reported in Henderson (2003), Table 1 presents some cross-country regressions with our sample. The data used in these regressions are described in Appendix 1. Extending the sample to 71 countries and 40 years, we find that annual growth in GDP per capita is higher in countries with higher rates of investment as a fraction of GDP, but do

not find a significant effect of schooling. Regression (6) finds that countries with low initial levels of GDP per capita catch up quicker and that growth is higher in countries with low population growth and high degrees of openness to international trade. These are the usual determinants in the empirical cross-country literature on the determinants of growth. In addition, regression (6) gives some evidence for a significant nonlinear effect of primacy on growth. However, examining Figure 1 we find that the conditional effect of primacy on growth performance is modest and negative and, in contrast to Henderson (1973), we see that intermediate degrees of primacy have a slightly more negative effect on annual growth than low and very high degrees of primacy. Our regressions thus do not confirm that mega-cities and higher levels of primacy curb growth prospects. The unconditional correlation shows a modest positive effect of primacy on growth.

Figure 1: Conditional effect of primacy on annual growth per capita



Our sample could not replicate the results that the optimal level of primacy is lower in countries with a high national land area and a high output per worker – see regressions (1)-(5). If anything, regression (3) seems to indicate that high levels of primacy harm growth less in countries with a large urban population. The main lesson seems to be, however, that one has to be very careful in interpreting cross-country results on the relationship between primacy and growth.

More recently, Brülhart and Sbergami (2008) have extended Henderson (2003) to a world-wide sample of 105 countries and a narrower sample of Western European countries over

the period 1960-2000 using Theil indices of intra-country geographic concentration based on data for sub-national regions as a complement to more conventional urbanization measures.[3] They thus offer extensive cross-country OLS and improved dynamic panel system GMM estimates (Blundell and Bond, 1998) of the effects of urbanization and primacy on growth and find empirical support for the Williamson (1965) hypothesis that agglomeration boosts growth in GDP per capita only up to a certain level of economic development.[4] Their choice of estimator is a significantly improved version of the Arellano and Bond (1991) difference GMM estimator used by Henderson (2003). When we employ both estimators in regressions 4 and 5 we still cannot replicate the same effects. We may be able to offer an explanation for the instability of the results to choice of variables and countries through the high levels of multicollinearity between the primacy measures.

Table 2: Cross-correlations for sample regression (3) in Table 1

	Primacy	Primacy squared	Primacy * GDP per capita	Primacy * ln urban population	Primacy * land area
Primacy	1				
Primacy squared	0.9714	1			
Primacy * GDP per capita	0.9589	0.9275	1		
Primacy * ln urban population	0.9783	0.9356	0.9680	1	
Primacy * land area	0.9687	0.9399	0.9317	0.9544	1

Table 2 shows that all cross-correlations are above 0.93. This means that there may not be enough variation in the data to distinguish the nonlinear effects of primacy on growth. This can cause the coefficients to have the wrong sign and standard errors to be too large for all the estimators used, even in system GMM. In regression (6) we therefore remove the interactions, but add several standard growth controls. We still find a negative effect of primacy on growth which becomes positive at higher levels of primacy.

Summing up, we find some empirical evidence that primacy is an important driver of national growth performance. But we realize that our results on the effects of urbanization on growth performance, like those of Henderson (2003) and Brülhart and Sbergami (2008), are

[3] Crozet and Koenig (2008) use data on EU regions at the NUTS3 level over the period 1980-2000 and obtain evidence which suggests that regions with more uneven spatial distribution of productions grow faster, at least for the northern regions in the EU. Bosker (2008), however, using a sample of 250 regions over 25 years finds that, on average, denser regions grow slower than other regions indicating a negative effect of agglomeration but also finds that being close to fast growing region boosts growth.

[4] They estimate that the critical level is about USD 10,000 in 2006 prices, roughly the current per-capita income of Brazil or Bulgaria. Their study thus suggests that effects of higher agglomeration on growth taper off as the country becomes richer, so poor countries that inhibit big city formation hinder growth.

highly sensitive to the particular sample of countries and time periods that are chosen and the list of explanatory variables that is included. This is why different studies find that there is either an optimal degree of urban concentration or a modest effect of urbanization on growth or an effect of agglomeration on growth only for low levels of development. Interpreting the estimated coefficients in cross-country growth regressions is notoriously difficult. Interpretation of empirical results becomes even more difficult when data on primacy and urbanization are strongly correlated with other determinants of economic growth. For example, Ades and Glaeser (1995) offer theory, case studies and cross-country evidence that high tariffs, low levels of international trade and political instability increase the degree of urban concentration but these same variables may be expected to have a direct negative effect on growth performance.

The roadmap of the remainder of our paper is therefore as follows. We first discuss in section 3 the potential host and neighbouring country determinants of various types of FDI and in sections 4 and 5 offer empirical evidence on the determinants of FDI. Our conclusion is that urbanization both in the host and neighbouring countries are crucial determinants of FDI. We then argue in section 6 that FDI is under the right conditions likely to boost growth and help host countries catch up with the world technology frontier and thus to the extent that urbanization will affect growth performance through its effect on FDI. We adopt this indirect approach, because we have more confidence in our estimated effects of urbanization on FDI than on cross-country estimates of urbanization on growth of individual countries.

3. Host and Neighbouring Country Determinants on Various Types of FDI

It helps in the interpretation of our empirical results to distinguish four rationales for FDI:

- ***Purely horizontal:*** FDI arises from a market-access motive to substitute for export flows; trade costs and thus distance from the home market make it more attractive to produce existing products in the host country close to the market and thus to have FDI in the host country, especially if the host country has a large market potential;
- ***Export platform:*** FDI occurs when a parent company invests in a host country in order to serve third markets with exports of final goods from the affiliate in the host country; distance from the home country, cheaper production in the host than in the home country and a large market potential in countries surrounding the host country induces FDI;
- ***Purely vertical:*** FDI occurs if the parent company is fragmenting its production process to foreign sites[5] in order to have cheaper access to factor inputs abroad; the host country

[5] FDI can establish a downstream/forward affiliate that buys products from the parent company or a upstream/backward affiliate that supplies intermediates to the parent company. Off-shoring occurs if an entire part of the production process of the parent company is moved abroad.

is a cheap production site for the home market in which case better quality of neighbouring sites decrease FDI while market potential is not the main motive; and

- ***Vertical specialization/fragmentation:*** occurs if the parent company fragments its production process and directs FDI towards the host country for off-shoring part of its production chain.

Markusen (1984) and Helpman (1984) have analyzed, respectively, horizontal and vertical FDI within a general equilibrium framework. Much of the empirical work on FDI has employed the gravity model, which suggests that market size of the host country and distance from the country of the parent company are key determinants of FDI. Ekholm et al. (2007) offer an export-platform explanation and Egger et al. (2007) stress the complex vertical nature of FDI with exports of intermediate inputs from affiliates to third markets for further processing before being shipped to the final destination. Both these latter explanations depart from earlier two-country models and stress the effect of third countries on FDI in host countries. The key insight is, however, that FDI decisions across host countries are not independent and the econometric analysis thus needs to allow for spatial interdependence to avoid biased estimates.

The proximity-concentration trade-off for horizontal FDI suggests that it is interesting to locate closer to a larger host market (as measured by population size and income per capita) with favourable conditions (e.g., openness, good institutions, well developed financial system) especially if one can save on high transport and trading costs (including tariffs, efficiency of ports and transport, and corruption in customs) to make it worthwhile to produce in multiple locations and have an affiliate in a host country. As long as exports from third countries are unattractive, one would expect a zero coefficient for the spatial lag on horizontal FDI and one would not expect an effect of surrounding market potential on horizontal FDI either.

One well-located affiliate in host country which also serves surrounding countries is called export-platform FDI. It many of the proximity benefits of horizontal FDI without incurring additional costs of setting up affiliates in each of the surrounding countries. With trade protection between destination markets less than frictions between the parent and destination countries, export-platform FDI is attractive and one would expect a negative coefficient for the spatial lag on export-platform FDI and a positive coefficient for surrounding market potential as FDI to the platform affiliate substitutes for FDI to surrounding markets and serves surrounding markets.

However, Blonigen et al. (2007) argue that the coefficient on surrounding market potential may be negative if border costs between the host country and its neighbours are significant and the potential host country is relatively large in market size but is not centrally located within the group of surrounding countries. With intermediate levels of border costs between the host and surrounding countries, it is interesting to set up an export-platform affiliate

and to do this not necessarily in the country with the greatest surrounding market potential which might be a small centrally located host country but in a large, peripheral host country. In such a setting, border costs imply that there may be a negative relationship between surrounding market potential and FDI. So, the negative coefficient on surrounding market potential offers empirical support for the border cost hypothesis.

With purely vertical FDI one also expects a negative coefficient for the spatial lag on FDI, since multinationals seek the lowest-cost destination of the activity they want to relocate and thus FDI in one country may harm FDI in neighbouring countries. There should be no effect of surrounding market potential on purely vertical FDI, since the affiliate's output is shipped back to the parent company. With vertical specialization/fragmentation FDI one expects a positive coefficient for the spatial lag on FDI, since having more suppliers and other agglomeration advantages (e.g., airports or ports) in surrounding countries makes fragmentation FDI in the host country more attractive. Again, one would not expect an effect of surrounding market potential on fragmentation FDI but a negative coefficient on surrounding GDP per capita would suggest evidence for the border cost hypothesis.

The discussion so far has been summarized by the 'spatial lags on FDI' and 'surrounding market potential-GDP per capita' rows in Table 2. By examining the signs of these two effects in the regression results, one may identify which particular type of FDI is more prevalent than other forms of FDI. No horizontal lag on FDI implies horizontal FDI, a positive lag suggests fragmentation FDI, and a negative lag indicates either export-platform or vertical FDI. In fact, it is hard to identify whether it is export-platform or vertical FDI as the coefficient on surrounding GDP per capita may be insignificant even with vertical FDI if the expected positive effect and the negative effect arising from the border cost hypothesis offset each other. We attempt to differentiate between these various types of FDI in the estimates discussed in section 4.

In sections 5 and 6, however, we adopt a different approach and estimate the effects of host and neighbouring countries attributes on FDI. Effectively, we unbundle the spatial lags and consider separately the effects of surrounding market potential factors and surrounding trade costs and production costs factors on the four types of FDI. Apart from Blonigen et al. (2007) and Garretsen and Peeters (2008) who focus in their explanation of outward FDI to various countries on spatial lag and spatial error models, there are few cross-country studies that consider the spatial determinants of FDI. The empirical literature so far considers distance from the country that is sending the FDI, market potential, skills and trade costs including quality of institutions in the host country, and FDI in neighbouring countries (i.e., spatial lags) as determinants of FDI. Location is, typically, not considered as a factor determining FDI and the term agglomeration

mostly refers to clustering between proximate countries. But actual agglomerations of cities in the host and neighbouring countries have so far not been included as a determinant of FDI. The internal geography of the host country has not been considered as a factor determining FDI either. Such spatial variables may be at least as important as the quality of institutions in the host country, but have not been considered in cross-country studies so far.[6] [7] [8] [9]

So what are the possible links between cities and FDI? First, market potential is more accessible if it is located in one city as this reduces transportation costs within the host country. Second, cities form around important growth-enhancing inputs such as ports and resources and also enjoy agglomeration advantages, all of which are relevant for FDI. More cities in the host country therefore give a higher chance of offering FDI the right type of specific inputs, especially if they are near the 'focal point' of a country (being the location of its largest city). Third, cities are more likely to attract a concentration of motivated, often high-skilled labour. Fourth, as we have seen in section 2, cities can become inefficiently large and succumb to the primacy problem. Congestion, pollution, over-population and other negative externalities then outweigh scale economies. We thus see that there are various reasons why both the number of cities and primacy (measured by the share of the largest one city in the urban population) in the host country may affect FDI. To the extent that there are spatial lags, the number of cities and primacy in neighbouring countries will also affect FDI. The key empirical question is whether it is feasible to

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[6] Wheeler and Mody (1992) use US data to explain outward electronics and manufacturing FDI. They rely on tournaments between states through (tax) incentives. Firms may spread risk across locations, unless agglomeration forces are strong enough. They use host market size, openness, relative labour costs, relative tax rates, and (perceived) risk to explain FDI. They expect openness to have a negative sign, since the focus is on horizontal FDI (import substitution, protection from competing imports).

[7] Coughlin and Segev (2000), however, offer within-country evidence that US FDI in Chinese provinces is positively related to US FDI in neighbouring provinces. However, Amiti and Javorcik (200) find, using information on 515 Chinese industries at the provincial level during 1998-2001, that access to markets and suppliers matter more than access to the rest of China which is consistent with underdeveloped transport infrastructure and informal trade barriers. Baltagi et al. (2007) also uses spatial econometrics to estimate the effects of third countries on US outward FDI for seven manufacturing industries, but find it tough to differentiate between export-platform FDI and complex vertical FDI.

[8] Another notable and interesting within-country study on the spatial determinants of FDI is Bobonis and Shatz (2007). They study the determinants of inward FDI to various US states and try to separate agglomeration effects from an effect arising from adjustment of the rate of capital, where the desired stock of capital in each state depends on market and labour market variables, geography, state policies, lagged capital in own and neighbouring states. They find that agglomeration has a lower effect than previously reported. Unfortunately, their estimates are based on the biased difference GMM-estimator.

[9] The effects of agglomeration on FDI within a specific country have also been studied by Head et al. (1995). They focus on horizontal Japanese manufacturing investments in US states and allow states to compete for FDI through corporate taxes, Free Trade Zones and job creation subsidies and also allow for an effect of state income, adjacent income, within-state agglomeration and adjacent agglomeration on FDI. Their key conclusion is that competition effects are important, so that that overall state effect on distribution of FDI is small. Head and Mayer (2004) perform a similar exercise for the determinants of Japanese FDI in the European Union and empirically demonstrate the effect of market potential, both GDP of the host country and that of adjacent regions weighted by distance and other trade frictions, for FDI. A disadvantage of these two studies is that they only explain discrete measures of FDI.

separate the effects of cities, urban concentration etcetera from institutions while discriminating between the four motivations for FDI.

To better understand these rationales for different types of FDI, Table 3 summarizes which host and neighbouring country variables should affect FDI in the host country and also whether the expected effect on FDI is positive, negative or zero for each of the four types of FDI.

Trade costs capture several dimensions in which trade may be hampered. If the main reason for FDI is to facilitate the expansion into markets which are hard to reach by simply shipping goods from the home country, we expect a negative effect of openness to trade. Internal road density makes the whole host market easier to reach, but this is less relevant for other types of FDI. On the other hand, if the main motivation is to produce goods cheaply and ship them back to the home market (vertical FDI), then openness and ports are needed to make this possible. Financial development and the quality of institutions should generally provide the means to set up a successful business, regardless of which type of FDI is more prevalent. The signs switch for surrounding trade costs, mainly because if neighbouring countries provide better conditions, then the host country probably is not the preferred location and therefore attracts less FDI.

Own market potential is mainly of importance to home firms seeking to sell in the host market. A wealthier market is more interesting, but we also hypothesize that the degree to which this market can be reached through concentrated activity determines its attractiveness. Arguably, the urban Chinese population is more attractive than the much larger rural population. The effects on vertically oriented FDI are more ambiguous, but probably lie instead with their effects on production costs. Surrounding market potential is irrelevant for firms seeking to sell only in the host country, but very relevant for firms seeking to use the host country as a hub from which to serve the entire region. A neighbouring large city will also be interesting. Obviously, surrounding market potential is irrelevant if the goal is to sell at home as with horizontal FDI.

Production costs are not necessarily an obstacle to firms who simply aim to sell locally, but are certainly important for vertical production chains. More cities offer more locations for production and a higher chance that a foreign firm will find a location with suitable comparative advantage for its specific activity. A country with more cities of sufficient size offers the benefits of agglomeration economies in combination with the benefits of multiple locations. We are able to make a distinction between the absolute number of cities and the number of standard size cities (in this case 750,000 people), where we weigh the cities by their distance from the largest city. We hypothesize that more cities is a bonus in the race for FDI, but not if they are very far apart or far from a main centre of activity, which is usually also a country's main port. Russia for example has many cities, but they tend to be far away from ports and therefore less attractive to FDI than the multiple of German cities in the neighbourhood of, say, the port of Hamburg or the river port

of Essen. In addition, internal geography has different implications than external geography of surrounding countries. The former will have a positive effect on vertical FDI, while the latter a negative effect, meaning that other surrounding countries offer good substitute locations. Natural and other resources, an input in production, are expected to have a positive effect.

Table 3: Host and Neighbouring Country Determinants for Four Types of FDI

	Purely horizontal	Export-platform	Purely vertical	Export specialization/ fragmentation
Spatial lag on FDI	0	–	–	+
Distance US	–	0	–	–
Skill level	+	+	+	+
Trade costs:				
Openness	–	+	+	+
Financial development	+	+	+	+
Institutions (law, corruption, bureaucracy)	+	+	+	+
Road density	+	0	0	+
Number of ports	0	+	+	+
Own market potential:				
GDP per capita	+	0	0	0
% Urban population (accessible market potential)	+	0	0	0
Primacy (city inefficiency)	–	0	0	0
Production costs (location, scale):				
Distance-weighted number of standard size cities	0	0	+	+
Natural resources	+	+	+	+
Surrounding market potential:				
GDP per capita	0	+/(–)	0	(–)
%Urban population (accessible market potential)	0	+	0	+
Primacy (city inefficiency)	0	0	+	+
Surrounding production costs:				
Distance weighted number of standard size cities	0	0	–	–
Natural resources	0	–	–	–
Surrounding trade costs:				
Openness	0	–	–	+
Financial development	0	–	–	0
Institutions (rule of law, corruption, bureaucracy)	0	–	–	0
Road density	0	0	0	+
Number of ports	0	–	–	+

The matrix of expected signs summarized in Table 3 thus offers us the ability to distinguish between on the one hand the effects of institutions versus the effects of agglomerations and cities, while revealing the most prevalent type of FDI. Future research on the sector level should be able to better discriminate among the four types of FDI. In section 5 we test empirically hypotheses put forward in Table 3 and section 6 investigates the robustness of our results with respect to country fixed effects and using the sample of OECD countries.

4. Spatial Autoregression and Determinants of FDI

To test the hypotheses put forward in Table 3, we attempt to explain the determinants of outward FDI for the US. Since there are many measures of FDI (e.g., portfolio FDI, mergers and acquisitions), we use a measure of FDI that corresponds to affiliate sales from the Bureau of Economic Analysis.[10] In line with the OECD Benchmark Definition of Foreign Direct Investment (3rd edition, 1999), the data only considers affiliates where the US parent company has at least 10% control. This should permit the parent company to exercise control and influence and participate in the affiliate. This implies that the FDI data we use only measures revenue flows from FDI rather than flow changes due to changes in, say, the valuation of the existing stock of FDI. At the same time, this definition of FDI has some limitations as cases of passive stock ownership are classified as FDI. Furthermore, long-term contracts and other non-equity relationships between multinationals and affiliates are not classified as FDI. Given *N* potential host countries and *T* years of observation, we can use these data on FDI to estimate the following spatial vector autoregression by maximum likelihood:

$$\ln \text{fdi} = \alpha_0 + \alpha_1 \text{Host variables} + \alpha_2 \text{Surrounding Market Potential} + \rho W \ln \text{fdi} + \varepsilon, \quad (1)$$

$$\text{where } W \equiv \begin{pmatrix} W_1 & 0 & 0 \\ 0 & .. & 0 \\ 0 & 0 & W_T \end{pmatrix}, \; W_t \equiv \begin{pmatrix} 0 & 115.4/d_{1,2} & .. & 115.4/d_{N,1} \\ 115.4/d_{2,1} & 0 & .. & 115.4/d_{N,2} \\ .. & .. & .. & .. \\ 115.4/d_{N,1} & 115.4/d_{N,2} & .. & 0 \end{pmatrix},$$

lnfdi is the *NT*x1 vector of outward US FDI to all the host countries, the host variables are population, trade costs, skill level, investment costs, distance from the US and GDP of the host country, the surrounding market potential is captured by the log of the inverse-distance-weighted GDP of all surrounding countries, the block-diagonal matrix *W* corresponds to the spatial lag

[10] Data from Blonigen et al. (2007) are deflated with a price index for gross domestic investment from the Economic Report of the President. The series ends in 1998, since a different definition is used after 1998.

weighting matrix with each block along the diagonal corresponding to a single year, ρ stands for the spatial autocorrelation coefficient, and ε corresponds to the NTx1 vector of error terms. The host variables distance, host GDP, trade and investment frictions, and surrounding market potential are inspired by the well known gravity model. Population is included, since higher population reduces ceteris paribus GDP per capita and thus FDI. Population controls for the tendency of FDI to move between wealthy markets.

The vector ρW lnfdi captures the proximity of each host country to all the other neighbouring host countries. The blocks along the matrix W depend on distances, so are the same for each year. The off-diagonal elements in each block contain the spatial inverse-distance weights between any two potential host countries, where the distances correspond to the Vincenty (1975) differences in kilometres between country centroids and are normalized by the shortest distance between two host countries (the distance between Netherlands and Belgium, i.e., 115.4 km).[11] The remaining data are described in Appendix 2 and the sample of countries that Blonigen et al. (2007) and the extended sample that we use are given in Appendix 3. Appendix 4 gives some stylized facts of the spatial characteristics of the countries in our sample.

The novelty of our approach is that we will not estimate spatial lags of FDI directly, because it is endogenous and requires computationally intensive spatial econometrics. The calculation of matrix eigen values becomes difficult as the number of countries increase. Instead, we aim to identify the exogenous determinants of FDI by spatially weighing its determinants, while allowing more countries to enter the regression. Before doing so, we will replicate the results of Blonigen et al. (2007) with OLS as this allows comparison with our other regressions. Although estimating (1) with maximum likelihood would be better, it allows for a larger sample and Blonigen et al. report (2007, p1309) that their coefficients of the primary explanatory variables are not effected by endogeneity of the lagged FDI variable. For some variables (i.e. investment costs) we have observations for fewer countries than for others (FDI). When calculating spatial lags, we use all observations available to us such as not to arbitrarily omit countries from the spatial lags, just because we miss observations on other variables for this country. We feel we therefore have less measurement error, even though we sacrifice the maximum likelihood approach. Future work should incorporate spatial econometrics as a robustness check.

The results from Blonigen et al. (2007) clearly reject a common coefficient on host GDP and their measure of surrounding market potential. Their results also suggest that export-platform

[11] Blonigen et al. (2007) use the shortest bilateral distance between capital cities, which is not necessarily the most appropriate measure. For example, a lot of economic activity is concentrated in Rotterdam and Antwerp rather than in Amsterdam and Brussels which would lead to a shorter, relevant distance.

FDI may be important for the developed European countries. However, Blonigen et al. (2007) find that estimated relationships of traditional determinants of US outward FDI for the period 1983-98 are quite robust to inclusion of terms to capture spatial interdependence, even though these terms are significant. But the traditional determinants of FDI and the estimated spatial interdependence are quite sensitive to the sample of countries that is used. Table 4 therefore presents some spatial autoregressive relationships for outward US FDI during the period 1983-1998 for various samples of countries. Regressions (1) and (2) correspond to regressions 4 and 5 using the same sample as in Blonigen et al. (2007, p. 1315) while regressions (3) and (4) extend the results to a sample with a larger number of countries.[12]

We thus find that a bigger market potential, a higher level of education, lower trade costs and investment costs in the host country attract more FDI. Regressions (1) and (3) also suggest that a shorter distance from the country of the parent company attracts more FDI. Turning now to the spatial determinant of FDI, the evidence suggests that there is a *negative* effect of surrounding market potential on FDI negatively and a *positive* contemporaneous correlation between FDI in the host country and FDI in neighbouring countries. This confirms the robustness of the main qualitative insight of Blonigen et al. (2007).

When we restrict attention to the sample of Blonigen et al. (2007), the spatial lags remain significant while the coefficient on surrounding market potential becomes insignificant once we allow control for time-invariant unobserved fixed effects specific to each country – see regression (2). However, in regression (4) for our extended sample we have a larger negative and significant coefficient on surrounding market potential but the positive coefficient on the spatial lags is lower once we allow for country dummies. Given that country dummies pick up spatial interactions being fairly constant over time, it is not surprising that the spatial lag coefficients are somewhat smaller after controlling for country fixed effects. A 10% higher distance-weighted FDI going into surrounding areas implies 3% higher FDI.

Given the discussion in section 3, our empirical evidence thus suggests that most of outward US FDI seems to be of the complex vertical or vertical specialization/fragmentation variety as purely horizontal FDI would imply no spatial lag while purely vertical or export-platform FDI would imply a negative spatial lag. At first sight the negative coefficient on surrounding market potential may appear a trifle puzzling, but it may arise if border costs between the host country and its neighbours are significant and the potential host country is relatively large in market size but not centrally located within the group of surrounding countries.

[12] Blonigen et al. (2007) point out that at each iteration of the ML procedure one has an extra term in the log-likelihood function, namely $\log\left(\left|I-\rho W_t\right|\right)=\sum_{i=1}^{N}\log(1-\rho\omega_i)$ where ω_i, i=1,..,N are the eigenvalues of the matrix time-invariant matrix W_t. One thus needs to calculate the eigenvalues only once.

So, the negative coefficient on surrounding market potential offers empirical support for the border cost hypothesis.

Table 4: Spatial Autoregressive Relationships in FDI

	(1)	(2)	(3)	(4)
	lnfdi	lnfdi	lnfdi	lnfdi
ln_poptot	-0.527***	-1.026***	-0.919***	-1.445***
	(0.077)	(0.320)	(0.078)	(0.353)
lntc	-0.849***	-0.081	-1.126***	-0.295***
	(0.062)	(0.077)	(0.080)	(0.086)
lnhumanav	0.240**	0.474***	0.177	0.478***
	(0.104)	(0.135)	(0.122)	(0.169)
lninvcost	-1.168***	-1.001***	-0.680***	-1.057***
	(0.204)	(0.186)	(0.252)	(0.229)
ln_dist	-0.441***	0.000	-0.314***	0.000
	(0.047)	(0.000)	(0.067)	(0.000)
trend	-0.010	-0.003	0.016	0.020
	(0.030)	(0.018)	(0.038)	(0.018)
trendsq	0.000	0.002***	-0.000	0.002***
	(0.001)	(0.001)	(0.002)	(0.001)
lngdp	1.714***	1.039***	2.017***	1.923***
	(0.087)	(0.122)	(0.094)	(0.136)
lngdp_smp	-0.685***	-0.670	-1.585***	-2.150***
	(0.220)	(0.427)	(0.232)	(0.347)
lnfdi_smp	0.319*	0.273*	0.727***	0.322*
	(0.176)	(0.162)	(0.165)	(0.192)
Constant	-19.967***	2.190	-4.201	21.344***
	(4.315)	(9.024)	(4.544)	(7.282)
Country dummies	No	Yes	No	Yes
Observations	521	521	601	601
R-squared	0.84	0.76	0.79	0.71
Standard errors in parentheses	: *** p<0.01, ** p<0.05, * p<0.1			

5. Empirical Evidence for Host and Neighbouring Country Urbanization on FDI

Our main empirical contribution is to extend the ‘market potential’ and ‘surrounding market potential’ with data on cities. This makes it possible to interpret ‘market potential’ as *accessible* market potential. For the time being, we use a restricted number of cities of a certain size, urbanisation and degree of primacy. In future work, we would like to use internal spatially

weighted urban market potential (e.g., the largest city as possible focal point for DFI including a weighting of a number of smaller cities with their distance to the largest city or the number of harbour cities and their size as a focal point for DFI). It would also be useful to disentangle host trade cost and to allow for the influence of institutions. Allowing for accessible market potential and unbundling spatial lags thus suggests that we estimate the following vector regression:

$$\begin{aligned}\ln \text{fdi} = {} & \beta_0 + \beta_1 \text{Host market potential} + \beta_2 \text{Host production costs} + \beta_3 \text{Host trade costs} \\ & + \beta_4 \text{Surrounding Market Potential} + \beta_5 \text{Surrounding production costs} \\ & + \beta_6 \text{Surrounding trade costs} + \varepsilon, \end{aligned} \tag{2}$$

where the explanatory variables and the expected signs of their effects on FDI are as discussed in section 3 and summarized in Table 3.

Table 5 starts off with fairly standard regressions where only market potential and host country characteristics are considered. Regression (1) is limited to the sample countries used in Blonigen et al. (2007) and regression (2) is limited to countries excluded from that analysis. Regression (3) combines the two samples. Appendix 3 lists the countries of both samples. Distance from the US has a negative effect on FDI, echoing the negative distance effect of trade in general. Interestingly, in the sample of additional countries, which consists of mostly developing countries, we see that openness plays a much smaller role that the quality of institutions as measured by the rule of law, corruption and the quality of bureaucracy, and human capital becomes much more important. Countries with high GDP attract FDI, while a large population decreases FDI (less GDP per capita). Surrounding market potential has a negative effect, albeit much smaller in the whole sample. At a glance these results suggest that vertical-type FDI is most common.

Regression (4) adds more relevant determinants of FDI: financial development, road density and remoteness. These do not change our qualitative results very much. Landlocked countries seem to attract more FDI, which seems odd as such countries tend to be remote from main trade routes. One possible explanation might be that landlocked countries are backward and thus may have many potential gains from FDI in roads and airports to make them less remote.

Regression (5) progresses the analysis towards our main hypotheses, that spatially weighted determinants of FDI such as neighbouring openness to trade have important implications. Spatially lagged openness and population enter negatively, suggesting that if neighbouring countries are better locations, then FDI will not move into the host country. This fits well with vertical FDI, but less with export oriented FDI, which actually needs openness of surrounding countries. In favour of the latter, good surrounding infrastructure does attract FDI.

However, these results may be biased because they do not take into account other possible drivers, such as agglomerations. Table 6 will further investigate this hypothesis.

Table 5: Determinants of FDI when Unbundling Spatial Lags, 1984-1998

		Blonigen et al. sample	Extra sample	Combined sample	With extra determinants	Also with spatial lags
		(1)	(2)	(3)	(4)	(5)
Determinant	**Mmenomic**	lnfdi	lnfdi	lnfdi	lnfdi	lnfdi
ln_dist	ln distance from USA (Vincenty)	-0.485***	-1.477***	-0.882***	-1.051***	-0.895***
		(0.073)	(0.135)	(0.083)	(0.091)	(0.147)
lnhumanav	ln human capital	0.063	0.813***	0.629***	0.289***	0.257**
		(0.176)	(0.161)	(0.147)	(0.103)	(0.110)
openness	S&W openness	0.217**	-0.091	0.424***	0.215**	0.266**
		(0.089)	(0.139)	(0.116)	(0.109)	(0.109)
lninst	ln Institutions (Corruption, rule of law, bureaucracy, higher = less risk)	-0.052	0.673***	0.694***	0.659***	0.485***
		(0.137)	(0.116)	(0.120)	(0.127)	(0.115)
lngdp	ln GDP in billions	1.809***	0.715***	1.294***	1.198***	1.092***
		(0.121)	(0.126)	(0.100)	(0.087)	(0.097)
ln_poptot	ln population	-0.911***	-0.146	-0.483***	-0.271***	-0.175*
		(0.135)	(0.115)	(0.104)	(0.092)	(0.103)
lngdp_smp	ln GDP surrounding market potential	0.106	-2.078***	-0.194**	-0.568***	-0.969***
		(0.075)	(0.349)	(0.093)	(0.130)	(0.363)
trend	trend	0.016*	0.080***	0.003	0.007	0.046***
		(0.008)	(0.020)	(0.009)	(0.009)	(0.013)
Constant	Constant	12.069***	27.809***	13.056***	16.725***	25.871***
		(1.355)	(2.732)	(1.147)	(1.298)	(2.742)
lnfindev	ln fin. development (private credit/GDP)				0.246***	0.335***
					(0.062)	(0.069)
landlock	LANDLOCK				0.578***	0.445***
					(0.123)	(0.127)
lnroadens	ln Road Density				0.293***	0.364***
					(0.054)	(0.053)
lnopenness_smp	ln S&W openness, surrounding					-0.571***
						(0.174)
lninst_smp	ln Insitutions, surrounding					0.194
						(0.363)
lnpoptot_smp	ln population, surrounding					-0.786***
						(0.220)
lnfindev_smp	ln fin. development (private credit/GDP), surrounding					0.158
						(0.401)
lnroadens_smp	ln Road density, surrounding					0.717***
						(0.208)
Observations		503	480	983	887	887
R-squared		0.74	0.55	0.78	0.83	0.84
Countries		34	41	75	74	74
Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1						

Table 6 and regression (6) first includes all the variables which we expect to have an effect on the location of FDI. The newly included variables that capture the internal and surrounding geography of cities often enter the regression significantly. However, our analysis also suffers from lack of variation in the data. Several variables are very highly correlated and can therefore not be separately identified within the same model. The correlation of the data for spatially weighted income per capita correlates with financial development in surrounding countries is 0.97 and 0.95 with surrounding road density. This reflects general clustering of wealthier and poorer countries in the global economy. Also the correlation of the spatially weighted rate of urbanization correlates positively with income per capita is 0.95. We therefore drop these variables in regression (2). This adjustment turns out to be important: human capital and landlocked countries no longer predict FDI inflow from the US. Most vertical FDI from the US is probably not very skill intensive. However, we still face some multicollinearity between spatially weighted income per capita and spatially weighted institutions. Since both effects may be important, we exclude each one of them, one at a time, in regressions (3) and (4). Both are insignificant while the other coefficients hardly change. This leads us to a more structural interpretation of the results.

Concerning internal market characteristics, we find evidence in favour of horizontal FDI. While openness to trade is not important, we find that a good financial infrastructure and competent institutions matter much more. High income per capita makes it worthwhile to produce and sell locally and the amount of infrastructure helps to reach more consumers. Accessibility of consumers is also important. Although the conditional effect of the percentage of urban dwellers is not significant, we find strong results for the number of standard size cities, weighted by their distance from the largest city. However, it does not seem the case that concentration of activity in a single city is beneficial: primacy actually deters foreign direct investment. Primate cities have often grown too large such that congestion costs have become larger than possible agglomeration benefits. Conditional on the effects of institutions and internal market potential, we find that agglomerations are attractors of FDI if they are of efficient size.

None of the surrounding variables should be of importance to pure horizontal FDI, but for vertical FDI they do matter. Turning to surrounding country characteristics, we see that if neighbouring countries offer better locations for FDI, such as a fair amount of medium-sized cities and low levels of primacy, then US parent companies are less likely to invest in the host economy. We find little evidence of export-platform FDI because surrounding income per capita should be very important, and our results show that it is not. The empirical evidence points more in the direction of vertical or complex vertical FDI.

We have possibly omitted two variables which capture an important dimension of production costs. A lot of FDI is directed towards natural resource extraction, either for the home market or as input in local production of final goods. Producing close to these inputs saves on transportation costs. The latter can be very relevant for heavy mining products. Adding local and surrounding export values of point-source natural resources as a share of GDP[13] does change the picture somewhat. Institutions are less important when natural resource wealth is present, while surrounding market potential (income per capita) becomes significantly negative, pointing more in the direction of the complex vertical model of FDI. Resources themselves actually enter positively in the host country itself and in surrounding nations (although less significantly). Mining resources can be a strong motivation for FDI and an input in the vertical production chain. Regression (10)'s support for a negative effect of surrounding market potential (measured by GDP per capita) on FDI may also arise with export-platform affiliates in not centrally located countries with a large market size.

Table 6: Replacing Total Population With Accessible Market Potential and Cities, 1984-98

				Preferred results		**With natural resources**	
		(6)	(7)	(8)	(9)	(10)	(11)
Mnemonic	**Determinant**	lnfdi	lnfdi	lnfdi	lnfdi	lnfdi	lnfdi
ln_dist	ln distance from USA (Vincenty)	-1.179***	-0.691***	-0.685***	-0.680***	-0.861***	-0.856***
		(0.116)	(0.105)	(0.104)	(0.104)	(0.091)	(0.092)
lnhumanav	ln human capital	0.288**	0.145	0.149	0.165	0.207	0.225
		(0.119)	(0.130)	(0.129)	(0.128)	(0.158)	(0.158)
openness	S&W openness	0.019	0.185	0.191	0.205	-0.026	0.011
		(0.125)	(0.130)	(0.130)	(0.127)	(0.139)	(0.137)
lnfindev	ln fin. development (private credit/GDP)	0.231***	0.333***	0.325***	0.330***	0.309***	0.319***
		(0.061)	(0.069)	(0.068)	(0.069)	(0.068)	(0.069)
lninst	ln Institutions (Corruption, rule of law, bureaucracy, higher = less risk)	0.391***	0.366***	0.375***	0.388***	0.050	0.088
		(0.119)	(0.133)	(0.133)	(0.133)	(0.117)	(0.120)
lngdppc	ln GDP per capita	1.205***	1.281***	1.278***	1.228***	1.658***	1.551***
		(0.106)	(0.128)	(0.128)	(0.121)	(0.133)	(0.128)
lnroadens	ln Road Density	0.280***	0.379***	0.381***	0.380***	0.453***	0.449***
		(0.051)	(0.058)	(0.059)	(0.059)	(0.057)	(0.057)
landlock	LANDLOCK	0.337***	0.112	0.119	0.115	0.009	0.006
		(0.113)	(0.117)	(0.117)	(0.117)	(0.117)	(0.117)
urbpav	% urban population	0.124	-0.672*	-0.699**	-0.683*	-2.045***	-1.987***
		(0.293)	(0.351)	(0.351)	(0.355)	(0.350)	(0.353)

[13] Including fuels, ores and metals. These are called point-source because they tend to be produced in a few locations.

primacy	Primacy (largest city % urban pop.)	-1.150***	-2.400***	-2.358***	-2.232***	-2.414***	-2.125***
		(0.344)	(0.342)	(0.336)	(0.309)	(0.311)	(0.279)
lncitycountall	ln # cities > 0	0.074	0.030	0.033	0.042	0.010	0.028
		(0.065)	(0.072)	(0.071)	(0.070)	(0.066)	(0.065)
lncitynumber_mp	ln City number, weighted by distance, within country in 750,000 equivalent	0.845***	0.827***	0.824***	0.822***	0.906***	0.899***
		(0.060)	(0.069)	(0.068)	(0.068)	(0.065)	(0.065)
lnfindev_smp	ln fin. development (private credit/GDP), surrounding	1.394***					
		(0.392)					
lninst_smp	ln Insitutions, surrounding	0.105	0.380		-0.115		-0.454*
		(0.388)	(0.431)		(0.248)		(0.264)
lngdppc_smp	ln GDP per capita, surrounding market potential	-3.188***	-0.449	-0.232		-0.602***	
		(0.400)	(0.324)	(0.186)		(0.193)	
lnroadens_smp	ln Road density, surrounding	2.837***					
		(0.271)					
urbpav_smp	% urban population, surrounding	-0.490**					
		(0.200)					
primacy_smp	Primacy, surrounding	0.724***	0.598***	0.673***	0.646***	0.538***	0.544***
		(0.173)	(0.181)	(0.157)	(0.174)	(0.171)	(0.185)
lncitynumber_smp	ln City number, weighted by distance, all surrounding countries	-1.859***	-0.816***	-0.809***	-0.867***	-0.667***	-0.772***
		(0.215)	(0.187)	(0.187)	(0.189)	(0.171)	(0.181)
lnopenness_smp	ln S&W openness, surrounding	-0.829***	-0.421**	-0.356**	-0.428**	-0.134	-0.237
		(0.178)	(0.180)	(0.169)	(0.181)	(0.176)	(0.191)
trend		0.049***	0.044***	0.043***	0.046***	0.049***	0.055***
		(0.012)	(0.012)	(0.012)	(0.012)	(0.011)	(0.011)
Constant		31.445***	5.992**	4.841*	2.807	11.394***	6.559***
		(3.850)	(2.977)	(2.545)	(1.809)	(2.580)	(1.791)
lnnatpoint	ln share of point-source natural resource exports in GDP					0.218***	0.214***
						(0.028)	(0.028)
lnnatpoint_smp	ln share of point-source natural resource exports in GDP, surrounding					0.292**	0.245*
						(0.131)	(0.132)
Observations		805	805	805	805	750	750
R-squared		0.87	0.84	0.84	0.84	0.86	0.86
Countries		66	66	66	66	65	65
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1							

The key result that can be gleaned from regressions (10) and (11) is thus that natural resource dependence both in the host and surround countries exerts a strong positive effect on FDI. We report a particularly strong effect for point-source natural resources. This result sheds a different perspective on the resource literature emanating from Sachs and Warner (1997) who offer cross-country empirical support for a significant negative effect of natural resource dependence on the

rate of economic growth. One reason why the so-called resource curse does not seem to apply to FDI may be that the mining and mineral sectors cause a boom in capital-intensive FDI, especially for point-source natural resources. In future work we will use FDI data at the sector level to examine whether it is indeed true to natural resource dependence induces a boom in mining and mineral FDI and whether such a boom is partially offset by a decline in FDI in other sectors of the economy or not. This seems important, since the growth-enhancing effects of FDI in manufacturing, services and even agriculture seems to be higher than that of FDI in the extractive industries. If FDI in the rest of the economy is indeed crowded out, this may well diminish employment, linkages to the domestic economy and growth externalities.

6. Robustness: Fixed effects and OECD Sample

Blonigen et al. (2007) find that, after allowing for country fixed effects, the estimated spatial determinants often become insignificant. Furthermore, the estimated spatial determinants are highly sensitive to the particular sample that is chosen. To examine the robustness of our empirical results on the host and neighbouring countries determinants of FDI, Table 7 therefore re-estimates the regressions reported in Table 7 first with fixed effects (excluding distance from the US and the number of cities in the host country) and then with the narrower sample of OECD countries. Note that the variable which measures the spatially weighted amount of standard size cities is not absorbed by the fixed effects. As cities grow in population over time the number of standard size cities changes as well. Openness to trade is also not absorbed because several countries become open to trade during the period 1984-1998.

Compared to regressions (10) and (11) of Table 6, we find that fixed effects absorb many of the previously estimated effects. This is probably due to the sluggish and path-dependent nature of institutional change and changes in the urban landscape during the relatively short period of fifteen years. We do find support for a negative effect of host country primacy and openness in neighbouring countries on FDI and a positive effect of own market potential, skills and natural resources. Natural resources in neighbouring countries now negatively affect FDI.

The OECD sample is a sample of very similar countries. This might make it easier to identify the main type of FDI, but multicollinearity is a serious problem. There is a very high correlation among the spatially weighted versions of institutions, openness, primacy, the absolute number of cities, and the internally weighted number of standard size cities. The results for the OECD should therefore be cautiously interpreted.

Table 7: FDI Regressions with Fixed Effects and the OECD Sample, 1984-1998

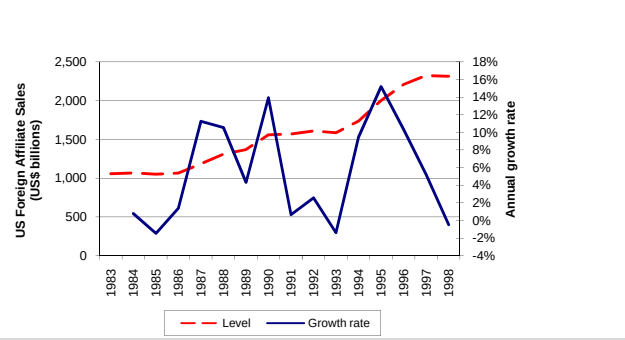
		Fixed effects		OECD sample	
		(1)	(2)	(3)	(4)
ln_dist	ln distance from USA (Vincenty)			-1.377***	-1.358***
				(0.108)	(0.111)
lnhumanav	ln human capital	0.718***	0.713***	0.777***	0.750***
		(0.261)	(0.261)	(0.186)	(0.182)
openness	S&W openness	0.026	0.025	0.542***	0.637***
		(0.058)	(0.058)	(0.186)	(0.170)
lnfindev	ln fin. development (private credit/GDP)	-0.034	-0.033	0.317***	0.316***
		(0.101)	(0.100)	(0.078)	(0.077)
lninst	ln Institutions (Corruption, rule of law, bureaucracy, higher = less risk)	0.014	0.005	0.533***	0.701***
		(0.062)	(0.068)	(0.197)	(0.186)
lngdppc	ln GDP per capita	0.683***	0.701***	1.231***	1.091***
		(0.190)	(0.175)	(0.162)	(0.146)
lnroadens	ln Road Density	-0.034	-0.032	0.642***	0.610***
		(0.135)	(0.135)	(0.050)	(0.053)
landlock	LANDLOCK			0.353***	0.346***
				(0.075)	(0.076)
urbpav	% urban population	1.202	1.256	-1.408***	-1.457***
		(1.197)	(1.213)	(0.322)	(0.316)
primacy	Primacy (largest city % urban pop.)	-2.956*	-2.880*	-2.116***	-2.187***
		(1.613)	(1.645)	(0.406)	(0.412)
lncitycountall	ln # cities > 0			1.540***	1.431***
				(0.132)	(0.139)
lncitynumber_mp	ln City number, weighted by distance, within country in 750,000 equivalent	-0.278	-0.280	-0.416***	-0.307**
		(0.294)	(0.296)	(0.119)	(0.125)
lngdppc_smp	ln GDP per capita, surrounding market potential	0.225		-0.970***	
		(0.675)		(0.240)	
primacy_smp	Primacy, surrounding		0.119		-1.144***
			(0.297)		(0.321)
lncitynumber_smp	ln City number, weighted by distance, all surrounding countries	-2.573	-2.252	1.768***	1.787***
		(1.734)	(1.642)	(0.289)	(0.279)
lnopenness_smp	ln S&W openness, surrounding	-0.922**	-0.931**	-0.907***	-0.918***
		(0.465)	(0.441)	(0.169)	(0.170)
trend		-0.301***	-0.324***	-0.206	-0.118
		(0.110)	(0.102)	(0.234)	(0.284)
lnnatpoint	ln share of point-source resources exports/ GDP	0.064***	0.068***	0.071***	0.066***
		(0.018)	(0.011)	(0.009)	(0.010)
lnnatpoint_smp	ln share of point-source resources exports/ GDP, surrounding	-0.124***	-0.122***	0.064	0.076*
lnnatpoint	ln share of point-source resources exports/GDP	(0.040)	(0.040)	(0.042)	(0.043)
Constant		0.133**	0.130**	0.122	0.073
		(0.058)	(0.059)	(0.113)	(0.112)
lninst_smp	ln Insitutions, surrounding	-5.643	-4.461	7.386***	2.442
		(6.908)	(4.704)	(2.440)	(1.834)
Observations		750	750	318	318
R-squared		0.53	0.53	0.91	0.91
Countries		65	65	22	22
Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1					

Closeness to US, human capital, openness, institutions, financial development, roads, cities and market potential have a positive impact, but urbanization and primacy have a negative impact on US FDI to the OECD. Good institutions and cities in surrounding countries help in attracting FDI, but high neighbouring market potential and openness harms FDI.

7. Does FDI Boost Economic Growth?[14]

The stock of global FDI has come from a little over 5% of global GDP in 1980 to 20 to 25% of global GDP in recent years. Global FDI stock has thus grown at a faster pace than global GDP. Markusen (2002) pointed out that FDI has grown each year by about a third during the late 1990s while exports and world GDP grew only at an annual rate of 1.5% and 0.6%, respectively. Figure 2 indicates that world-wide US outward FDI flows have also more than doubled in fifteen years.

Figure 2: Spectacular growth of outward FDI for the US



The spectacular growth in FDI suggests that FDI might be an important potential engine of growth. Indeed, FDI may be an important channel of international knowledge and technology spill-over effects emanating from successful economies and this way boost productivity growth of less successful economies. FDI may for many countries be an effective way to update their technology and skills in producing products for the world market, especially in the development phase. And for the parent company FDI can offer access to new retails markets and to cheap labour, buildings and land. Growth rates of individual countries are thus in the long run

[14] The potential growth-enhancing effects of FDI are discussed in more detail in Harding and Rattsø (2008).

determined by the world technology frontier (typically, the US) and in the short run FDI can help with catching up to the world technology frontier. Cross-country evidence based on detailed firm-level data offered by, for example, Aghion and Griffith (2005) gives convincing evidence of the importance of world technology frontier in catching up growth. Caselli and Coleman (2006) offer cross-country evidence on the existence of a world technology frontier. Earlier evidence on diffusion of technology and human capital based on the analysis of barriers to technology adoption and development of Parente and Prescott (1994) has been reviewed in Benhabib and Spiegel (2005).

We learn from the barriers and growth literature that monopoly power, primary and secondary education and good infrastructure are crucial determinants for economies that are trying to benefit from rolling out existing large-scale technologies and catching up to the world possibility frontier. To the extent that FDI embodies know-how and technology, creates new markets and generates demonstration effects, FDI is a crucial factor in catching up with the world productivity frontier, even though FDI may compete with domestic industries for scarce labour, credit and other production factors and crowd out existing industries. FDI (and to some extent foreign trade itself) may also help to improve the workings of government institutions, open up the economy and motivate other domestic firms to improve their performance and thus catch up to the world technology frontier in this way, although FDI by very large multinationals may also threaten local political autonomy in host countries. FDI may nevertheless be an important mechanism by which countries improve their position in the world income distribution as described by Acemoglu and Ventura (2002). FDI as a driver of growth seems most relevant for not fully industrialized, middle-income countries with the right type of institutions and reliable governments.[15] However, once countries approach the world technology frontier they gain much more from competition, higher education and research & development in order to get a competitive innovation edge and shift the world technology frontier itself. The parable *Red Queen* of Alice in Wonderland is relevant for advanced economies, since if one does not innovate one falls behind the pack of countries on the world technology frontier.

Alfaro et al. (2004) employ a cross-country analysis to demonstrate empirically that FDI has positive spill-over effects on domestic firms and boosts economic growth only if the host country is blessed with good macroeconomic management, infrastructure and skilled labour, and especially well-developed financial markets. FDI thus seems under the right conditions to be an effective vehicle of knowledge and technology transfer as well as a motor of positive growth

[15] Blonigen and Wang (2005) stress that the determinants of FDI differ for low-income and high-income countries. They also find that FDI in low-income countries has a greater effect on growth, provided there is enough supply of human capital, and crowds out domestic investment more than in high-income countries.

externalities. Micro-based evidence also suggests that FDI may be an important engine of growth. For example, Javorcik (2004) uses firm-level data for Lithuania to establish that there are statistically significant positive productivity spill-over effects from FDI taking place through contacts between foreign affiliates and their local suppliers in upstream sectors, especially for projects with shared domestic and foreign ownership but not for fully owned foreign investments. Javorcik and Spatareanu (2008) arrive at similar conclusions about vertical spill-over effects with Romanian firm-level data. Since FDI seems to be a key engine of growth and cross-country regressions to establish the effects of primacy and urbanization on growth as discussed in section 2 are notoriously difficult to interpret, we explored the possible effects of primacy of cities and urbanization on growth by investigating in sections 3-7 the indirect effects of primacy of cities and urbanization on FDI. We thus argue that, even if cities have an ambiguous effect on growth, they seem to boost growth indirectly via FDI.

8. Concluding Remarks

According to the United Nations Population Fund, for the first time in history more than half of the human population (3.3 billion people) will be living in urban areas. Not only will most people be concentrated in cities, but the majority of production and of wealth is created in urban centres. Cities rather than countries are increasingly trying to attract multinationals and FDI in order to create wealth for its citizen. One thus wonders whether cities are more important for welfare than the country in which people are living. We have tried to shed some light on this topical and important question by investigating the empirical evidence for the effects of urbanization, city formation and primacy on FDI and growth performance.

Our empirical evidence suggests that the urban landscape of a country and its neighbours have important implications for how much FDI it is able to attract. Besides the well known effects of distance and market potential, we find that accessible market potential and locations for production in the form of agglomerations appear to be beneficial for FDI flows. The development of local infrastructure and new cities of sufficiently large size seem to attract more investment by US multinationals. There is a risk that cities grow too large so that congesting, pollution and over-crowding forces outweigh the positive agglomeration forces. Primacy is usually a sign that cities have grown too large and have become inefficient. Our evidence suggests that such regions will attract relatively less FDI. The regional spatial dimension is also important. Neighbouring attractive locations compete for FDI with locations in the potential host country. This suggests that most FDI aims to serve the local market or is motivated by vertical production chains which seek out good locations for production. Goods are then sold on world markets or at home, rather than in the immediate region. Cities therefore do not necessarily function as a regional hub, since

surrounding market potential actually decreases FDI in the host country. Our evidence also suggests that high quality institutions as may manifested by good rules of law, low corruption and efficient bureaucracy as well as a sound financial system boosts. However, after taking into account the presence of natural resources, institutions cease to be important. Cities on the other hand are a much more robust determinant of FDI. Although we could not confirm a robust and significant *direct* impact of cities on growth performance, there may well be a strong *indirect* effect of cities on growth as FDI appears to be a strong driver of knowledge and technology transfers and thus of growth. We tentatively conclude that cities are important for FDI and growth: more medium-sized cities stimulate growth but congestion, pollution and over-crowding associated with mega-cities seems to depress economic performance.

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Appendix 1: Description of the Data for the Growth Regressions

Descriptive Statistics*

	Mean	Std. Dev.	Min	Max
FDI (US$ millions)	20,696	45,812	1	350,173
Distance to US	5,170	2,496	455	10,163
Skill level	5.78	2.66	0.37	11.82
Openness	0.66	0.47	0.00	1.00
Financial Development	50.8%	38.2%	0.0%	180.5%
Institutions	9.81	4.04	1.00	16.17
GDP per capita	9,787	8,003	602	31,948
Road Density (km/land area)	0.67	0.96	0.01	4.70
Landlocked	0.13	0.33	0.00	1.00
Urbanization level	56.0%	24.0%	8.5%	100.0%
Primacy	39.2%	27.4%	2.6%	100.0%
Number of Cities, absolute	6.53	18.83	1	138
Number of Cities, internal distance weighted in equivalents of 750,000 inhabitants**	0.006	0.007	0.000	0.046
GDP (US$ billions)	296	528	3	4,315
Population (thousands)	56,527	172,137	241	1,241,891
Spatially weighted variables* **				
Financial Development	1.21	0.69	0.35	4.45
Institutions	23.65	12.66	6.43	71.96
GDP per capita	25,333	18,259	6,961	113,067
Road Density	1.70	1.55	0.30	8.68
Urbanization level	1.44	0.67	0.46	3.69
Primacy	1.27	0.45	0.50	2.64
Number of Cities, external distance weighted in equivalents of 750,000 inhabitants**	0.003	0.001	0.001	0.007
Openness	1.66	0.94	0.31	4.97
GDP (US$ billions)	629	339	214	2,341

* See Appendix 2 for definitions. Table refers to the sample of regression 3, Table 4.
** Internal refers to the number of cities weighted by their distance to the largest host city within the same country. External refers to the number of cities weighted by their distance to the largest host city where all world cities are included.
*** Weights are the distance between country centroids.

Appendix 2: Description of the Data for the FDI and Its Determinants

Variable	Mnenomic		Definition
FDI	lnfdi		FDI, from Blonigen et al. 2007: US affiliate sales abroad
distance to US	ln_dist		Vincenty distance in km between country centroids, CID data
skill level, average years of total schooling	lnhumanav		Lee, Barro years of schooling, 5 year average
openness	openness		Sachs & Warner openness, updates by Wacziarg & Welch
financial development	lnfindev		Private credit as share of GDP
institutions (rule of law, corruption, bureaucracy)	lninst		ln Institutions (Corruption, rule of law, bureaucracy, higher = less risk), from International Country Risk Guide
Investment share of GDP			Gross fixed capital formation as % of GDP, PWT 6.2 from Heston et al (2006)
Trade costs	lntc		Inverse of exports plus imports as a share of GDP. PWT 6.1
Investment costs	lninvcost		Inverse of composite index composite index comprising operations risk index, political risk index and remittance and repatriation factor index, developed by Business Environment Risk Intelligence S.A. (Blonigen et al., 2007)
road density	lnroadens		Length of road network / surface area
number of ports			
GDP	lngdp		GDP in constant $ billions, PPP, PWT6.1
population	ln_poptot		PWT6.1
5-year average yearly growth in GDP per capita			GDP per capita yearly growth rate averaged over 5 years intervals between 1960-2000. PWT 6.1.
Average yearly population growth rate			Ln difference in total population, PWT 6.2 from Heston et al (2006)
% urban	urbpav		Urban population as share of total population. World Urbanization Prospects 2007
primacy	primacy		Population of largest city as a share of total urban population
log GDP/capita	lngdppc		PWT6.1
number of cities	lncitycountall		Those cities with at least 750000 people in 2007, WUP2007
distance weighted number of standard size cities	ln(citynumber_smp_oc+largestcitypop)		Those cities with at least 750000 people in 2007 within the same country, WUP2007, weighted by their distance from the largest city, normalized to shortest distance in sample (Brazzaville – Kinshasa, 10.4 km)
Point-source resources	lnnatpoint		ln share of point-source natural resource exports in GDP. World Bank (2006)

Spatial lags:			
GDP	lngdp_smp		idem, country centroid distance weighted sum of variable, normalized by shortest distance (Netherlands Belgium, 115.4 km)
population	lnpoptot_smp		idem, country centroid distance weighted sum of variable, normalized by shortest distance (Netherlands Belgium, 115.4 km)
primacy (easily accessible mp)	primacy_smp		idem, country centroid distance weighted sum of variable, normalized by shortest distance(Netherlands Belgium, 115.4 km)
GDP/capita (wages)	lngdppc_smp		idem, country centroid distance weighted sum of variable, normalized by shortest distance (Netherlands Belgium, 115.4 km)
distance weighted number of standard size cities	ln(citynumber_smp_ac-citynumber_smp_oc)		Those cities with at least 750000 people in 2007, all countries, WUP2007, weighted by their distance from the largest city in the country, normalized by shortest distance in sample (Brazzaville – Kinshasa, 10.4 km)
openness	lnopenness_smp		idem, country centroid distance weighted sum of variable, normalized by shortest distance (Netherlands Belgium, 115.4 km)
financial development	lnfindev_smp		idem, country centroid distance weighted sum of variable, normalized by shortest distance (Netherlands Belgium, 115.4 km)
institutions (rule of law, corruption, bureaucracy)	lninst_smp		idem, country centroid distance weighted sum of variable, normalized by shortest distance (Netherlands Belgium, 115.4 km)
road density	lnroadens_smp		idem, country centroid distance weighted sum of variable, normalized by shortest distance (Netherlands Belgium, 115.4 km)
Point-source resources	lnnatpoint_smp		ln share of point-source natural resource exports in GDP, surrounding. World Bank (2006)

Appendix 3: Country sample used in Table 4*

Algeria	0	Denmark	1	Indonesia	1	Netherlands	1	Spain	1
Argentina	1	Dominican Republic	0	Iran, Islamic Rep.	0	New Zealand	0	Sri Lanka	0
Australia	1	Ecuador	0	Ireland	1	Nicaragua	0	Sweden	1
Austria	1	Egypt, Arab Rep.	1	Israel	1	Niger	0	Switzerland	1
Bangladesh	0	El Salvador	0	Italy	1	Norway	1	Syrian Arab Republic	0
Belgium	1	Finland	1	Jamaica	0	Pakistan	0	Thailand	1
Bolivia	0	France	1	Japan	1	Panama	0	Togo	0
Botswana	0	Ghana	0	Jordan	0	Papua New Guinea	0	Trinidad and Tobago	0
Brazil	1	Greece	1	Kenya	0	Paraguay	0	Turkey	1
Canada	1	Guatemala	0	Korea, Rep.	1	Peru	0	Uganda	0
Chile	1	Haiti	0	Malawi	0	Philippines	1	United Kingdom	1
China	0	Honduras	0	Malaysia	1	Portugal	1	Uruguay	0
Colombia	1	Hong Kong, China	0	Mali	0	Senegal	0	Venezuela, RB	1
Costa Rica	0	Iceland	0	Mexico	1	Singapore	1	Zambia	0
Cyprus	0	India	0	Mozambique	0	South Africa	1	Zimbabwe	0

* Numbers refer to whether a country is included in regression 1 of Table 4 (1) or not (0).

Appendix 4: Countries with the ten most and ten least number of spatially weighted internal number of standard city sizes in 1998

Internal city number	FDI	Primacy	GDP per capita	Institutions	Distance to US	Point-source resources	Surrounding Primacy	Surrounding openness	Surrounding resources	Country
0.0007	13	38.9%	884	3.000	12,307	6.5%	1.650	2.234	0.144	Niger
0.0010	12,962	22.7%	31,948	15.000	8,556	14.0%	1.284	2.739	0.090	Norway
0.0011	23	57.5%	910	5.000	12,248	9.2%	2.603	3.428	0.306	Togo
0.0011	1,458	17.5%	3,743	8.000	3,538	0.4%	1.329	2.785	0.076	Guatemala
0.0012	1,982	45.9%	7,728	11.000	4,400	0.5%	1.268	2.504	0.078	Costa Rica
0.0012	263	37.3%	3,236	9.000	4,054	0.2%	1.376	2.885	0.081	Nicaragua
0.0012	270	27.5%	832	8.000	15,915	22.9%	1.657	1.774	0.084	Zambia
0.0012	17	39.0%	1,105	5.000	11,001	0.8%	1.859	2.662	0.165	Mali
0.0012	20	22.4%	1,096	7.000	16,933	1.0%	1.756	1.677	0.101	Mozambique
0.0013	5,389	30.1%	21,074	16.000	8,997	1.6%	1.146	2.390	0.101	Finland
0.0129	140,850	21.8%	23,371	13.000	9,078	0.9%	1.757	3.940	0.140	France
0.0130	7,579	12.5%	3,604	5.750	14,472	12.4%	0.760	1.175	0.065	Indonesia
0.0132	3,420	35.8%	4,252	8.000	12,212	1.3%	1.570	2.585	0.125	Egypt, Arab Rep.
0.0150	24,237	35.8%	11,933	10.000	9,876	1.0%	0.861	1.530	0.062	Argentina
0.0161	17,610	29.1%	13,265	11.000	9,585	2.1%	0.669	1.123	0.050	Korea, Rep.
0.0177	17,182	2.8%	3,475	9.000	11,512	0.9%	0.808	1.359	0.059	China
0.0199	5,269	5.8%	2,368	10.000	13,076	0.2%	0.922	1.656	0.063	India
0.0219	84,126	12.5%	6,964	7.000	9,624	0.7%	0.887	1.439	0.065	Brazil
0.0226	83,615	24.7%	7,528	8.420	2,860	2.2%	0.863	1.673	0.057	Mexico
0.0455	183,517	41.4%	23,582	12.170	8,834	0.2%	0.605	1.037	0.049	Japan