Volume Title: Capital Flows and the Emerging Economies: Theory, Evidence, and Controversies

Volume Author/Editor: Sebastian Edwards, editor

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-18470-6

Volume URL: http://www.nber.org/books/edwa00-1

Conference Date: February 20-21, 1998

Publication Date: January 2000

Chapter Title: Is There a Curse of Location? Spatial Determinants of Capital Flows to Emerging Markets

Chapter Authors: Swati Ghosh, Holger Wolf

Chapter URL: http://www.nber.org/chapters/c6167

Chapter pages in book: (p. 137 - 156)

5

Is There a Curse of Location? Spatial Determinants of Capital Flows to Emerging Markets

Swati Ghosh and Holger Wolf

5.1 Introduction

Walter Bagehot noted more than a century ago that "the same instruments which diffused capital through a nation are gradually diffusing it among nations" (1880, 71).[1] The trend toward enhanced financial integration has since continued, with frequent spurts and the occasional spectacular reversals. By and large, the 1990s have been associated with increased integration: private-to-private capital flows between mature and emerging markets have increased very substantially, rising from US$44 billion in 1990 to US$167 billion in 1995, with public sector flows remaining virtually unchanged at about US$60 billion. Indeed, prior to the dramatic Mexican and Asian reversals (themselves evidence of increased integration), the shift from public to private flows has led some observers to pronounce a new era in which official bilateral and multilateral development assistance would be increasingly replaced by direct private investments.

While the large-scale inflows (and the recent large-scale outflows) have received wide attention by both policy makers and the academic community,[2] the fact that the new private flows bypassed the vast majority of

Swati Ghosh is senior economist in the East Asia and Pacific region at the World Bank. Holger Wolf is assistant professor in the Center for German and European Studies and the Department of Economics at Georgetown University.

The authors thank Miguel Savastano, Sebastian Edwards, and conference participants for helpful comments. The assistance of the central banks and the statistical offices of the G7 economies in obtaining data is gratefully acknowledged.

1. Presciently, he also noted that while "the effect of this will be in the end much to simplify the problems of international trade . . . for the present, as is commonly the case with incipient causes whose effect is incomplete, it complicates all it touches" (Bagehot 1880, 71).

2. See Calvo, Leiderman, and Reinhart (1993a, 1993b), Chen and Kahn (1997) and Chuhan, Claessens, and Mamingi (1993), among others.

developing countries has received less notice. Of the 107 countries classified as either low income or middle income by the World Bank, forty-eight countries received less than US$100 million in net private inflows in 1995, while another fourteen received between US$100 and US$200 million. The remaining forty-five economies received the lion's share, with China (US$44,339 million), Brazil (US$19,097 million), Mexico (US$13,068 million), Malaysia (US$11,924 million), Indonesia (US$11,648 million), Thailand (US$9,143 million), Hungary (US$7,841 million), and Argentina (US$7,204 million) each receiving more than twice the *total* inflows of the forty-eight less developed countries (LDCs) with the smallest inflows.[3]

The concentration of flows to a select group of star emerging economies admits of two explanations. First, it might simply be the case that fundamentals in these stars dominated fundamentals in the also-rans. In particular, development thresholds may play a crucial role in deciding who does, and who does not, obtain foreign funds: Market size matters for foreign direct investment (FDI), while the existence and liquidity of asset markets are trivial determinants of portfolio flows. If threshold effects are indeed the crucial determinants, the laggards will gain access to world capital markets as an automatic side effect of development. Furthermore, whether such access will be obtained is at least partially dependent upon their own policies.

Alternatively, one may suppose that development, and hence the breaching of thresholds enabling full access to world capital markets, is significantly determined by accidents of history, and specifically by location, which are largely exogenous. There are good reasons to support such a conjecture. It is well known, for instance, that bilateral trade decreases strongly in distance; indeed, this relation is one of the sturdiest stylized facts of the empirical trade literature. It is also well known that trade and FDI linkages are reinforcing: Countries with relatively high bilateral trade shares tend to have relatively high bilateral FDI shares.[4] It is not unreasonable to suppose that financial links in turn depend on FDI and trade links. Foreign-owned firms may have an easier time accessing foreign capital markets, as may domestic firms linked through demand and supply channels to foreign firms. As such linkages develop and international familiarity with the country grows, domestic firms in turn may find easier access. To the degree that location drives trade, which in turn drives FDI and financial integration, the outlook for the laggards is less rosy: An improvement in access under this scenario requires compensation for the natural

3. These countries of course also account for the lion's share of LDC population, thus the concentration in flows per capita is somewhat less pronounced.

4. The link is not perfect. In some cases, notably in the presence of trade barriers, FDI may be a substitute for, rather than a complement to, trade. The empirical and theoretical consensus, however, point to a complementary nature of FDI and trade as the rule. See Mundell (1957), Helpman (1984), Neary (1995), and Markusen (1997) for some representative views.

disadvantage of location, which also impedes—through the trade-growth nexus—development itself.

In this paper, we aim to throw some light on the role of geography in determining financial flows. We proceed in two steps. We begin on the recipient side by examining the determinants of access, assessing whether, controlling for other factors, location matters for determining access.

We next turn to the source countries to examine the spatial distribution of *outward* financial flows in a standard gravity framework. Gravity models have been quite useful in accounting for the distribution of bilateral trade, with most of the explanatory power deriving from bilateral distance (negatively), dummies for common borders, common language, common trade bloc membership (positive), and market size (positive). Using a data set of capital outflows by type and destination for the G7 economies, we estimate identical gravity specifications for trade and for four types of capital flows: foreign direct investment, bank lending, portfolio debt, and portfolio equity. The approach permits two insights. First, it yields a direct estimate of the sensitivity of capital flows to distance, and hence of the importance of location, ceteris paribus. Second, it permits a comparison of the relative importance of distance, the possession of common borders, common language, common membership in trade blocs, and market size across the different types of capital flows.

5.2 Data

This paper draws on a fairly diverse set of data sources. The national aggregated and disaggregated inward capital flow data are taken from the World Development Indicators (World Bank 1997). G7 outward capital flows are taken from the Bank for International Settlements (BIS; bank lending), Organization for Economic Cooperation and Development (OECD; foreign direct investment), and correspondence with national central banks, ministries of finance, and financial market groups (portfolio flows). The core of the trade data, as well as the distance, common border, common language, and trade bloc variables, have been taken from Shang-Jin Wei's NBER web page (www.nber.org/~wei). Trade and distance data were augmented from the International Monetary Fund's *IMF Trade Statistics* and from Bali online (www.indo.com/distance/) to match our sample. Inward capital flows are the average for the 1990–95 period. All outward data are for a single year, 1994 for FDI and bank lending, and different years between 1990 and 1994 for the portfolio data.

5.3 Determinants of Access

Examining the determinants of access requires a definition of "access." Our main measure is based on the three access scores for alternative capi-

tal flow types reported by *Euromoney,* based on a mixture of observed capital flows and subjective assessments. The three measures are intended to capture, respectively, access to bank lending, short-term finance, and capital markets. The bank lending measure is based on reported long-term private nonguaranteed debt disbursements. The short-term finance measure is based on the U.S. Export-Import Bank assessment, while the capital market measure is based on syndicated loan and bond issues and a subjective judgment of the current ease of market access. To obtain the overall access score, we rank countries by their combined scores, then classify countries in the top third as having access and countries in the bottom third as lacking access; we drop the intermediate group.[5] As a test for robustness, we also considered a second measure based on the average *absolute* net inflow of private capital as a percentage of gross domestic product (GDP) during the 1990–95 period. The third of countries with the largest share are assigned to the access group, the third of countries with the smallest shares to the no-access group. The middle third is again dropped to obtain a sharper distinction.

The measures are not ideal. Large net flows are a sufficient but not a necessary condition for access to world financial markets. Two caveats arise. First, among perfectly integrated markets, adjustment may happen primarily through relative price adjustment rather than flows. Given that most countries in the present data set are far from fully integrated, however, this possibility is a lesser concern. Second, small net flows are consistent with large but offsetting gross flows. This is arguably a more serious concern, though there is little evidence that offsets are significant at the bottom of our access measure: For the subset of countries in this group for which both inflows and outflows are available, one of the two categories tends to dominate the other, so that absolute net flows provide a reasonably good proxy for gross flows. The *Euromoney* rating attempts to reduce the reliance on observed flows by taking account of subjective assessments by market participants, and hence it is our preferred measure.

A first look at the data reveals significant apparent location effects. Only one of twenty-one African countries, but fifteen of eighteen European countries, is classified as having access. The split is of course consistent with other spatially correlated determinants of access. We examine the linkages in two steps. We begin with a probit analysis before turning to classification trees to formally allow for threshold effects.

5.3.1 Probit Tests

To assess the importance of location for access, ceteris paribus, we first regress in a probit framework the access dummy on relative population

5. Our measure is solely based on the access subscore reported by *Euromoney,* and thus excludes the scores for "economic performance," "political risk," "debt indicators," and "credit ratings" that dominate in the overall country risk score reported by *Euromoney.*

size (measured by 1989 population as a fraction of the sample maximum); relative market size (measured by 1989 U.S.-dollar GDP, purchasing power parity [PPP] adjusted, as a fraction of the sample maximum); real development stage (measured by 1989 GDP per capita as a fraction of the sample maximum); growth (measured by 1985–89 GDP per capita growth as a fraction of the sample maximum); openness (the 1989 export-to-GDP ratio); and three measures of location—the distance to the closest G7 economy, the GDP-weighted average distance to all G7 economies (all expressed relative to the sample maximum), and continental dummies for Africa and the Western Hemisphere (except Canada and the United States).

To reduce the endogeneity problem, the explanatory variables are either for 1989, or for the average of the years 1985 to 1989, while the access rating is for 1993. Our interest is twofold: first, to assess whether the explanatory variables have power for predicting whether a country has access, and second, to determine whether after controlling for these factors, a residual effect remains for location. Table 5.1 presents the results. The first three columns present regressions of the access dummy on, respectively, the weighted distance, the individual distances, and the two continent dummies. The weighted distance, a rough proxy for a country's distance from "world GDP," enters negatively and is significant at the 10 percent level. Bilateral distances offer a more mixed picture, perhaps reflecting the high correlation between the four European series (0.988) and between Canada and the United States (0.965). Restricting the distances to Germany, Japan, and the United States yields negative effects for all three distances (Germany: −0.67 [0.79], Japan: −4.14 [3.70], United States: −0.54 [0.64]). Both of the continental dummies for Africa and the Western Hemisphere are negative and significant.

Location factors are thus correlated with access. The next four columns examine to what extent this correlation reflects spatially correlated fundamentals. Column (4) presents the regression on the four fundamentals. Only income per capita, a proxy both for productivity and spending power, enters significantly, with a positive sign. A higher number of consumers and a faster growth rate are positively correlated with access; however, both variables are insignificant. Openness controlling for these factors enters negatively, albeit also insignificantly. The last three columns add the location variables to examine whether, controlling for the fundamentals, location exerts an additional effect. The answer is negative: None of the location factors enters significantly, while GDP per capita remains significant. Within the probit framework, the development stage is thus the main determinant of whether a country has or does not have access to financial markets.[6]

6. Results are by and large similar for the flow measure, with the exception of the openness variable, which enters positive, but is also insignificant. GDP per capita is the most significant influence; adding location variables to the fundamentals yields insignificant effects.

Table 5.1 **Access Determinants: Probit**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	1.11	0.43	0.79	−2.07	−3.16	26.96	−1.85
	(1.85)	(0.29)	(3.64)	(2.98)	(1.95)	(1.31)	(2.08)
Average distance	−1.88				1.78		
	(1.92)				(0.75)		
Distance to:							
Canada		−2.40				3.39	
		(0.90)				(0.59)	
France		−18.06				−3,158.7	
		(0.25)				(1.30)	
Germany		−14.72				119.47	
		(0.58)				(0.95)	
Italy		22.92				390.42	
		(1.38)				(1.21)	
Japan		−2.29				−71.42	
		(1.11)				(1.35)	
U.K.		8.22				2,681.1	
		(0.12)				(1.30)	
U.S.		4.81				−47.09	
		(1.51)				(1.36)	

Africa			−2.46				−0.85
			(4.76)				(1.07)
Latin America			−1.55				0.006
			(3.03)				(0.09)
Population size				2.46	2.67	−11.67	2.31
				(0.95)	(0.98)	(1.11)	(0.91)
GDP per capita				26.28	28.44	174.2	24.39
				(3.33)	(3.28)	(1.43)	(2.90)
GDP per capita growth				1.89	1.84	12.53	1.50
				(1.51)	(1.45)	(1.42)	(1.13)
Openness				−2.02	−2.65	−32.23	−1.29
				(0.88)	(1.07)	(1.35)	(0.52)
Log likelihood	−48.04	−37.15	−30.61	−11.55	−11.25	−7.80	−10.81
Number of observations	72	72	72	65	65	65	64

Note: Numbers in parentheses are *t*-statistics.

There are good reasons to take these results with a grain of salt, however. In particular, the implicit assumption of linearity underlying the estimations may not be warranted. For instance, while it stands to reason that there is a positive relationship between the development stage and access, the link may take the form of a threshold effect rather than a log linear relation, so that access is obtained once some threshold level of development is breached but, beyond that level, further increases in the development level do not lead to equal increases in access. Similar conjectures hold for several of the explanatory variables. With fixed costs of entry, foreign financial firms may require a minimum aggregate economy size before committing resources. Beyond threshold effects, context dependence may also play a role. Thus the relative export ratio may be a crucial determinant of which of a group of small economies has access to world financial markets, but may matter little for determining the access of larger countries whose home financial sector is of sufficient size to attract foreign interest.

By definition, the coefficients in the standard multivariate regression analysis reflect the marginal effect of a change in the explanatory variable, holding constant the other variables. As such, these regressions cannot readily capture threshold effects or complementarities. In principle, it would be possible to allow for such effects by including sufficiently many dummy variables and interactive terms in the regression. In the absence of clear-cut theoretical predictions about the shape of the interaction, however, let alone the level of thresholds, adding such terms becomes impractical. The presence of threshold effects and context dependence can nevertheless be readily examined within a classification tree context, to which we turn next.

5.3.2 Classification Trees

A classification tree provides a simple ordering of a set of potential explanatory variables by their ability to predict into which of two groups a binary dependent variable falls. In the present case, the dependent variable is simply the 0-1 dummy for access. The algorithm searches through all possible thresholds for all potential explanatory variables to identify the variable (with an associated threshold) that best separates the two groups of countries. Suppose, for instance, that the lowest export growth in countries with access was 15 percent, while the highest export growth in countries without access was 12 percent. In this case, "export growth above 13 percent" provides a perfect separation rule.

More generally, the split will not be perfect, there will be some countries that have high export growth but no access (type I errors) and others that have low export growth but enjoy access (type II errors). The algorithm searches through all observed values of all explanatory variables to find the variable-cum-threshold that minimizes the sum of the type I and type

II errors.[7] The sum of the errors then provides an (inverse) measure of the ability of the variable to predict access. This rule is then used to split the sample into two subsamples, and the algorithm is applied in turn to each of them. To enhance robustness, the original sample is split into a learning and a test sample, and the ability of the rules identified for the learning sample to predict the division of the test sample enters the evaluation function for the rule.

In principle, the process could continue until every observation has been placed into its own branch (akin to including as many explanatory variables as observations in a regression), thus getting a perfect, if meaningless, fit. To avoid this overfitting, a termination rule is required. The termination rule used resembles, loosely speaking, an *adjusted* R^2 criterion. After each split, the improvement in the overall fit (which, just like the change in the raw R^2 upon adding an additional explanatory variable is always nonnegative) is combined with a penalty on the number of branches that promotes parsimony. If the penalty exceeds the improvement, the branch is terminated at the prior node; if not, the algorithm continues.

In essence, the technique thus uses the potential explanatory variables to produce an ordered sequence of criteria (a decision tree) determining the likelihood that a country will or will not have access. Since the sequence of criteria can depend upon previous branchings of the tree, the algorithm can readily accommodate cross-dependencies between the explanatory variables. As a side benefit, the technique also establishes a hierarchy of explanatory variables, based on their ability to discriminate between the two groups (access, no access) of countries. Finally, because the algorithm uses interior thresholds, it is by construction extremely robust to outliers.

Restricting the set of explanatory variables to the bilateral distances to each of the G7 countries yields a single split: Countries more than 11,353 miles from Japan are classified as having no access, those closer as having access. The simple rule works quite well: Twenty-four of the twenty-six countries (92.3 percent) with greater bilateral distances indeed have no access under the *Euromoney* classification, while thirty-four of the forty-six countries (73.9 percent) with shorter bilateral distances have access. Restricting the sample to continental dummies likewise yields a quite powerful simple rule for predicting access: Countries in Africa and countries in the southern and central Western Hemisphere are predicted to have no access; of these thirty countries, twenty-seven (90 percent) are correctly classified, with very similar results for the flow-based measure.

The location of a country is thus highly correlated with whether the country enjoys access to international financial markets. We examine to

7. Depending on the question examined, different weights can be attached to type I and type II errors. For the present application, both types were weighted equally.

what extent this correlation reflects spatially correlated fundamentals by expanding the set of explanatory variables to also include the fundamental variables. The results are striking: Knowledge of GDP per capita is almost sufficient to predict access, with a threshold of 2,800 comparable U.S. dollars. Of the thirty-two countries with lower income per capita, thirty-one (96.9 percent) are rated as having no access; of the forty countries above, thirty-five (87.5 percent) are rated as having access. Overall, the simple threshold allows correct classification of 92 percent of observations.

For the simple flow measure, income per capita is again the dominant discriminator (with a $1,501 threshold), but is followed, for both high and low income countries, by a threshold on the minimum share of industry in GDP (43 and 33 percent, respectively). The overall fit is again very good: Using the thresholds on income per capita and on the industry shares allows correct classification of forty-eight out of fifty-six observations. Controlling for fundamentals, the distance variables do not enter as useful discriminants, nor do continental dummies.

The classification tree analysis, viewed in conjunction with the probit results, yields three quite robust insights. First, access is highly correlated with location: Countries located in Asia and the Western Hemisphere (except Canada and the United States) have a much lower probability of having access to world financial markets. Second, access is highly correlated with income per capita and industry shares. Third, income per capita provides a better discriminant than distance to the G7 economies.

The findings permit two interpretations. First, it might be that income per capita is lower in Africa and the Western Hemisphere for reasons unrelated to location. In this case, addressing the obstacles to growth will permit the as yet excluded countries to breach the development threshold and gain access. Second, it might be that low income per capita is itself causally linked to location. Such a link is not ex ante unreasonable. For instance, two separate literatures establish a strong positive trade-growth nexus and a very strong negative trade-distance linkage. Joining these two stylized facts potentially gives rise to a negative link between growth and the "distance" to world GDP.

The strength of such exogenous location effects relative to policy actions in determining growth and thus income per capita is an open question for future research exceeding the scope of the present paper. We can note, however, that a simple regression for the present data set of per capita growth on income per capita, openness, the investment ratio, the average distance measure, and the Africa and Western Hemisphere dummies does yield a significant negative effect of the continental dummies, and a negative but insignificant effect of distance. Significant negative coefficients on continental dummies have also been reported in a number of other papers in the empirical growth literature dating back to Barro (1991) and have proved rather robust to the inclusion of new explanatory variables.

5.4 Determinants of Outward Financial Flows

The previous section examined the dependence between the probability of having access and properties of the recipient country, including location. We now turn to the source countries to examine the determinants of the spatial distribution of outward flows, including the location of the recipient country relative to the source country. Relative location has long played a major role in empirical trade. A substantial literature documents that bilateral trade increases strongly in proximity, is even higher between countries sharing borders, and is higher still between countries sharing a border and a common language.[8] In contrast, spatial factors have received much less explicit attention in international finance, perhaps reflecting a greater concentration on price rather than quantity effects.[9]

In this section, we aim to provide some initial stylized facts on the spatial nature of outward capital flows to guide further exploration. It is ex ante far from evident whether such linkages exist and which form they take. For instance, standard portfolio theory may well be taken to suggest a *positive* effect of distance on flows: The very presence of a strong *negative* effect of distance on trade suggests that business cycle (and thus, to an approximation, return) correlations decrease in distance, suggesting that optimally diversified portfolios allocate higher shares to geographically distant markets. Taking a contrary view, it is also reasonable to suppose that informational advantages arise from proximity, for instance, common language may facilitate assessment of potential investments, common borders may facilitate supervision, and so forth, suggesting a *negative* effect of distance on capital flows.

To learn more about the spatial determinants of capital flows we explore capital flows in a standard gravity model. The model is advantageous for our purposes both because of its excellent track record in accounting for the spatial distribution of bilateral trade flows and because of its compatibility with a wide range of modeling approaches, allowing us to explore spatial linkages in a fairly unrestricted setting.

The estimated gravity equations are standard: The variable of interest (the log of bilateral exports, FDI, bank loans, debt, and equity) is related to the log of bilateral distance, a dummy for common borders and common language, a measure of remoteness, as well as to the market size of the recipient (measured by GDP in comparable U.S. dollars) and its development level (measured by GDP per capita in comparable U.S. dollars).

8. See Frankel, Stein, and Wei (1993), Engle and Rogers (1994), Helliwell (1995), Helliwell and McCallum (1995), Linneman (1966), McCallum (1995), Rauch (1996), and Wei (1996) among others for recent evidence. Recent work has shown the major theoretical trade models to be able to accommodate gravity effects (Anderson 1979; Armington 1969; Bergstrand 1985; Deardorff 1995).

9. Exceptions include Bohn and Tesar (1996) and Eaton and Tamura (1994).

Where possible, regressions are performed on the level of the financial variables. For some of the portfolio series, only flow observations were available; here it is assumed that the flows in a given year are proportional to the stock.

The remoteness indicator is a fairly recent innovation in the gravity literature. It aims to capture a dependence of the effect of bilateral distance on the proximity of third trading partners (Deardorff 1995): Two countries located close to each other but "distant" from world output are likely to transact more with each other than two equally distant states closer to world output. Remoteness is simply the GDP-weighted average distance to the G7 and, under the null, is expected to enter with a positive sign: Controlling for bilateral distance (which enters separately), greater remoteness from alternative transaction partners enhances the incentive for bilateral transactions. For the current data set, Iceland is the least remote country, while the Pacific islands are most remote.

Tables 5.2 through 5.7 presents the results. All regressions are single equation ordinary least squares (OLS). With consistent data sources, panel estimation would have been preferable. Given the heterogeneity of the current data set, with flow and stock measures from different sources and somewhat different definitions, single equation estimation seemed preferable. Table 5.2 provides a summary measure of the results, reporting the median coefficient estimate for each variable for each of the five transaction measures. The results display considerable similarity. The median elasticity of bilateral transactions with respect to bilateral distance is always negative though often insignificant, ranging between −0.45 for equities and −0.96 for FDI. The negative relation between trade and bilateral distance thus extends to other types of bilateral transactions, including bank loans, debt, and equity. The median elasticity with respect to remoteness is always positive, ranging from 0.33 for debt to 2.89 for FDI. Controlling for bilateral distance, greater proximity to world GDP reduces transactions. Not too surprisingly, the elasticity of transaction with respect to the recipient country market size is uniformly positive and closely centered around unity. Indeed, judging from the medians, FDI and

Table 5.2 **Gravity Regression: Median Coefficients**

	Median Export	Median FDI	Median Loan	Median Debt	Median Equity
Log distance	−0.71	−0.96	−0.81	−0.62	−0.45
Log remote	1.51	2.89	2.10	0.33	1.92
Adjacent?	0.45	0.62	−0.34		
Language?	0.64	0.81	0.15		
Log GDP	0.79	0.97	0.96	1.09	0.95
Log GDP per capita	0.25	0.57	0.35	0.09	0.99

Table 5.3 **Gravity Regression: Exports**

	Canada	France	Germany	Italy	Japan	United Kingdom	United States
Constant	−42.28	−17.80	−18.57	−15.32	−29.65	−22.56	−32.42
	(7.58)**	(2.99)**	(3.62)**	(2.17)**	(4.25)**	(4.52)**	(5.78)**
Log distance	−1.59	−0.68	−0.58	−0.71	−1.36	−0.64	−1.17
	(3.95)**	(3.59)**	(3.40)**	(3.19)**	(4.17)**	(3.89)**	(2.45)**
Log remote	4.03	1.37	0.98	0.87	2.82	1.51	2.68
	(6.09)**	(1.99)*	(1.62)	(1.13)	(5.18)**	(2.54)**	(4.30)**
Adjacent?	0.62	0.16	0.17	0.28		1.20	0.84
	(0.46)	(0.29)	(0.47)	(0.48)		(1.56)	(0.81)
Language?	0.72	0.68	0.64	−0.27	−0.71	1.05	0.53
	(2.87)**	(2.52)**	(2.20)**	(0.27)	(0.56)	(5.49)**	(1.98)*
Log GDP	0.89	0.66	0.79	0.72	0.81	0.71	0.96
	(8.44)**	(8.81)**	(12.60)**	(7.47)**	(8.15)**	(10.96)**	(9.98)**
Log GDP per capita	0.31	0.15	0.25	0.22	0.40	0.30	0.25
	(2.86)**	(1.84)*	(3.57)**	(2.39)**	(3.51)**	(4.05)**	(2.40)**
Number of observations	66	67	71	65	68	71	67
R^2	0.76	0.75	0.87	0.74	0.72	0.81	0.74
Adjusted R^2	0.74	0.73	0.86	0.71	0.70	0.80	0.72

Note: Numbers in parentheses are *t*-statistics.

*Significant at the 10 percent level.

**Significant at the 5 percent level.

Table 5.4 **Gravity Regression: FDI**

	Canada	France	Germany	Italy	Japan	United Kingdom	United States
Constant	−28.92	−32.19	−28.83	−38.47	−59.22	−48.04	−47.50
	(1.86)*	(1.83)*	(1.90)*	(2.52)**	(5.23)**	(3.80)**	(4.80)**
Log distance	−1.53	−0.63	−0.21	−0.96	−1.70	−1.06	−0.49
	(1.39)	(1.24)	(0.48)	(1.89)*	(3.12)**	(2.00)*	(0.39)
Log remote	2.89	2.35	1.24	2.39	4.53	3.55	3.04
	(1.59)	(1.31)	(0.81)	(1.51)	(5.25)**	(2.50)**	(2.34)**
Adjacent?	−0.70	−0.01	0.62	0.62			1.05
	(0.27)	(0.01)	(0.48)	(0.34)			(0.46)
Language?	1.11	1.33	0.81	0.52	−2.77	2.17	0.57
	(1.58)	(1.26)	(0.90)	(0.23)	(1.53)	(1.98)*	(1.08)
Log GDP	0.68	0.73	0.89	0.97	1.36	1.29	1.09
	(2.52)**	(2.74)**	(3.86)**	(4.18)**	(7.32)**	(5.65)**	(5.65)**
Log GDP per capita	0.57	0.61	0.40	0.64	0.74	−0.24	0.53
	(2.00)*	(2.43)**	(1.90)*	(2.60)	(3.27)**	(0.44)	(2.50)**
Number of observations	19	30	32	33	32	13	32
R^2	0.70	0.57	0.61	0.61	0.76	0.86	0.71
Adjusted R^2	0.55	0.46	0.52	0.52	0.71	0.76	0.65

Note: Numbers in parentheses are *t*-statistics.

*Significant at the 10 percent level.

**Significant at the 5 percent level.

Table 5.5 **Gravity Regression: Bank Loans**

	Canada	France	Germany	Italy	Japan	United Kingdom	United States
Constant	−20.89	−34.04	−9.57	−27.92	−33.13	−32.34	−42.81
	(1.52)	(4.26)**	(1.52)	(2.96)**	(3.39)**	(5.39)**	(5.05)**
Log distance	−1.46	−0.57	−0.81	−0.22	−1.52	−0.09	−1.52
	(1.42)	(1.53)	(3.95)**	(0.69)	(3.05)**	(0.40)	(2.61)**
Log remote	2.43	2.14	0.43	1.13	2.10	1.27	3.95
	(1.57)	(1.97)*	(0.60)	(0.96)	(2.47)**	(1.70)*	(4.24)**
Adjacent?	0.30		−0.60				−0.34
	0.11		(1.41)				(0.25)
Language?	0.36	1.25	−0.05		−1.85	0.54	−0.04
	(0.57)	(2.98)**	(0.16)		(0.97)	(2.25)**	(0.11)
Log GDP	0.60	0.98	0.82	0.96	1.20	1.03	0.92
	(2.29)**	(9.69)**	(10.10)**	(7.63)	(8.03)**	(14.05)**	(5.60)**
Log GDP per capita	0.36	0.24	−0.04	0.13	0.60	0.35	0.63
	(1.37)	(1.89)*	(0.45)	(0.84)	(3.26)**	(3.41)**	(3.57)**
Number of observations	34	86	40	69	58	81	53
R^2	0.43	0.61	0.86	0.53	0.69	0.81	0.68
Adjusted R^2	0.30	0.58	0.84	0.50	0.66	0.80	0.63

Note: Numbers in parentheses are *t*-statistics.

*Significant at the 10 percent level.

**Significant at the 5 percent level.

Table 5.6 **Gravity Regression: Debt**

	Germany	Italy	United States
Constant	−1.46	−13.53	−57.61
	(0.16)	(0.97)	(5.38)**
Log distance	−0.11	−0.62	−1.30
	(0.65)	(1.39)	(2.44)**
Log remote	0.03	0.33	4.34
	(0.04)	(0.22)	(3.85)**
Adjacent?			
Language?			
Log GDP	0.38	1.11	1.09
	(2.71)**	(4.27)**	(5.88)**
Log GDP per capita	0.09	−0.71	1.14
	(0.32)	(1.67)	(5.50)**
Number of observations	20	21	47
R^2	0.41	0.63	0.73
Adjusted R^2	0.26	0.54	0.70

Note: Numbers in parentheses are *t*-statistics.
**Significant at the 5 percent level.

Table 5.7 **Gravity Regression: Equity**

	Germany	Italy	United Kingdom	United States
Constant	−40.51	−23.25	−31.48	−54.47
	(2.63)**	(1.45)	(1.22)	(5.92)**
Log distance	−0.47	−0.43	−0.89	−0.08
	(1.55)	(0.92)	(2.03)**	(0.18)
Log remote	0.98	−0.11	2.85	3.39
	(0.64)	(0.07)	(1.32)	(3.52)**
Adjacent?				
Language?				
Log GDP	1.03	0.98	0.51	0.92
	(4.10)**	(3.54)**	(1.33)	(5.72)**
Log GDP per capita	1.52	0.79	0.98	1.00
	(3.22)**	(1.52)	(0.67)	(5.49)**
Number of observations	19	20	10	49
R^2	0.77	0.70	0.61	0.72
Adjusted R^2	0.70	0.62	0.30	0.70

Note: Numbers in parentheses are *t*-statistics.
**Significant at the 5 percent level.

Table 5.8 **Gravity Regressions: Summary**

Canada	−1.53	FDI	−0.96
Japan	−1.52	Loans	−0.81
United States	−1.17	Exports	−0.71
United Kingdom	−0.76	Bonds	−0.62
France	−0.63	Equity	−0.45
Italy	−0.62		
Germany	−0.47		

financial flows appear to be more sensitive to recipient market size than is trade. The relative productivity of the recipient country likewise is always positively related to transaction size, with elasticities ranging from a low of 0.09 for debt (though only three individual estimates are available for debt) to a high of unity for equity transactions. The results complement our earlier finding that income per capita acts as a key determinant of access. The dummies for language and common borders are not significant but are, with one exception, of the expected positive sign.

Turning to the results for the individual transaction types, bilateral exports exhibit the familiar strong gravity pattern, decreasing strongly in bilateral distance but increasing in the remoteness of the partner country. The spatial determinants are of less significance for the FDI regressions; however, all seven distance elasticities are of the predicted negative sign, while all seven remoteness elasticities are positive.

The same pattern emerges for bank loans, debt, and equity, with the sole exception of the remote coefficient on Italy. The significance level of the coefficients is substantially lower compared to the export regressions; this may be at least partly attributable to the sharply reduced number of observations.

Table 5.8 summarizes the results on the distance elasticities. The first two columns report the median elasticity by country; the last two columns report the median elasticity by transaction type. Transactions of European countries are on average considerably less sensitive to distance, with elasticities ranging from 0.5 to 0.75. In contrast, the three non-European countries have elasticities above unity. A possible explanation may be sought in the greater openness of the European economies and the relatively low transactions costs for intra-European trade. On the transaction types, it is interesting to observe that the distance elasticity is larger for loans and FDI, both involving sizable commitments with limited liquidity, than for more liquid portfolio investment. This ordering is consistent with views emphasizing the importance of proximity for monitoring, arguably more important for less liquid assets.

5.5 Conclusion

The last decade has witnessed a resurgence in private-to-private capital flows from mature to emerging markets. To date, however, the flows have reached only a small group of developing countries. In this paper, we contrast two explanations for the continuing lack of access of many less developed countries. The first attributes lack of access to lack of development: Both FDI and portfolio inflow require functioning real and financial development. In this view, the as yet excluded markets will gain access as their domestic markets mature. The second view is less optimistic: If financial flows, just as trade flows, depend crucially on location, specifically on the proximity to mature markets, the access of disadvantageously located economies, particularly in Africa, may remain quite limited for the foreseeable future.

The provisional evidence presented here suggests that the second view cannot be rejected out of hand. Two pieces of evidence suggest that location may matter. First, looking across recipient countries, we found that economies located in Africa and the Western Hemisphere enjoyed less access to world capital markets than did countries located in other continents. This direct dependence of access on location vanished, however, once controls for other potential determinants of access were included, notably total and per capita GDP. An open issue for future research is whether the very high correlation between location and GDP per capita is accidental or whether low GDP per capita is itself a function of location, for instance through trade gravity linkages.

The second piece of evidence was gathered from gravity-type regressions of five different transaction types—exports, FDI, loans, debt, and equity—for the G7 economies. We found a strong uniform pattern across all five types: Every single estimated distance elasticity was negative, though significance levels are low. Importantly, the estimated distance effect was conditional on controlling for total and per capita GDP, a prima facie puzzle under standard capital market models, though one that can readily be reconciled if information flow is endogenized to distance. A better understanding of the causes of the distance effects is clearly desirable at this juncture. We simply note the implication that capital flows will decrease in the remoteness of a recipient country to "world GDP" even for similar fundamentals (as captured by GDP per capita). In this sense, the findings support the view that location matters in a fundamental sense for development prospects.

References

Anderson, James. 1979. A theoretical foundation for the gravity equation. *American Economic Review* 69:106–16.

Armington, Paul. 1969. A theory of demand for products distinguished by place of production. *IMF Staff Papers* 16 (1): 159–78.

Bagehot, Walter. 1880. *Economic studies.* Ed. Richard Holt Hutton. London: Longmans, Green.

Barro, Robert. 1991. Economic growth in a cross section of countries. *Quarterly Journal of Economics* 106:407–43.

Bergstrand, Jeffrey. 1985. The gravity model in international trade. *Review of Economics and Statistics* 67:474–81.

Bohn, Henning, and Linda Tesar. 1996. U.S. portfolio investment in Asian capital markets. Working paper, University of California, Santa Barbara.

Calvo, Guillermo, Leonardo Leiderman, and Carmen Reinhart. 1993a. Capital inflows and real exchange rate appreciation in Latin America: The role of external factors. *IMF Staff Papers* 40 (1): 108–51.

———. 1993b. Inflows of capital to developing countries in the 1990s: Causes and effects. *Journal of Economic Perspectives* 10 (2): 123–39.

Chen, Zhaohui, and Mohsin Khan. 1997. Patterns of capital flows to emerging markets. IMF Working Paper no. 97/13. Washington, D.C.: International Monetary Fund.

Chuhan, Punam, Stijn Claessens, and Nlandu Mamingi. 1993. Equity and bond flows to Latin America and Asia: The role of external and domestic factors. PRE Working Paper no. 1160. Washington, D.C.: World Bank, March.

Deardorff, Alan. 1995. Determinants of bilateral trade: Does gravity work in a neoclassical world? NBER Working Paper no. 5377. Cambridge, Mass.: National Bureau of Economic Research.

Eaton, Jonathan, and Akiko Tamura. 1994. Bilateralism and regionalism in Japanese and US trade and FDI pattern. NBER Working Paper no. 4758. Cambridge, Mass.: National Bureau of Economic Research.

Engle, Charles, and John Rogers. 1994. How wide is the border? NBER Working Paper no. 4829. Cambridge, Mass.: National Bureau of Economic Research.

Frankel, Jeffrey, Ernesto Stein, and Shang-Jin Wei. 1993. Continental trading blocs: Are they natural or supernatural? NBER Working Paper no. 4588. Cambridge, Mass.: National Bureau of Economic Research.

Helliwell, John. 1995. Do national borders matter for Quebec's trade? NBER Working Paper no. 5215. Cambridge, Mass.: National Bureau of Economic Research.

Helliwell, John, and John McCallum. 1995. National borders still matter for trade. *Policy Options* 16 (July/August): 44–48.

Linneman, Hans. 1966. *An econometric study of international trade flows.* Amsterdam: North-Holland.

Markusen, James. 1997. Trade versus investment liberalization. Working paper. University of Colorado, Department of Economics.

McCallum, John. 1995. National borders matter: Canada-US regional trade patterns. *American Economic Review* 85 (June): 615–23.

Mundell, Robert. 1957. International trade and factor mobility. *American Economic Review* 47:321–35.

Neary, Peter. 1995. Factor mobility and international trade. *Canadian Journal of Economics* 28:S4–S23.

Rauch, James. 1996. Networks versus markets in international trade. NBER Working Paper no. 5617. Cambridge, Mass.: National Bureau of Economic Research.
Wei, Shang-Jin. 1996. Intra-national versus international trade. NBER Working Paper no. 5531. Cambridge, Mass.: National Bureau of Economic Research.
World Bank. 1997. *Private capital markets.* Washington, D.C.: World Bank.

Comment Miguel A. Savastano

Swati Ghosh and Holger Wolf want to put geography considerations at the forefront of discussions of capital flows to emerging markets. To do this, they examine the role that geographical factors have played on an important and grossly overlooked regularity of the surge of private capital flows to emerging markets in the last decade: the fact that a handful of developing countries has received the lion's share of the flows and that, by and large, those flows have bypassed the vast majority of the developing world. The authors put forward two competing hypotheses to account for the uneven distribution of capital flows to less-developed economies: a "development threshold" hypothesis (i.e., the level of income and income per capita in the recipient countries) and a "location" hypothesis (i.e., geographical factors, including the bilateral distance between the recipient countries and the G7 economies). They then proceed to test the two hypotheses, first from the recipient countries' perspective by examining the determinants of access to international financial markets (using a probit regression and a "classification tree" procedure), and then from the source countries' side by estimating gravity-type equations for exports and four types of capital flows during the early 1990s using a fairly unconventional set of data.

The results do not help the authors' case. What Ghosh and Wolf find is that each hypothesis receives some empirical support when it is tested separately, but that when they are tested jointly the development threshold hypothesis (the GDP measures) overwhelmingly dominates the location hypothesis. This is what the authors obtain from the probit estimates in table 5.1 and from their original analysis of access based on "classification trees," and this is also what they obtain from the gravity-type regressions of outward capital flows reported in tables 5.4 to 5.7. In fact, not counting the results for bilateral exports (table 5.3), the coefficients of the "location"

Miguel A. Savastano is deputy division chief at the Research Department of the International Monetary Fund.

The opinions expressed in these comments are exclusively those of the author and do not represent those of the IMF.