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Global Foreign Direct Investment Flows: The Role of Governance Infrastructure

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Summary. — It is widely argued that a country's economic performance over time is determined to a great extent by its political, institutional and legal environment. We refer to these institutions and policies as the governance infrastructure of a country. We utilize newly developed indices to examine the effects of governance infrastructure on *both* foreign direct investment (FDI) inflows and outflows for a broad sample of developed and developing countries over 1995–97. In addition, we examine the role of other forms of infrastructure including human capital and the environment. The results clearly indicate that governance infrastructure is an important determinant of both FDI inflows and outflows. Investments in governance infrastructure not only attract capital, but also create the conditions under which domestic multinational corporations emerge and invest abroad. It would appear that investments in governance infrastructure are subject to diminishing returns, so that the benefits, in terms of inflows, are most pronounced for smaller and developing economies.

Key words — foreign direct investment, capital flows, multinational corporations, infrastructure, governance

1. INTRODUCTION

It is widely argued that a country's economic performance over time is determined to a great extent by its political, institutional and legal environment (OECD, 2001). We refer to these institutions and policies as the governance infrastructure of a country. The governance infrastructure of a country helps to define its investment environment, and thus creates favorable conditions for economic growth.

Recent empirical evidence tends to confirm the hypothesis that crosscountry differences in growth and productivity are related to differences in governance infrastructure (Hall & Jones, 1999; Kaufmann, Kraay, & Zoido-Lobaton, 1999b; Keefer & Knack, 1997; Knack & Keefer, 1995; Roll & Talbott, 2001). [1] Because the investment environment of a country affects both domestic and foreign investors, and because foreign direct investment (FDI) has been shown to promote host country efficiency, it is a natural extension of the literature to consider the impact of governance infrastructure on crosscountry differences in FDI flows. [2] Our paper therefore focuses on the linkage between governance infrastructure and FDI flows. [3]

The potential relevance of governance to explaining FDI flows across countries has been indirectly suggested by Lucas (1990), who addresses the question of why capital flows from rich to poor countries do not take place in the world economy until capital to labor ratios and, hence, wages and capital returns, are

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equalized. He considers a number of possible explanations and rejects several prominent explanations on conceptual grounds, including the possibility that technological change makes capital substantially more productive in developed countries. An explanation that he considers quite plausible are the efforts of host country governments to appropriate economic rents associated with inward FDI through instruments such as heavy taxation. He offers this as a possible explanation for relatively low rates of capital formation in developed countries in the face of substantial factor price differences between developed and developing countries. While Lucas identifies explicit policies that are targeted at foreign investors, other governance policies that discourage domestic capital investment may also be relevant factors influencing intercountry differences in economic performance. In general, however, he highlights an argument that capital flows cannot be predicted by looking exclusively at labor and capital scarcity.

There is a relatively extensive empirical literature focusing on the characteristics of locations that seem to either attract or repel foreign investors. [4] While it seems plausible that FDI will be attracted to regions characterized by more favorable governance infrastructures, all other things constant, most of the relevant literature has focused on economic determinants of FDI inflows. It is, of course, true that the international business literature has acknowledged the importance of country-specific political risk (Kobrin, 1976). As a consequence, empirical analyses of FDI now routinely include some kind of variable to control for intercountry differences in the broad political environment (Altomonte, 2000; Bevan & Estrin, 2000; Mody & Srinivasan, 1998; Morisset, 2000; Stevens, 2000; Tuman & Emmert, 1999), albeit with somewhat mixed results (Dawson, 1998). [5]

It is difficult to generalize about the statistical impact of political governance attributes, in part because the attributes are measured in different ways in different studies. Moreover, although many previous studies adopt measures that are closely related to the idea of governance infrastructure, there has as yet been no systematic attempt to relate directly governance infrastructure measures to FDI flows for a wide cross-section of countries. Nor has there been much discussion regarding the specific infrastructure elements that are especially robust determinants of FDI.

Our paper adds to the relevant literature in several ways. Most prominently, we utilize newly developed indices to examine the effects of governance infrastructure on *both* FDI inflows and outflows for a broad sample of (at most) 144 developed and developing countries over 1995–97. Specifically, we use the governance indices developed by Kaufmann, Kraay, and Zoido-Lobaton (1999a) to measure governance infrastructure. These six indices, described below, cover a broad range of institutional and policy outcomes and are available for a large sample of countries. In particular, they include factors not commonly found in the FDI literature, notably measures of the rule of law, the regulatory environment, and graft. Our results clearly indicate that governance infrastructure is an important determinant of both FDI inflows and outflows. The results suggest that investments in governance infrastructure not only attract capital, but also create the conditions under which domestic multinational companies (MNC's) emerge and invest abroad. It would appear that investments in governance infrastructure are subject to diminishing returns, so that the benefits, in terms of inflows, are most pronounced for smaller and developing economies.

Governance infrastructure is not the only infrastructure that can contribute to economic well-being and create a favorable climate for FDI. Investments in human capital, physical infrastructure and the environment may also be important. In the context of FDI, the absence of educated and healthy workers can pose a significant deterrent to foreign entry. As increasing amounts of FDI becomes skill- and efficiency-seeking, access to an educated and skilled workforce becomes essential. There is evidence that a more highly educated populace does in fact attract FDI (Mody & Srinivasan, 1998), but the role of health has to our knowledge not been explored. Similarly, environmental regulation may increase the costs of doing business and thus deter FDI. On the other hand, a clean environment may be associated with a higher quality of life, and thus attract FDI. To date, there are only a limited number of studies linking environmental policies to FDI (List, 2001; Smarzynska & Wei, 2001 and Wheeler, 2001), with no consistent evidence of a race to the bottom with respect to environmental policies. That is, there is no consistent evidence of a negative relationship between FDI inflows and higher environmental standards.

In this study, we account for aspects of human capital development and the environmental regime using the Human Development Index (HDI) developed by the United Nations, and the Environmental Sustainability Index (ESI) developed jointly at Columbia University, Yale University and the World Economic Forum. The HDI is a composite index created by combining GDP/capita, an education outcome index and a health status index. The ESI measures environmental sustainability using a variety of different measures. Our study contrasts the linkages between FDI and HDI and ESI to the linkage between FDI and governance infrastructure.

The study proceeds as follows. In Section 2, we define governance infrastructure and compare and contrast our definition to other related concepts. In Section 3, we operationalize our measure of governance infrastructure, as well as of indices measuring human capital, physical infrastructure and environmental sustainability. Section 4 describes our statistical model. Section 5 discusses our estimation technique and results. A summary and conclusions is provided in Section 6.

2. GOVERNANCE INFRASTRUCTURE

Broadly speaking, governance infrastructure comprises public institutions and policies created by governments as a framework for economic and social relations. We are most concerned with those elements of the governance infrastructure that can affect the investment decisions of MNCs. A "positive" governance infrastructure would therefore include: an effective, impartial and transparent legal system that protects property and individual rights; public institutions that are stable, credible and honest; and government policies that favor free and open markets. These conditions encourage FDI, and presumably private domestic investment as well, by protecting privately held assets from arbitrary direct or indirect appropriation. In a related manner, the same conditions encourage sunk cost investments by MNCs that facilitate efficient operation in host countries.

As we use the term, governance infrastructure is similar to the notion of social infrastructure used by Hall and Jones (1999) in that the definition includes both institutions and policies. We prefer the term governance because it is readily distinguishable from related notions of physical infrastructure, social capital and human capital.

Governance infrastructure, so conceived, can be contrasted with physical infrastructure and human capital. Physical (public) infrastructure is conventionally thought to include investments in the construction and maintenance of communications, transportation and utility networks. Human capital reflects less tangible investments in people, mainly in the form of education and health. To the extent that education and health are provided by government or influenced by public policy, human capital may be thought of as human infrastructure. Indeed, Vining and Weimer (2001) define infrastructure broadly to include both human capital and physical infrastructure on the grounds that they both facilitate investment and growth, and are subject to market failure.

Governance infrastructure can also be distinguished from social capital. Social capital refers to the networks and shared values that encourage social cooperation, trust and, possibly, economic growth (Knack & Keefer, 1997; OECD, 2001). Unlike much physical capital and governance infrastructure, social capital resides in social relationships. Indeed, to the extent that transactions rely on sanctions and trust (Humphrey & Schmitz, 1998), one may think of sanctions (legal recourse, regulation) as elements of governance infrastructure, while trust emerges from moral and social norms. Nevertheless, social capital and physical and governance infrastructure may overlap because social capital can involve public organizations such as schools or government agencies (OECD, 2001, chapter 3). It might also be augmented by investments in physical and governance infrastructure, as well as human capital. In this regard, there is some evidence to suggest that the existence of social capital (trust) is "linked to better performance of government institutions, including publicly provided education" (Knack & Keefer, 1997, p. 1253).

In fact, a measure of social capital was excluded from this study for two main reasons. One is that there is no consensus in the literature as to the appropriate way to specify social capital in studies focusing on differences in performance among organizations or geographical regions. [6] Second, and related to the first, the relationship networks underlying social capital can be formed in many different ways. One would presumably need to aggregate the various forms of relationship networks into

broader indices comparable to governance indices. In this regard, we are unaware of the existence of reliably estimated "meta-indices" of social capital for even a few of our sample countries. While the exclusion of social capital might contribute to biased estimates of the coefficients for included infrastructure variables, to the extent that social capital is systematically correlated with the latter, the literature says little about whether social capital and governance infrastructure are strongly correlated in either a positive or negative direction.

Governance infrastructure is related to measures of country-specific risk commonly used in the international business literature (Bevan & Estrin, 2000; Keefer & Knack, 1997; Mody & Srinivasan, 1998). Private rating agencies typically determine these measures by assigning weights to various economic, political and institutional factors that define the investment environment. These factors are not conceptually much different from those used to define governance infrastructure. Indeed, we show below that there is a very high statistical correlation between our measures of governance infrastructure and one commonly used measure of country-specific risk. Nevertheless, the measure of governance infrastructure we use is arguably more comprehensive.

3. MEASURING GOVERNANCE AND OTHER INFRASTRUCTURE

Governance infrastructure is measured in our study by the six governance indicators estimated by Kaufmann *et al.* (1999a,b). These indices (which we will refer to as KKZL indices) describe various aspects of the governance structures of a broad cross-section of countries, including measures of political instability, rule of law, graft, regulatory burden, voice and political freedom, and government effectiveness. [7] The indices have been estimated (using an unobserved components model) employing 31 different qualitative indicators from 13 different sources, including BERI, DRI/McGraw Hill, the Heritage Foundation, the World Bank, the World Economic Forum and the Economist Intelligence Unit. Thus, they are in a sense meta-indices, encompassing many of the various measures used in previous studies. Aggregate indicators drawn from a variety of sources should provide more precise measures of governance than individual indicators. A further advantage is that these measures are available for an unusually large sample of countries (between 145 and 158 countries). For these reasons, we believe that the KKZL indices are superior to other indices that have been used in empirical studies.

A disadvantage is that the indicators are estimated, and thus subject to measurement error. But, the magnitude of the measurement errors can be estimated which facilitates interpretation of how informative each indicator is about the broader concept of governance (Kaufmann *et al.*, 1999a). In addition, the indices are highly correlated with each other such that it is very difficult to use them all in a single equation (Table 1). We have therefore created an aggregate measure estimated as the first principal component of the six measures. We refer to this aggregated governance infrastructure index as GII.

In order to control for both physical infrastructure and human capital, we employ the HDI published by the United Nations. This index is now available for 168 countries, although not for every year. HDI is derived from three subindices: GDP/population, educational literacy and enrolment, and life expectancy at birth. Each of the subindices is also available. We have calculated the average value of HDI for 1995 and 1997. The health and education components are direct measures of human capital. The GDP/population component is a measure of wealth that we use as a proxy measure for the amount of physical infrastructure. [8]

Because neither the HDI nor the KKZL indices directly measure environmental quality or environmental regulation, we also employ the ESI, created by The World Economic Forum, in conjunction with Columbia and Yale Universities. The ESI index is derived from 22 factors that contribute to environmental sustainability including air quality, public health and environmental regulation. The ESI index therefore reflects environmental infrastructure in the form of policy choices made by governments, as well as human capital reflected in public health conditions.

We treat the HDI and ESI indices as measures of human capital and physical and environmental infrastructure, but they may also measure development outcomes. As a consequence, the three indices (GII, HDI and ESI) may be related. In particular, effective governance may be a determinant of development outcomes, as measured by HDI or ESI. [9]

Table 1. *Correlation matrix: governance infrastructure and other measures n = 144*

	Mean (sd)	HDI	GDPC	EDUC	LIFE	GII	VOICE	INSTAB	GOV	REG	LAW	GRAFT	ESI
HDI[a]	0.68 (0.19)	1.00											
GDPC	0.63 (0.25)	0.93	1.00										
EDUC	0.75 (0.18)	0.90	0.70	1.00									
LIFE	0.68 (0.18)	0.94	0.81	0.80	1.00								
GII[b]	0.01 (0.96)	0.69	0.69	0.53	0.60	1.00							
VOICE	0.06 (0.93)	0.59	0.59	0.50	0.52	0.85	1.00						
NSTAB	−0.02 (0.93)	0.64	0.66	0.52	0.58	0.88	0.67	1.00					
GOV	−0.02 (0.88)	0.63	0.69	0.44	0.55	0.95	0.75	0.78	1.00				
REG	0.07 (0.78)	0.51	0.56	0.37	0.44	0.84	0.73	0.66	0.75	1.00			
LAW	0.04 (0.92)	0.69	0.75	0.51	0.60	0.94	0.69	0.87	0.88	0.72	1.00		
GRAFT	−0.01 (0.90)	0.65	0.71	0.49	0.55	0.93	0.75	0.74	0.93	0.67	0.87	1.00	
ESI[c]	49.49 (11.3)	0.65	0.62	0.61	0.53	0.78	0.73	0.63	0.72	0.64	0.67	0.75	1.00

[a] HDI is the Human Development Index published by the United Nations Development Program, averaged for 1995 and 1997. HDI combines three measures, gdp per capita (GDPC), education, measured by a combination of adult literacy and the combined gross primary, secondary and tertiary enrolment (EDUC) and life expectancy at birth (LIFE). Index range is 0.0–1.0.

[b] GII is the first principal component of a series of governance indicators estimated by Kaufmann *et al.* (1999a) for the World Bank. The KKZL indices are themselves estimated by aggregating a number of measures for 1997. VOICE (Voice and Accountability) includes measures of political and civil liberties as well as freedom of the press. INSTAB (Political Instability and Violence) includes measures of political violence, terrorism and ethnic conflict. GOV (Government Effectiveness) includes measures of government efficiency. REG (Regulatory Burden) includes measures of the degree of regulation and market openness, including tariffs, and import, export and FDI restrictions. LAW (Rule of Law) is a measure that includes costs of crime, contract enforcement, and property rights. GRAFT (Graft), includes measures of corruption. Indices range from −2.5 to 2.5.

[c] ESI is the Environmental Sustainability Index, published by The Center for International Earth Science Information Network (CIESIN) at Columbia University, and created with the Yale University Center for Environmental Law and the World Economic Forum. The ESI is based on 22 factors that contribute to environmental sustainability, such as air quality, public health and environmental regulation. Based on 2000 data. Index ranges from 0 to 100. The ESI index was available for only 114 countries.

Nevertheless, we include these measures because development outcomes are also relevant to any discussion of FDI flows. The FDI literature suggests that host country wealth (normally measured by GDP/capita) is an important determinant of FDI flows (Dunning, 1993). Moreover, some recent evidence suggests that the location decisions of foreign investors may be influenced by quality of life variables, of which GDP/capita is but one (Peterson, Malhota, & Wagner, 1999). Given that GDP/capita is not necessarily a good measure of well-being or quality of life (OECD, 2001), the HDI and ESI indices may serve as such measures and therefore attract FDI.

The means and correlation coefficients for the main indices (GII, HDI and ESI), and their components are presented in Table 1. [10] All measures are quite highly correlated, but the within group values are typically higher than those between groups. In particular, the HDI and GII indices are highly correlated with their individual component measures. [11] It is, therefore, inappropriate to include individual component measures in the estimating equation, as doing so would provide little more information than is gained by including only the HDI and GII indices.

The HDI and GII indices are correlated ($r = 0.69$), which is not surprising given that the HDI index likely measures both inputs and output. The ESI variable is the least correlated with any other measure, and it is the only variable that explicitly accounts for environmental quality. It is not however, available for as large a sample of countries (122 in total, but only 114 in our sample).

We experimented with various combinations of the KKZL and HDI subindices. For example, we created a human capital index that was the sum of the education and health subindices of the HDI. This variable was still highly collinear with HDI and the GDP/capita component of the index. Similarly, we created a new variable from the KKZL indices that was the sum of the government efficiency, regulatory burden, and legal system efficiency indices. This variable was also highly collinear with GII, and with the remaining KKZL indices.

As noted earlier, the KKZL indices are estimated and, therefore, possibly subject to measurement error. We attempted to assess their reliability by comparing them to a measure of political risk published by *Institutional Investor Magazine*. This measure is a composite index derived from a variety of sub-measures, but its components are not published. As noted above, the measure is often used in the FDI literature (Bevan & Estrin, 2000; Mody & Srinivasan, 1998). The KKZL indices and their first principal component (GII) are all highly correlated with the Institutional Investor risk variable. For example, the correlation between the latter and GII is $r = 0.87$. Thus, despite the possibility of measurement error, it would appear that the KKZL measures are robust, at least in relation to "expert" judgments of national political environments.

4. MODELING FDI INFLOWS AND OUTFLOWS

The basic question we seek to address is whether governance infrastructure, as measured by GII, affects FDI inflows and outflows across countries. In doing so, we also consider the impact of physical and environmental infrastructure, as well as human capital. In order to estimate the impacts of the variables of interest, we need to hold constant other potentially important influences on FDI within the confines of a parsimonious model. The model chosen to estimate FDI inflows is specified as Eq. (1).

$$\begin{aligned}\text{Ln FDI}_{it} = {} & \beta_0 + \beta_1 \text{Ln GDP}_{it-1} \\ & + \beta_2 \text{Governance Infrastructure Index (GII)}_{it} \\ & + \beta_3 \text{Human Development Index (HDI)}_{it-1} \\ & + \beta_4 \text{Environmental Sustainability Index (ESI)}_{it} \\ & + \text{interactive terms} + \varepsilon_{it}\end{aligned} \tag{1}$$

Globerman and Shapiro (1999) have argued that FDI inflows and outflows are symmetrical. The presumption is that capital outflows may be stimulated by the same factors that encourage capital inflows. Specifically, superior governance encourages inward FDI, as well as increased capital investment more generally. Some of the successful firms created through the domestic investment process may, in turn, invest abroad as world-class multinational companies. In effect, superior governance encourages capital investment and the expansion of businesses that, in turn, are associated with increases in inward and outward FDI. Accordingly, the same specification is also used to estimate equations whose dependent variables are either capital outflows (Ln FDO), or net capital flows, defined as Ln ($\text{FDI}_{it} - \text{FDO}_{it}$). In the next subsection, we discuss in more detail how the statistical model was chosen and specified.

(a) *Control variables*

A large number of variables have been considered in the literature as possible determinants of inward FDI. [12] In fact, however, surprisingly few are consistently significant across the broad set of empirical studies that have been performed. One variable that is consistently statistically significant is a measure of the host country's size, usually identified by a measure of real gross domestic product (GDP). [13] The theoretical linkage between real GDP and location advantage is straightforward. A larger market implies that distribution costs will be lower when production and distribution facilities are sited in that market where, presumably, the bulk of a seller's customers will be located. As a related point, a clustering of other producers in the large market may create or accentuate agglomeration economies that, in turn, lower costs for all producers in that market. Contributing to the relevant agglomeration economies may be the availability of highly specialized inputs that cannot be found in smaller markets. [14]

Other variables provide less consistent results. As noted, GDP per capita is often employed as a measure of how well-off consumers are in a country. The problem with the GDP per capita variable is that it is also an implicit measure of wage rates, since productivity levels are highly correlated with wage rates, as well as with GDP per capita. All other things constant, higher wage rates will discourage inward FDI. Similarly, relative wage rates will implicitly reflect productivity differences among countries. Hence, they will not necessarily reflect differences in unit labor costs that, in principle, are what they are meant to measure. Consequently, it is not surprising that GDP per capita and relative wage rates are frequently either statistically insignificant or appear with the "wrong" signs in FDI regression equations. [15]

We followed the literature in selecting control variables reflecting the openness of the economy (imports + exports/GDP), labor costs (wages and salaries per employee in manufacturing), taxation (government tax revenue/GDP), exchange rate instability (measured by dummy variables classifying the country's exchange rate regime as fixed against the US dollar, fixed against some other currency, managed floating or free floating), [16] and three measures of physical infrastructure (Internet hosts per 10,000 people; telephone mainlines per 1,000; millions of kW-h of electricity generated/GDP). None of these control variables was ever statistically significant in any specification estimated. Moreover, each was available for a smaller sample than the variables ultimately included. As a consequence we do not include them in the final model as summarized in equation one. [17]

It is unsurprising that some of these variables were not found to affect FDI flows, despite some theoretical and empirical support for their relevance in the literature. The potential ambiguity of relative wage measures was discussed earlier. With respect to tax differences, the conceptually appropriate measure to compare across countries is the marginal effective tax rate. This rate differs from industrial sector to sector, and it is extremely difficult to measure (Chen, 2000). Broader measures (such as tax revenues/GDP) do not measure the impact of taxation at the margin. In addition, there is considerable intracountry variation in tax rates within large countries, and simple averages may disguise the ability of a particular region to attract FDI. Finally, any aversion to high taxes might be mitigated by their link to the provision of infrastructure that, in turn, is highly valued by international investors.

The fact that we could find no link between FDI flows and measures of physical infrastructure is at odds with the recent literature, which tends to find a positive and statistically significant effect. [18] In our case, the problem was multicollinearity between measures of physical infrastructure and measures of GDP or HDI (mainly the GDP/capita component). Larger and richer countries are characterized by more physical infrastructure. For example, the correlation coefficient between telephones per capita and HDI is $r = 0.94$. When our physical infrastructure measures were regressed against FDI in the absence of GDP and HDI, they were statistically significant and positive. For this reason, HDI must be considered, as a practical matter, to measure both physical infrastructure and human capital.

Similarly, the openness of an economy, measured by trade flows as a ratio of GDP, is likely related to a host country's legal and political framework that, in turn, is supportive of business investment. Although trade variables were never significant, the regulatory burden (REG) index of GII is to a great degree a measure of openness, since it includes measures such as tariffs and other trade restrictions, resulting in collinearity between the trade

measure and the GII index. In fact, our results indicate that open economies attract FDI.

The relationship between FDI and the exchange rate is more complex. The relevant issue is whether greater volatility of exchange rates discourages FDI. On the surface, it would seem to be the case, since risk-averse investors presumably view such volatility as a direct cost (if hedging is used to reduce the volatility) or an indirect cost (if risk is unhedged). But, to the extent that MNCs operate across a number of exchange rates, the volatility of any one currency might actually reduce the overall volatility of the MNC's cash flow. This will be the case, for example, if movements in that currency are uncorrelated, or negatively correlated, with movements of other currencies in which the MNC operates. In this case, currency volatility might be largely offsetting for MNCs operating across a "basket" of currencies. In short, it is theoretically unclear how trade openness and exchange rate volatility affect FDI flows, and our results may reflect this theoretical ambiguity.

(b) *The dependent variable*

We measure FDI in terms of flows. To the extent that inward and outward FDI have been going on for a long time, recent and relatively large changes in FDI behavior may not be apparent if FDI stock figures are used. That is, changes in stocks on a year-to-year basis will be quite small when they occur against an absolutely large accumulated base value. As a result, it may be difficult to identify the empirical factors affecting FDI stock values given relatively small variations in the FDI stock dependent variable. Moreover, inward and outward FDI behavior is more comprehensively measured for flows than for stocks.

The data on both inflows and outflows were obtained from the United Nations publication, *The World Investment Report* (UNCTAD, 1998, Annex B). The UN, in turn, obtained most of the data directly from the International Monetary Fund's computer tapes. In those cases where a country did not report to the IMF, data were obtained from the UNCTAD FDI/TNC database.

(c) *Specifying the model*

The model is specified such that both FDI flows and GDP are measured in logarithms, with the GDP coefficient measuring the elasticity of FDI flows. Given its GDP level, a country will be more or less attractive to foreign investors depending upon the extent and nature of its infrastructure and quality of life.

Alternative specifications to (1) were considered and tested. In particular, we estimated models in which the dependent variable was specified as being the ratio of FDI (inflows or outflows) to GDP, and the Ln GDP term was dropped as an explanatory variable. This specification was rejected because the dependent variable was typically clustered within a narrow range, and the limited variation produced very unreliable parameter estimates and low degrees of explanatory power when either ordinary least squares (OLS) or Tobit estimation methods were employed. As an alternative, the logisitic transformation of the FDI/GDP ratio was calculated and employed as the dependent variable. This specification produced results that are similar to those reported below. Indeed, there is virtually no difference in terms of levels of significance of the explanatory variables, and none of our conclusions would change as a consequence of using this alternative specification. [19]

In addition, we estimated models in which the dependent variable was specified as the proportion of total global FDI received by any country (PFDI), or the logistic transformation of PFDI. These measures were highly correlated with Ln FDI, suggesting some indifference as to the choice among them. Thus, the results are in fact similar, regardless of how the dependent variable is measured, and so we only present results based on the (natural) logarithmic specification (with GDP also in natural logs). This specification allows greater flexibility in that it allows the elasticity of FDI with respect to GDP to be estimated, and it permits us to introduce lagged GDP as an explanatory variable.

In terms of independent variables, we arrived at the final specification by eliminating all control variables that were not statistically significant in preliminary estimations. In the (unreported) results, the GDP variable was always statistically significant; moreover, it explains virtually all of the variance in the dependent variable. As noted above, none of the other control variables for which data were available was ever statistically significant with the exception of GDP/capita. Since GDP/capita is part of the HDI index, we control only for GDP (measured in logarithms) in our reported results. Standard *F*-tests indicate that this

model is preferred over ones that also include the control variables discussed above.

The simple specification described by equation (1), without interaction terms, was subjected to RESET specification tests (discussed below). When the specification failed the RESET test, we considered specifications in which the GII, HDI and ESI indices were interacted with the Ln GDP term. When the inclusion of the interactive term or terms allowed the specification to pass the RESET test, they are reported. To the extent possible, all independent variables were lagged relative to the dependent variable. The measurement of the variables is discussed in the next section.

(d) *Data and measurement*

The sources and measurement of all variables is summarized in Table 2. We were able to measure most variables for a cross-section of 144 countries. The ESI variable was available for only 114 countries, while only 98 countries recorded FDI outflows. At the time the data were collected, 1997 marked the last date for which FDI data were available. But, use of a single year's data on FDI flows can be misleading, particularly for small countries, where a single transaction in a given year can create temporary and possible large changes in recorded FDI flows, including negative values. In order to minimize this possibility, we chose to average the FDI data over 1995–97. At the same time, the GII measures were available for only one year (1997), and the HDI indices were not available for every year, thus limiting our ability to create a useful time-series panel.

In fact, there is remarkable temporal stability in most of the relevant variables employed in this study. For example, FDI inflows in 1995 and 1996 have a simple correlation coefficient of 0.75. The correlation coefficient for FDI inflows for 1996 and 1997 is 0.986. Outward FDI flows are also highly correlated on a

Table 2. *Variables, definitions and data sources*

Variable	Definition	Source
FDI	FDI inflows in $US, averaged 1995–97	UN World Investment (UNCTAD, 1998)
FDO	FDI outflows in $US, averaged 1995–97	UN World Investment (UNCTAD, 1998)
FDIN	Net FDI flows (FDI inflows minus FDI outflows), averaged 1995–97	UN World Investment (UNCTAD, 1998)
GDP	Real GDP in 1990 $US, average 1994–96	United Nations Statistical Yearbook (various years)
HDI	Human Development Index, averaged 1995 and 1997. Index combines GDPCI, EDUCI AND LIFEI	UNDP (various years)
GDPCI	GDP/capita index, measuring standard of living, averaged 1995 and 1997.	UNDP (various years)
EDUCI	Education index, combining adult literacy and primary, secondary and tertiary enrolment ratios, averaged 1995 and 1997.	UNDP (various years)
LIFEI	Life expectancy at birth index, averaged 1995 and 1997.	United Nations Development Programme, various years
GII	First Principal Component of Governance Indices (LAW, INSTAB, REG, GOV, GRAFT, VOICE, developed by Kaufmann *et al.* (1999a)	Kaufmann *et al.* (1999a), data available at: http://www.worldbank.org/wbi/governance/datasets.htm#dataset
LAW	Rule of Law Index, measures contract enforcement, property rights, theft and crime, etc.	Kaufmann *et al.* (1999a)
INSTAB	Political Instability and Violence Index, measures armed conflict, social unrest, ethnic tensions, terrorist threats etc.	Kaufmann *et al.* (1999a)
REG	Regulatory Burden Index, measures government intervention, trade policy, capital restrictions etc.	Kaufmann *et al.* (1999a)
GOV	Government Effectiveness Index, measures red tape and bureaucracy, waste in government, public infrastructure etc.	Kaufmann *et al.* (1999a)
GRAFT	Graft and Corruption Index, measures corruption among public and private officials, extent of bribery etc.	Kaufmann *et al.* (1999a)
VOICE	Voice and Accountability Index, measures civil liberties, political rights, free press, fairness of legal system etc.	Kaufmann *et al.* (1999a)
ESI	Environmental Sustainability Index, 2000, measures the health of the environmental system	Available at:www.ciesin.columbia.edu/indicators/ESI

year-to-year basis. Specifically, the correlation coefficient between outward FDI in 1995 and 1996 is 0.965. For the years 1996 and 1997, the simple correlation coefficient is 0.981.

Key independent variables are also highly correlated over the mid-1990s sample period. For example, the index of human development (HDI) created for 1995 has a simple correlation of 0.979 with the same index calculated for 1997. The subindex measuring educational attainment for 1995 has a simple correlation equal to 0.992 with the same index for 1997. Real GDP in 1995 has a correlation of 0.999 with real GDP in 1997.

In summary, values of relevant dependent and independent variables in models of FDI behavior change relatively slowly over time. [20] As a consequence, although adjustments to changes in the relevant independent variables do not occur immediately, departures from equilibria are arguably ordinarily small, at least relative to past FDI behavior. Discrete and substantial short-run departures from equilibrium values for the dependent and independent variables would presumably be associated with much lower year-to-year correlations of each variable than we identify for our sample, as discussed above. As a result, cross-section distributions of the relevant variables may, for our sample time period, reasonably approximate a steady-state equilibrium. Given the highly correlated values of the dependent variables across our sample of countries, the precise choice of year(s) for those variables does not seem a crucial issue.

To the extent possible, we attempted to measure the independent variables for a prior period. GDP is measured in US dollars and averaged for 1994–96. The GDP variable was lagged both to allow for adjustment lags, and to reduce the potential for a bias created by the dependent variable (FDI) causing higher values of GDP. HDI and its subindices are averaged over the two years 1995 and 1997. GII and its subindices were only available for 1997, but it is doubtful that its value would change much over a relatively short period of time. The earliest year for which ESI was available was 2000, but it is also doubtful whether this index changes much over time. Of course, it would be preferable to lag all explanatory variables (or at least to test for the appropriate lags), but data constraints did not allow us to do so.

We conclude that a cross-section sample of countries should allow the identification of a long-run relationship between FDI and infrastructure attributes. Since the FDI values are also highly correlated on a year-to-year basis for the mid-1990s, as are the values of the independent variables, it seems unnecessary to estimate different cross-sections over time or to pool cross-sections over time. A single cross-section in which the relevant variables are averaged over the sample period seems a sufficiently robust approach to modeling in this case.

(e) *Multicollinearity*

Despite the parsimony of the basic model, there is still a potential problem created by intercorrelations among the independent variables of interest, i.e. real GDP and the measures of infrastructure. In addition to the correlations among the infrastructure variables presented in Table 1, Ln GDP is correlated with the HDI index ($r = 0.92$), and also with GII ($r = 0.69$). These correlations underscore the potential difficulty in statistically identifying the influence of specific infrastructure measures in FDI models that include conventional economic variables such as GDP.

5. ESTIMATION AND RESULTS

(a) *The FDI model*

The basic results for the FDI model are found in Tables 3 and 4. Each reported equation was estimated by OLS, with heteroskedastic-consistent standard errors. The dependent variable is measured in logarithms, as is GDP. The other variables (HDI, GII, ESI) are indices and are not transformed. We tested for specification error through a series of RESET tests (one and two power). For the full sample (defined below), it was found that any equation with GII alone always failed the RESET test (one power), but passed comfortably when GII was interacted with Ln GDP. Interactive terms involving HDI and ESI were never statistically significant. The implication of this finding will be discussed below. All other equations passed the RESET tests.

We were also concerned about measurement error, particularly with respect to the governance variables. These variables were estimated by Kaufmann *et al*. (1999a), and therefore each observation has a standard error. For each of the KKZL variables, we took the ratio of the standard error to the mean estimate, and in-

Table 3. *Regression results, FDI inflows dependent variable is Ln FDI*

	All countries dependent variable is Ln FDI					Developing and transition economies dependent variable is Ln FDI				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Ln GDP	0.951***	0.826***	0.764***	0.791***	0.737***	0.893***	0.903***	0.845***	0.862***	0.861***
	(0.059)[a]	(0.080)	(0.062)	(0.085)	(0.070)	(0.088)	(0.093)	(0.078)	(0.107)	(0.085)
Human Development		−0.374		0.874			−0.328		0.470	
Index (HDI)		(0.881)		(0.872)			(0.850)		(0.798)	
Education Index (EDUC)			1.190**		2.068***			1.183***		1. 703***
			(0.556)		(0.669)			(0.570)		(0.689)
Governance Infrastructure		2.083***		1.525**			0.969***		0.569***	
Index (GII)		(0.735)		(0.774)			(0.219)		(0.209)	
Regulation Index (REG)			1.101***		1.076***			1.080***		1.043***
			(0.156)		(0.214)			(0.173)		(0.239)
Environment Sustain-				0.005	−0.021				0.023	−0.009
ability Index (ESI)				(0.015)	(0.014)				(0.019)	(0.020)
Ln×GDP*×GII		−0.124**		−0.090*						
		(0.062)		(0.049)						
Constant	−3.857***	−2.260***	−2.980***	−2.635**	−3.636***	−3.413***	−2.98***	−3.698***	−4.456**	−4.208***
	(0.587)	(0.644)	(0.549)	(0.930)	(0.821)	(0.806)	(0.732)	(0.697)	(1.124)	(1.106)
R^2	0.64	0.73	0.78	0.72	0.78	0.49	0.61	0.68	0.61	0.69
n	144	144	144	114	114	115	115	115	86	86

[a] Figures in parentheses are heteroskedastic-consistent (white) standard errors.

* $p < 0.01$.

** $p < 0.05$.

*** $p < 0.001$.

Table 4. *Regression coefficients, GII and HDI subindices dependent variable is Ln FDI*[a]

	(1) All countries		(2) Developing and transition economies	
	Coefficient (standard error)	R^2	Coefficient (standard error)	R^2
HDI	2.890* (0.943)	0.67	2.095* (0.740)	0.52
Gdp per capita[a]	1.674* (0.569)	0.66	1.194* (0.606)	0.50
Education[a]	2.365* (0.604)	0.67	1.960* (0.616)	0.52
Life expectancy[a]	2.142* (0.747)	0.66	1.642* (0.768)	0.50
ESI[b]	0.037* (0.011)	0.69	0.053* (0.016)	0.58
GII	0.744* (0.136)	0.73	0.930* (0.182)	0.61
Rule of law[c]	0.609* (0.161)	0.69	0.640* (0.211)	0.54
Voice and accountability[c]	0.669* (0.144)	0.71	0.795* (0.164)	0.58
Political instability/violence[c]	0.649* (0.157)	0.70	0.638* (0.197)	0.56
Government effectiveness[c]	0.748* (0.146)	0.71	0.909* (0.225)	0.57
Regulatory burden[c]	1.119* (0.154)	0.77	1.105* (0.198)	0.69
Graft[c]	0.595* (0.136)	0.68	0.721* (0.218)	0.57
n	144		114	

[a] Figures in parentheses are heteroskedastic-consistent (White) standard errors. Each equation contains an unreported constant term and Ln GDP.

[b] Indicates variables that are components of the GII index.

[c] Indicates variables that are components of the HDI index. For this variable $n = 114$ for the all country sample and $n = 86$ for the developing and transition economy sample.

* $p < 0.001$.

cluded a dummy variable in the equations where this ratio took on extreme values (greater than two) for any measure. Inclusion of this dummy variable did not alter the results reported below. To be sure, this procedure will not correct for systematic measurement errors that, if present, might bias our parameter estimates for the GII coefficients; however, we have no reason to believe that such systematic biases characterize the KKZL indices.

Table 3 presents results for the full sample of countries ($n = 144$), as well as for a sample that excludes OECD members plus Hong Kong and Singapore ($n = 115$). The latter sample is referred to as developing and transition economies. Because there were fewer observations for ESI, and a more limited sample size, we present two sets of results for each sample: one for the largest possible sample ($n = 144$ and 115), but excluding ESI, and one for a restricted sample ($n = 114$ and 86) that includes ESI.

For the full sample, the first model (1) presents a simple regression of LnFDI on LnGDP (lagged one period). This model produces a surprisingly high level of explanation for cross-section estimation ($R^2 = 0.64$), which suggests that GDP acts as a control variable for a variety of economic factors. The coefficient on the GDP term is highly significant and suggests an elasticity that is not statistically different from unity. [21]

When we add HDI, GII and the interaction of GII and Ln GDP (model 2), or these variables plus ESI (model 4), the explanatory power of the equations improves. But, the only variable that is statistically significant in both equations is GII (positive) and its interaction with Ln GDP (negative, although significant only at the 10% level in model 4). [22] This specification suggests that while governance improvements can attract FDI, they do so at a diminishing rate. That is to say, there are "diminishing returns" to governance improvements, so that the greatest effects will be felt by smaller economies (which are typically poorer). Thus, larger and richer countries have less to gain (at the margin) from governance improvements than do smaller and poorer economies. The smaller impact of governance improvements on FDI in larger countries might be a statistical artifact of relatively limited variation in the governance index across developed countries. To assess this possibility, we calculated the standard deviations of the GII variable across the full sample of countries, as well as the separate sample of developing and transition economies. In fact we found that the standard deviations of GII for the latter sample is *lower* than that for the whole sample. In this regard, the smaller impact of governance on FDI as GDP increases seems a worthy topic for further research.

The HDI and ESI coefficients are not statistically significant in these specifications, although they are each significant, and positive, when entered individually (with Ln GDP). There are grounds for concern that collinearity among the independent variables is hampering reliable estimation of the individual coefficients. Some indirect evidence that the HDI index is a statistically relevant influence on FDI is provided by substituting the educational component of the HDI index for the HDI variable and the regulation component of GII for the GII variable (Models (3) and (5)). The simple correlation between REG and EDUC (0.37) is lower than the simple correlation between HDI and GII (0.69), and lower than for any other combination of the subindices. Both REG and EDUC are less correlated with GII and HDI than are other subindices. In effect, EDUC and REG can be seen as instrumental variables for the broader HDI and GII measures. [23]

Models 3 and 5 provide improved explanatory power, with both the EDUC and REG coefficients positive and statistically significant. This result suggests that the HDI index suffers more from a collinearity problem with the GII index than do the individual components of the HDI index. In any case, the result with respect to EDUC certainly suggests that educational infrastructure encourages FDI in the expected way. As before, the ESI index remains statistically insignificant.

To assess the possibility that the stage of a country's development, as distinct from a country's size, conditions the relationship between FDI and infrastructure measures, we examined a subsample of developing and transition economies (the full sample less OECD members as at 1996 plus Hong Kong and Singapore). [24] The results are reported in Table 3, columns 6–10. One difference between these results and those for the full sample is that interaction term between GII and Ln GDP is never statistically significant in the estimating equations for the smaller sample of countries, and the non-interactive version passed the RESET test. As a consequence, no interactive specifications are reported.

Although the explanatory power of the equations estimated for the developing economies is lower than those for the full sample, the coefficient estimates and levels of significance are quite similar. The finding that the impact of political governance does not diminish with size among developing countries suggests that they stand to benefit more at the margin from such improvements than do richer countries. It is also noteworthy that we find no evidence that FDI flows are attracted to developing economies where environmental conditions are poor. [25]

We also note that for both samples, a variety of alternative specifications were estimated with various combinations of the main indices (GII, HDI and ESI), and the subindices. We have already determined that individual components of the broader indices such as EDUC and REG are positively related to FDI flows. In order to examine the potential impact of the other components of the HDI and GII indices, we estimated equations that contain various combinations of Ln GDP, subindices of HDI and GII, and the interaction of Ln GDP and an infrastructure subindex. The results indicate that no interactive terms are statistically significant for any of the subindices, and that when all the subindices are entered into an equation at once, only two variables are statistically significant (and positive): education and regulatory burden. In addition, government effectiveness (GOV) was often nearly statistically significant and positive. In order to give some sense of the relative contributions of these variables, Table 4 presents results where variables are individually included in an equation with Ln GDP. For comparative purposes, this table also includes the GII, HDI and ESI indices.

The results confirm the importance of governance infrastructure, as measured by GII and the KKZL indices. The GII index provides more explanatory power than ESI and HDI as measured by the coefficients of determination, and this is true of both samples. In general, the GII index provides more explanatory power than do any of its components (except regulatory burden), while the HDI index does not provide much advantage over any of its components. The results also suggest that education is the most important of the HDI variables (education, per capita GDP and life expectancy) as judged by the size of its coefficient, and this is true for both samples. When considering the variables that comprise the governance (GII) index, the regulation coefficient is larger than any of the other coefficients, suggesting that open economies with free markets will attract more FDI than will economies in which external and internal competition are discouraged. This is true regardless of a country's stage of development, although the effect is marginally weaker for the developing country sample. In both samples, the second most

important of the governance variables is effective government, and this variable is stronger for developing countries than for developed countries.

Perhaps the most important result to emerge from Table 4 is that the HDI coefficient and all of its component coefficients are lower in the sample of emerging and transition economies, while the GII coefficient and most of its component coefficients are higher. This suggests that governance is relatively more important to developing and transition economies, while wealth and human capital are relatively more important to developed countries.

In summary, our results point in a consistent direction. Specifically, they confirm the well-established fact that the size of a national economy strongly conditions how attractive that location is to foreign investors. They also strongly support the notion that governance infrastructure is an important direct influence on FDI, although the influence diminishes as countries become larger. An additional inference suggested is that FDI will be more strongly affected by improvements in political governance in developing countries than in developed countries. Of the governance indicators considered, the evidence suggests that regulatory burden and government effectiveness are the most important determinants of FDI flows for all countries.

There is less reliable evidence regarding other variables, where issues of collinearity and causality arise. In particular, the HDI is not significant in the presence of GII. One possible reason is that the HDI is in fact an output measure which is determined by GII, as suggested by Kaufmann *et al.* (1999b). When we estimate a model with independent variables that relatively uncorrelated with each other, however, there is evidence that education levels are important independent determinants of FDI flows. Furthermore, there is no evidence that the impact of this variable decreases with the size of the country. Finally, we find no evidence to suggest that FDI is in any way attracted to locations with weaker environmental regulations or with inferior environmental quality.

(b) *The FDO model*

Globerman and Shapiro (1999) argue that the same factors encouraging inward FDI influence outward FDI (henceforth FDO), although the precise nature of the relationship between FDO and some of the independent variables is not clear *a priori.* On the one hand, factors creating a favorable domestic business environment may both attract foreign capital and limit capital outflows. In this case, the infrastructure variables that encourage FDI will discourage FDO, and will carry opposite signs in the relevant equations. On the other hand, as discussed in an earlier section, the same factors encouraging foreign-owned MNCs to establish affiliates in a country may also encourage the growth of domestically owned MNCs that then establish their own affiliates abroad. In this context, the infrastructure variables that directly encourage FDI may indirectly encourage FDO. [26] Thus, an effective domestic governance infrastructure could well encourage capital outflows by successful domestic firms. Moreover, the relationships between infrastructure variables and FDO may be more complex than relationships between infrastructure measures and FDI. For example, already established investments by MNCs might be characterized by relatively large sunk costs. As a result, factors that have relatively large negative impacts on inward FDI may have much smaller impacts on FDO. [27]

Clearly, if one is interested in the overall impact of infrastructure variables on MNC investment in a country, one should consider both FDI and FDO. Hence, we estimated the model summarized in equation (1) using both the logarithm of FDO and the logarithm of FDI minus FDO as dependent variables. [28] Analogous estimates to those reported in Table 3 are reported in Table 5. As before, each equation was subjected to RESET specification tests resulting in the reported specifications. Each reported equation therefore passed the RESET test.

The FDO results are both similar to, and different from, the FDI results. In both cases, it is clear market size is a crucial determinant of FDI flows. As economies grow larger, there is a tendency for both capital inflows and outflows to increase. This is true for both samples of countries. But, as the net FDI equations for the total sample indicate (columns 4 and 5), there is no relationship between Ln GDP and Ln (FDI-FDO), so that the two effects cancel out, on average. The same is not true of developing and transition economies, where the Ln GDP coefficient is positive and statistically significant (columns 9 and 10), suggesting that for these economies increases in market size result in positive net capital flows.

Table 5. *Regression results, FDI outflows and net FDI flows*

	All countries					Developing and transition economies				
	Dependent variable is					Dependent variable is				
	Ln FDO			Ln (FDI FDO)		Ln FDO			Ln (FDI FDO)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Ln GDP	1.355***	1.012***	1.052***	0.002	−0.309	0.948***	1.176***	1.189***	0.924***	0.901***
	(0.092)	(0.131)	(0.098)	(0.204)	(0.325)	(0.142)	(0.147)	(0.129)	(0.126)	(0.094)
Human Development		1.120		−0.141			1.856		−0.862	
Index (HDI)		(0.131)		(2.734)			(1.976)		(2.316)	
Education Index			1.086		3.713*			0.830		1.163
(EDUC)			(1.257)		(2.243)			(1.316)		(1.501)
Governance Infrastruc-		−1.434		18.489***			−5.433**		0.021	
ture Index (GII)		(1.150)		(2.263)			(2.438)		(.530)	
Regulation Index			−3.724**		20.859***			−6.446**		−2.253
(REG)			(1.582)		(3.794)			(2.540)		(1.391)
Environment Sustain-		−0.010**	−0.011***	0.007	−0.123**		−0.009**	−0.012**	0.083	0.034
ability Index (ESI)		(0.004)	(0.004)	(0.076)	(0.073)		(0.005)	(0.005)	(0.069)	(0.055)
Ln × GDP* × GII		0.252***		−1.872***			0.660**			
		(0.093)		(0.194)			(0.264)			
Ln × GDP* × REG			0.538***		−1.992***			0.818***		0.331**
			(0.140)		(0.403)			(0.261)		(0.133)
Constant	−9.843***	−7.268***	−7.875***	5.065	10.704***	−6.348***	−9.378***	−8.976***	−6.743**	−6.037***
	(0.976)	(1.205)	(1.001)	(3.190)	(3.766)	(1.355)	(1.400)	(1.234)	(2.703)	(1.970)
R^2	0.60	0.74	0.76	0.56	0.38	0.33	0.44	0.50	0.38	0.43
n	98	98	98	98	98	70	70	70	70	70

Figures in parentheses are heteroskedastic-consistent (White) standard errors.

* $p < 0.01$.

** $p < 0.05$.

*** $p < 0.001$.

As was the case for FDI, governance infrastructure is an important determinant of FDO for both samples (columns 2 and 7). In the case of FDO, however the results suggest that improvements in the governance infrastructure will restrict capital outflows for small economies and encourage capital outflows for larger economies. [29] But, the former effect only holds for very small economies, so that for most countries the effect is positive. As governance improves, most countries should expect to see increased capital outflows. For the total sample, the evidence (column 4) suggests that the net effect is positive for smaller economies, but negative for larger ones with the latter effect dominating for economies with Ln GDP greater than 9.7 (compared to a mean of 10.6). When the sample is restricted to developing and transition economies, the linear specification was found to be appropriate, and the GII coefficient is not statistically significant. Thus, the evidence suggests that for smaller economies, improvements in governance will either result in positive net capital flows, or will have no effect on the balance, while for larger economies improvements in governance will likely create the conditions for successful domestic firms to expand abroad.

As was the case for FDI, there is no evidence that HDI affects capital outflows. Moreover, when we substitute the education index (EDUC) for HDI, and the regulation index (REG) for GII in order to minimize the effects of multicollinearity (columns 3 and 8), we find that education is not a significant determinant of FDO in either sample. Investments in education are therefore not found to result in capital outflows. For the total sample, the net effects of education on capital flows are positive (column 5), while for developing and transition economies the net effect is zero (column 10).

The regulatory burden term performs in much the same way as the over-all GII index. Movements toward the creation of more open and free markets will limit capital outflows for small economies, but not for larger ones, and the turning point occurs before the mean level of GDP is reached. The net effect on the total sample is such that reducing the regulatory burden will have a net positive effect on FDI flows for small countries, but the overall effect will be negative beyond a critical size that is reached before the sample mean GDP level is reached. Thus, relatively small and poor countries will experience net inflows as a consequence of creating more open markets.

Finally, the results in Table 5 provide no evidence to suggest that there is capital flight from areas where environmental conditions, including the regulatory environment, are supportive of a sustainable environment. Indeed, the relevant ESI coefficient is negative and statistically significant in the FDO equations for both samples. The higher is the index of environmental sustainability, the lower are the capital outflows. For the most part, the ESI index is not related to net flows.

As was the case for FDI, we examined the impact of the various indices and subindices when they were entered individually (or with interactive terms) with Ln GDP. In order to conserve space, we do not present these results. [30] In general, we found that the individual indices (GII, HDI) provide stronger explanatory power than any individual subindex. We confirmed that education and health are not significant determinants of FDO flows for developing and transition economies, and that the regulatory burden term is the most important of the GII terms (as judged by R^2 for both samples). For the total sample, it is generally true that raising any of the subindices will cause capital outflows to increase for large economies, and these will also result in lower net FDI flows for larger countries.

In summary, we find fairly strong evidence suggesting that improvements in governance infrastructure will also affect capital outflows, and thus net FDI flows. In general, the effects are strongest for large economies, and are likely most important when liberalization of the economic environment is involved. There is one type of liberalization that may not cause capital outflows and that is environmental regulation. Finally, education infrastructure is not related to capital outflows and may therefore have a positive net effect on FDI flows.

6. SUMMARY AND CONCLUSIONS

The purpose of this study is to assess whether and to what extent the governance infrastructure attributes of national economies influence FDI flows into and from those economies. In addition, we examine the role of other forms of infrastructure including human capital and the environment. This study therefore focuses on a broad set of indices measured for a relatively large sample of countries for the second half of the 1990s. Estimation of both FDI inflow and

outflow equations is based upon a symmetrical and parsimonious specification.

The results clearly indicate that governance infrastructure is an important determinant of both FDI inflows and outflows. On balance, for most countries, both inflows and outflows respond positively to good governance. In particular, good political governance is characterized by policies promoting competition on both a domestic and an international level, as well as by open and transparent legal and regulatory regimes, and effective delivery of government services. These appear to be more important than measures of political voice and political stability, and even the rule of law. The evidence also suggests that the returns to investments in good governance (in terms of net FDI flows) are greater for developing and transition economies. [31]

The results with respect to human capital (education and health) and environmental sustainability are less reliably estimated owing to problems of multicollinearity and causality. We do however find evidence consistent with findings of previous studies that investments in education are likely to attract FDI. Moreover, there is no indication that the positive impacts of education on FDI are a diminishing function of real GDP. We also find that such investments are not associated with capital outflows, so that the net effect of investments in education on FDI flows is likely to be positive. Our findings with respect to both the human capital and governance infrastructure indicators are subject to the caution that they may reflect the influence of omitted variables, most notably a measure of social capital. It is also possible that there is some feedback from FDI flows to infrastructure that would, if significant, contribute to biased estimates in our regression models.

Our results also provide some support for a claim that initiatives to promote environmental protection and remediation encourage, rather than discourage, inward FDI. Similarly, we find no evidence of capital flight from countries pursuing relatively strong environmental policies. While estimation of precise relationships between environmental policies and FDI flows is hampered by multicollinearity, statistical problems do not obviate rejection of the claim that governments will engage in an environmental "race-to-the-bottom" in order to attract and retain direct investments. [32] Indeed, our results suggest that weakening environmental protection regimes are more likely to discourage than encourage FDI.

Our findings might lend some support to arguments for public investment in infrastructure attributes that have other intrinsic social benefits. For example, support for improvements to national health care systems can be defended on grounds that improved health care generates public goods-type externalities. Increased inflows of FDI that themselves create spillover efficiency benefits for host economies offer an additional source of social benefit to an overall benefit-cost appraisal of government health care expenditures. For many developing countries, public goods arguments for improved health and educational systems, as well as for a cleaner environment, may trump considerations about their impacts on FDI. Nevertheless, complementarity between public goods investments and inward FDI strengthens the case for such investments in developing countries.

Perhaps our most important conclusion is that political governance matters, and improved political governance does not necessarily oblige governments to make large investments of taxpayers' money. In this regard, our findings reinforce similar conclusions drawn in Altomonte (2000) and UNCTAD (1998). Indeed, improved governance might be more consistent, in many cases, with a smaller economic and regulatory role for government. As well, any set of policies that broadly promotes economic growth will indirectly promote increased inward FDI by encouraging a higher level of real GDP.

Finally, it should be recognized that policies promoting inward FDI will likely indirectly encourage increased outward FDI by promoting the emergence and growth of successful home-country MNCs. But, this development should not necessarily be seen as a "cost" of investing in governance or other types of infrastructure. Rather, intra- and inter-industry FDI flows among countries facilitate specialization in production along the same lines as intra- and inter-industry trade. Such specialization, itself, can be a source of improved productivity and real economic growth in host economies.

Our results are subject to a number of caveats. In addition to the statistical problems discussed above, it is possible that the parsimonious specification adopted might result in omitted variable bias. Our specification relies heavily on GDP as a control variable, and further research on the relationship between market size and other possible determinants of FDI is warranted.

Another caveat is that the geographical unit of analysis is the nation-state. In fact, the influence of infrastructure on the location decisions of MNCs might be more geographically circumscribed. For example, MNCs in the electronics sector will likely have strong preferences to locate in specific regions of the United States regardless of the availability of infrastructure in other regions. In this case, infrastructure comparisons will likely be circumscribed to the few regions that enjoy other necessary pre-conditions.[33] The availability of infrastructure data at the national level dictates the geographical level of analysis. Whether the results would be significantly different if it were possible to carry out the analysis at subnational levels is uncertain.

NOTES

1. For a broader survey of the literature see Brunetti (1997).

2. The impact of FDI on host country efficiency arises from spillover productivity gains. A summary of available evidence on this phenomenon is provided in Blomstrom, Kokko, and Globerman (2001).

3. A focus on FDI flows rather than stocks reflects the fact that FDI data are widely available only for flows.

4. Dunning (1993) offers an extensive review of empirical studies of the determinants of FDI. Globerman and Shapiro (1999) provide an updated literature review with particular emphasis on the influence of government policies.

5. Available studies also identify the specific impact of government "corruption" on FDI flows. See, for example, Wei (2000).

6. See, for example, Nahapiet and Ghoshal (1998), Pennings, Lee, and van Witteloostuijn (1998); Putnam (1995) and Sparrowe, Liden, Wayne, and Kraimer (2001).

7. The data are available at: http://www.worldbank.org/wbi/governance/datasets.htm#dataset. Further detail is provided in Kaufmann *et al.* (1999a) (Appendix A) and Table 1 of this study. The full set of variables employed in this study and their sources are presented in Table 2.

8. We did collect data on physical infrastructure, but these variables were typically highly correlated with GDP/capita. These measures are discussed below.

9. Kaufmann *et al.* (1999b) suggest that their governance measures are important causal determinants of development outcomes, including GDP/capita and health status.

10. The indices are all reported in their original scales, and these scales are also used in the regression analysis. But, the results are robust to scale transformations, including logarithmic. The ESI is derived from 22 subindices, a number too large for individual analysis.

11. GII was also measured as the sum of the six underlying indices. The correlation coefficient between this measure and the first principal component that we employ is 0.99.

12. Dunning (1993) identifies an exhaustive list of such variables and also discusses empirical evidence regarding their importance. For additional summaries of available evidence, see Caves (1996) and Globerman and Shapiro (1999).

13. Some studies identify a near perfect positive correlation between FDI and GDP across host countries. See, for example, Morisset's (2000) study of African countries.

14. The various sources of agglomeration (or external) economies are discussed in Krugman (1991).

15. Altomonte (2000) references several studies that provide ambivalent findings on the relationship between labor costs and the geographical distribution of FDI.

16. The presumption is that a country will fix its currency against the major currency (or currencies) in which its trade and investment flows are most heavily concentrated. As such, if currency volatility discourages FDI flows, countries operating fixed exchange rate regimes should be characterized by more FDI than those operating floating rate regimes, all other things constant.

17. The data sources for unreported variables and the unreported results are available from the authors.

18. See, for example, Cheng and Kwan (2000); Kumar (1996); Loree and Guisinger (1995); Mody and Srinivasan (1998); Wheeler and Mody (1992); Zhao and Zhu (2000).

19. These results are available from the authors on request.

20. This is more likely to be true for developed than for developing countries. In particular, marked short-run changes in the "political" environment surrounding FDI have been identified for certain African countries (Morisset, 2000).

21. This is not however always the case. In specifications that include other explanatory variables, the elasticity is at times less than unity. The latter findings further support the use of FDI, rather than FDI/GDP, as the preferred specification of the dependent variable.

22. Similar interactive terms were estimated for the other variables (ESI and HDI), but none were statistically significant.

23. To be sure, the EDUC variable can also be interpreted as a conventional human capital variable.

24. For a discussion of this concern, as well as empirical evidence for Asian MNCs, see Erramilli, Agarwal, and Kim (1997) and Zhao and Zhu (2000).

25. There is a potential variable measurement problem, since the ESI index is measured for the year 2000. It seems unlikely to us however that the values of this variable changed substantially between, say, the mid-1990s and 2000. Moreover, this finding is broadly consistent with those of Smarzynska and Wei (2001) and Wheeler (2001).

26. There is no notion implied here that FDI is necessarily good while FDO is bad for a country. Both flows contribute to an increased specialization of international production that should improve real incomes internationally.

27. This argument is developed in Rugman (1990).

28. The sample size is reduced, since a number of countries recorded FDI but not FDO. This reduction allowed us to use a single sample with ESI in all estimates. Ln (FDI-FDO) was calculated by separating countries with net inflows and outflows, and assigning a negative value to the latter.

29. The point at which Ln GDP encourages capital outflows occurs where Ln GDP = 5.6 for the total sample, and Ln GDP = 8.2 for the sample of developing and transition economies. The respective means (standard deviations) are 10.4 (2.7) and 9.6 (1.6). In both cases it is only the very smallest economies for which improvements in governance do not result in capital outflows.

30. The results are complicated by the fact that some of the preferred specifications include an interactive term and some do not. In general, specifications for the total sample include interactive terms, while those for the sample of developing and transition economies do not.

31. This result is consistent with an interpretation suggested by Altomonte (2000). Namely, that the "quality" of a host country's legal framework is positively related to expected future rates of economic growth. Hence, FDI will be attracted to countries with higher quality legal frameworks because of the superior economic performance that those frameworks encourage. If the economic benefits of higher quality legal frameworks are subject to diminishing returns, the linkage between FDI and political governance might be nonlinear.

32. Thomsen (2000) discusses these and related objections to international investment.

33. The relevant notion here is that firms are attracted to regions that are home to "clusters" of firms engaged in the same or closely related activities. In the United States, firms engaged in micro-electronics-related activities are disproportionately located on the East and West Coasts.

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