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THE EFFECT OF POPULATION HEALTH ON FOREIGN DIRECT INVESTMENT

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ABSTRACT

We conduct a panel data analysis of 74 countries over 1980 –2000 to investigate whether population health affects foreign direct investment inflows. Our main finding is that health has a positive and significant effect on such inflows for low- and middle-income countries. This finding is consistent with the view that health is an integral component of human capital in developing countries.

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1. INTRODUCTION

As Ralph Waldo Emerson famously wrote in the 19th century, "Health is the first wealth". Sickness and disability constrain human capability and have a negative impact on welfare (Bloom, Canning, and Jamison, 2004). In addition to the importance of health as a consumption good, health can also be viewed as a form of human capital that enhances economic performance both for the individual and at the level of the macroeconomy.

Health affects economic performance through direct and indirect mechanisms (Bloom and Canning, 2000). It has a direct effect on workers' productivity because healthy workers are generally more physically and mentally robust than those afflicted with disease or disability and are less likely to be absent from work because of personal or household illness. Microeconomic analyses using anthropometric measures (such as onset of menarche, stature, and nutritional status) as well as indexes of morbidity, have consistently demonstrated that health affects earnings and productivity (Knaul, 1999; Ribero, 1999; Savedoff and Schultz, 2000; Schultz and Tansel, 1997).

Health can also affect economic performance through indirect mechanisms; for example, improved health can increase the return to other forms of human capital, such as education and worker experience. Healthier children have enhanced cognitive function and higher school attendance, allowing them to become better educated, higher earning adults (Bhargava, 2001). In addition, healthier workers, who have lower rates of absenteeism and longer life expectancies, acquire more job experience.

At the macroeconomic level, a substantial body of evidence has demonstrated that population health is a robust predictor of growth in per capita income (Barro, 1991; Bhargava *et*

al., 2001; Bloom, Canning, & Sevilla, 2004). However, countries may benefit to different degrees from health; Bhargava *et al*. (2001) argue that economic growth resulting from health improvements is more pronounced in developing countries than in industrial countries.

Health, viewed as a form of human capital, could affect foreign direct investment (FDI) through several mechanisms.[1] The World Health Organization's Commission on Macroeconomics and Health (2001) suggests that a healthy workforce is important when attracting foreign direct investment due to the effect of health on worker productivity. In addition, for fear of endangering their own health and that of their expatriate staff, foreign investors may shun areas where disease is rampant and where access to health care is limited.[2]

A classic instance of disease interfering with investment was during the building of the Panama Canal. Yellow fever and other pathogens claimed the lives of 10,000 to 20,000 workers between 1882 and 1888, forcing Ferdinand de Lesseps and the French to abandon the construction project (Jones, 1990). More recently, the outbreak of Severe Acute Respiratory Syndrome (SARS) has exemplified how disease, or even the fear of disease, can dampen investment: FDI inflows into mainland China declined by US$2.7 billion during 2003 (Business Daily Update, 2003). Similarly, FDI inflows to Hong Kong fell 62% in one quarter (Tam, 2003). These trends quickly reversed once the outbreak was controlled, but they suggest that lengthier epidemics, such as HIV/AIDS or malaria, could have severe, long-term effects on FDI.[3]

Even though circumstantial evidence suggests a link between health and FDI, empirical findings are noticeably absent. The gap in the literature is not without consequence. While other sources of capital market flows and official development assistance to developing countries have steadily declined, FDI has continued to rise and now represents the largest component of net resource flows to developing countries (Miyamoto, 2003). In addition to providing employment

opportunities and financial capital, FDI can generate positive externalities, such as transferring technology and skills and increasing access to global markets (Lim, 2001; UNCTAD, 2003).

These potential benefits are particularly relevant for developing countries and many are actively seeking to attract greater FDI inflows. Many countries have already implemented business facilitation measures, created investment promotion agencies, and liberalized their investment frameworks (Asiedu and Lien, 2004; UNCTAD, 1998). One consequence of the convergence of national FDI policies is that it has become more difficult for a country to distinguish itself based on economic policy alone (UNCTAD, 1998). In this paper we investigate the role of population health as a possible factor that encourages inflows of FDI.[4]

The remainder of the paper is organized as follows: Section 2 describes the theory of FDI and the empirical model used in the analysis, Section 3 details the data used and our sources, Section 4 presents our empirical results, and Section 5 concludes. To the best of our knowledge, this represents the first empirical investigation evaluating whether health directly affects, *ceteris paribus*, FDI.[5]

2. THE MODEL

Firms invest abroad instead of, say, exporting or licensing to a local company, to satisfy one of two strategic objectives. They may seek to better serve the local market, producing locally to avoid transportation costs, trade barriers, or production delays, and speed information flow; this is market-seeking or horizontal FDI. Alternatively, they may seek to produce for the global market but select this location to minimize production costs through lower-cost inputs; this is export-oriented or vertical FDI (Shatz and Venables, 2000).

Following Asiedu (2002) and Blonigen and Wang (2004), we conjecture that horizontal FDI will be driven largely by domestic demand (market size). Local production allows a firm to avoid transportation costs and import duties, but this is only attractive if the domestic market is sufficiently large to cover the fixed costs of setting up production and any country-specific cost disadvantages. Investigators have traditionally found that host market size, usually measured in terms of real gross domestic product (GDP) per capita and population size, is a positive determinant of FDI inflows (Chakrabarti, 2001; Schneider and Frey, 1985; Wheeler and Mody, 1992). By contrast, *ceteris paribus,* vertical FDI will flow to countries that possess cheap, productive inputs and have the fewest restrictions on trade. The presence of highly educated healthy workers, available at low wages, may be a large inducement for vertical FDI.

We model the gross level of FDI inflows at time t in country i as follows:

$$\log FDI_{it} = a + \boldsymbol{\alpha} \log Pop_{it} + \boldsymbol{\beta} \log GDP\ per\ cap_{it} + \boldsymbol{\theta}\ Health_{it} + \boldsymbol{\mu} \log Edu_{it} + \boldsymbol{\gamma}\, \boldsymbol{X}_{it} + D_t + \boldsymbol{\varepsilon}_{it},$$

where Pop is total population and $\boldsymbol{X}$ represents a set of control variables. We include time dummies, D_t, to capture changes in the volume of global international investment flows, and $\boldsymbol{\varepsilon}$ represents the error term.

Our FDI measure is gross inflows. Many researchers use other measures, for example, net inflows, but we prefer gross inflows for two reasons. First, this measure seems more appropriate for investigating the incentives for foreign businesses to invest in a particular country. Second, in terms of knowledge spillovers, which may be a central benefit of FDI, it is the gross inflows that matter and not net inflows.

Population and GDP per capita can be considered as scale variables that capture market size effects. However, GDP per capita can also be thought of as a proxy for labor costs (assuming a fairly fixed share of labor income in total GDP). The coefficient on GDP per capita should therefore be interpreted with caution, because it may reflect both a market size and a cost effect. The literature commonly normalizes FDI flows by dividing by some scale variable, for example, population or GDP. We prefer not to impose a particular normalization or scale factor, instead estimating a relationship. Our log formulation allows for normalization by population or GDP as special cases. For example, in the case of population we can transform our equation as follows:

$$\log (FDI/Pop)_{it} = a + (\alpha\text{-}1) \log Pop_{it} + \beta \log GDP\ per\ cap_{it} + \theta\ Health_{it} + \mu \log Edu_{it} + \gamma X_{it} + D_t + \varepsilon_{it}.$$

It follows that we can test if normalizing by population is a valid method of measuring the scale effect by estimating the original equation and testing the restriction that $\alpha = 1$. A coefficient on population different from unity suggests that a simple normalization achieved by dividing FDI by population does not fully capture the scale effect of population size. Similarly, normalizing FDI by total GDP gives an equation with a coefficient of $\alpha - 1$ on log population and $\beta - 1$ on log GDP per capita, without changing any of the other coefficients.

At a given level of labor costs, proxied in our model by GDP per capita, our theory suggests that countries with higher levels of education and health should have more productive workers and should be more attractive to foreign investors. We use life expectancy at birth to proxy the health of a country's population. We would prefer a measure of health that explicitly accounts not only for mortality rates, but also for the morbidity effects of ill-health. However, Murray and Lopez (1996) demonstrate that higher life expectancy is associated with lower

morbidity and overall better health status. Furthermore, Shastry and Weil (2002) report that the survival rate of adult males is linearly related to adult male height, which is often used as a measure of health (human) capital. These findings establish a relationship between mortality and morbidity measurements.

Following Barro and Sala-i-Martin (1995), who argue that secondary schooling is the best measure of education for predicting economic growth, our educational stock measure is the log of the percentage of the population aged 25 or above who have completed secondary schooling (Cohen and Soto, 2001).

We follow the literature for the inclusion of other relevant control variables, including openness of the economy, infrastructure, quality of governance, and distance to major world markets. Openness of the economy to trade is especially important for firms seeking to export products from the host country to the global market, as tariffs, quotas, and other forms of capital controls will diminish firms' profits (Asiedu and Lien, 2004). Openness is required not only with respect to exports, but also for imports, because many FDI ventures may require the purchase of intermediate inputs from abroad. We employ the ratio of trade (imports + exports) to GDP as our measure of openness.

Governance is increasingly being identified as a key factor that firms evaluate when choosing to invest abroad (Gastanaga, Nugent and Pashamova, 1998; MIGA and Deloitte & Touche, 2002). In particular, the quality of bureaucratic institutions affects FDI inflows (Globerman and Shapiro, 2002; Stein and Daude, 2001). Wei (2000) finds that corruption has a strong negative impact on the location of FDI. We use Knack and Keefer (1995) indexes of bureaucratic quality and corruption in government.

Good infrastructure in the form of transportation and communication networks can increase firm productivity and help attract foreign investment. We employ telephone mainlines per 1,000 population as a proxy for host country infrastructure. However, this measure has its shortcomings, as it only accounts for the availability and not the reliability of the infrastructure, which may be particularly problematic in poor countries where support for infrastructure may be lacking (Asiedu, 2002).

We also investigate whether geography affects the distribution of FDI inflows. Transportation costs and distance from the home country are commonly included in gravity models of international investment and may affect a firm's decision about where to locate abroad (Brainard, 1997; Yigang, 2003). Although Hausmann and Fernández-Arias (2000) find that distance to major markets is not a robust FDI determinant, we include distance from major markets as a possible control variable in our analysis.

In addition, Gallup, Sachs and Mellinger (1999) argue that the economies of coastal regions, with their easy access to international trade through sea lanes, should outperform the economies of inland areas. While inland areas can access markets through rail or road links, these are often much more expensive forms of transportation. Thus we include a dummy variable for whether a country is landlocked with the stipulation that the country is not located in Western or Central Europe (countries in Western and Central Europe have close proximity to a major market and the absence of sea routes may not matter).

3. DATA

The empirical analysis employs panel data for a set of 74 countries observed over the last two decades. A list of countries used in the analysis is provided in Table 1. A summary of data sources and variable descriptions is provided in Table 2. We use all countries for which data are

available, but exclude major petroleum exporters, because for these countries our measure of openness (trade flows) may not reflect a lack of trade barriers, and GDP per capita is unlikely to proxy labor costs.[6]

[insert tables 1 and 2 about here]

The dependent variable, gross FDI inflows, is based on annual data averaged over each decade. We constructed gross FDI inflows using data from the *World Development Indicators* (World Bank, 2003). The *World Development Indicators* does not include data on gross inflows directly, but does provide data on total gross flows (the sum of gross inflows and gross outflows) and on net inflows (gross inflows minus gross outflows), from which gross inflows can be derived.[7]

All explanatory variables are taken at the beginning of the relevant time period.[8] Summary statistics for the full sample are presented in Table 3. The correlation coefficients for the full sample of 74 countries are presented in Table 4. Life expectancy ranks second only to GDP per capita in strength of raw correlation to log gross FDI inflows.

[insert tables 3 and 4 about here]

4. ESTIMATION AND RESULTS

Table 5 reports our panel data estimates for the full sample of 74 countries with up to two observations per country, one for 1980–90 and one for 1990–2000. All reported regressions

passed the Ramsey RESET test for model misspecification. In addition, we estimate heteroskedasticity-consistent standard errors.

[insert table 5 about here]

Column (1) of Table 5 reports results for an ordinary least squares specification that is representative of the FDI literature. The coefficients on income per capita and total population, our indicators of market size, are positive and strongly significant, and this remains true for all our specifications. Corruption is not significantly different from zero in our specifications, yet the other governance measure, quality of bureaucratic institutions, is both significant and positive in the model. Adding life expectancy in column (2) demonstrates that health is a statistically significant predictor of gross FDI inflows at the 1% level and is robust to adding education in column (3). The results indicate that every additional year of life expectancy increases FDI inflows by about 7% among the full sample of countries.

The other component of human capital, education, has a positive coefficient, but is not statistically significant. This finding is consistent with the conflicting evidence on the importance of education in determining inflows of FDI. Root and Ahmed (1979), as well as Schneider and Frey (1985), report that education does not significantly affect FDI flows to developing countries. More recently, however, Noorbakhsh and Paloni (2001) and Globerman and Shapiro (2002) argue that education does have a positive and significant impact on foreign investment and that its effect has been increasing over time. The reason for the poorly determined coefficient on secondary schooling in our model could be due to measurement error in the data on education that biases the estimated coefficient toward zero (see Krueger and

Lindahl, 2001). We also tried other measures of education, such as the number of accumulated years of education in the population aged 15–64 and school enrollment rates, but did not find any measure that produced a statistically significant effect.

We further test for robustness by adding infrastructure and geographic variables that are also postulated to be determinants of FDI inflows: including telephones as a proxy for infrastructure, a dummy variable for landlocked status and distance to major markets. The results reported in column (4) indicate that the coefficient on life expectancy is robust to these alternate specifications, though many of the controls do not themselves appear to be statistically significant.

Recent evidence suggests that pooling data from industrial and developing countries in empirical FDI studies may yield misleading coefficient estimates (Blonigen and Wang, 2004). We might expect that developing countries are more dependent on export-oriented, vertical FDI, while industrial countries are more attractive for market-seeking, horizontal FDI. Of particular relevance to the current study, we noted a gap in average life expectancy between income groups: 75.2 years for high-income countries versus 59.4 years for low- and middle-income countries. Diminishing returns to health might well make it a more important investment in low-income countries. We therefore analyze the model using two restricted samples, one of low- and middle-income countries and one of high-income countries selected on the basis of the World Bank's income classification.[9,10]

The results for low- and middle-income countries are reported in Table 6. The model being estimated in Table 6 is identical to that reported in Table 5, the only difference being the sample. The results are broadly similar to those in Table 5. The coefficient on openness is somewhat larger than before, which is consistent with foreign investment to developing countries

being mainly export-oriented. Life expectancy once again has a positive and statistically significant effect on FDI. The large decrease in the coefficient on GDP per capita when we add life expectancy to the model indicates that when health is excluded from the model, GDP per capita is, to some extent, serving as a proxy for health in low- and middle-income countries.

The effect of population health on FDI inflows is robust to adding education and other control variables. Our results suggest that every additional year of life expectancy leads to about a 9% increase in gross FDI flows to low- and middle-income countries.

[insert table 6 about here]

The index of corruption is now significant, but of the wrong sign. The results suggest that higher levels of corruption are associated with higher levels of FDI in low- and middle-income countries. This finding, although perhaps surprising, agrees with Stein and Daude's (2001) and Wheeler and Mody's (1992) results. It is also consistent with Alesina and Weder (1999), who argue that the relationship between corruption and economic performance is complicated. Some types of corruption may allow the relatively efficient provision of services to foreign firms, its main effect being on the distribution of domestic economic gains with little distortion of productive activities.

Table 7 uses the same specifications as Table 5 for a restricted sample of high-income countries. The sample size now becomes quite small and may lead to some variables becoming statistically insignificant simply because of a lack of power; therefore, these results should be treated with caution. Unlike the results reported from the previous two samples, openness, GDP per capita and bureaucratic quality are not statistically significant. The lack of significance of

openness is consistent with the theory that FDI going to industrial countries is mainly to access their markets rather than to export.

[insert table 7 about here]

Even though GDP per capita does not have a significant impact on FDI inflows, the other proxy of market size, total population, is highly significant at the 1 percent level. The lack of significance of GDP per capita could be due to a balancing of the market size effects with the cost of production effect, which tends to work in the opposite direction.

Reduced corruption does appear to have a positive and significant impact on FDI in this sample, indicating that the type of corruption, or the way it affects the economy, may differ between industrial and developing countries.

Most important from our point of view, health is not statistically significant in any specification among high-income countries. This is consistent with the view that the worker productivity effects of health differentials appear mainly in developing countries, although our caveat about the small sample size for the high-income countries should be noted here.

5. CONCLUSION

This paper provides empirical evidence that health is indeed a positive and statistically significant determinant of FDI inflows to low- and middle-income countries. These results are robust to adding control variables, such as education, infrastructure, and income per capita. By contrast, improved health does not appear to contribute significantly to the attractiveness of high-

income countries to foreign investors. Our findings support the results of Bhargava *et al.,* (2001), who find diminishing returns to health as a factor in economic growth. Our results are also consistent with those of Blonigen and Wang (2004), who argue that the underlying factors that determine the level of FDI activity vary systematically across countries at different stages of development.

Our main result is that a one-year improvement in life expectancy contributes to about a 9% increase in gross FDI inflows to low- and middle-income countries. Our findings are consistent with the literature that links health to increased worker productivity and suggest that the payoff to population health improvements should also include an elevated rate of FDI inflows.

Table 1. *List of countries*

High-income countries	***Low- and middle-income countries***	
Australia	Argentina	Madagascar
Austria	Bangladesh	Malawi
Belgium	Bolivia	Malaysia
Canada	Brazil	Mali
Cyprus	Bulgaria	Mexico
Denmark	Burkina Faso	Morocco
Finland	Cameroon	Mozambique
France	Chile	Nicaragua
Germany	China	Niger
Greece	Colombia	Panama
Ireland	Costa Rica	Paraguay
Italy	Dominican Republic	Peru
Japan	Ecuador	Philippines
Netherlands	El Salvador	Romania
New Zealand	Ethiopia	Senegal
Norway	Ghana	Sierra Leone
Portugal	Guatemala	South Africa
Singapore	Guyana	Sudan
Spain	Haiti	Tanzania
Sweden	Honduras	Thailand
Switzerland	Hungary	Tunisia
United Kingdom	India	Turkey
United States	Jamaica	Uganda
	Jordan	Uruguay
	Kenya	Zambia
		Zimbabwe

Table 2. *Variable definitions and sources*

Variable	Definition	Source
Log gross FDI inflows	Calculated from gross FDI (percentage of GDP), FDI, net inflows (percentage of GDP) and GDP (constant 1995 US$); see text for details	World Bank (2003)
Log total population	Population, total	World Bank (2003)
Log GDP per capita	GDP per capita, PPP (constant 1995 international $)	World Bank (2004)
Openness of economy	Sum of imports of goods and services (percentage of GDP) and exports of goods and services (percentage of GDP)	World Bank (2003)
Life expectancy	Life expectancy at birth, total (years)	World Bank (2003)
Telephones	Telephone mainlines (per 1000 population)	World Bank (2003)
Log education	Percentage of population aged 25 or over who have completed secondary education	Cohen and Soto (2001)
Bureaucratic quality	Index with 0–6 range, with higher values indicating "better" ratings	Knack and Keefer (1995)
Corruption in government	Index with 0–6 range, with higher values indicating "better" ratings	Knack and Keefer (1995)
Distance to major markets	The minimum Great-Circle (air) distance in 1000 kilometers from the country's capital city to the closest major port: New York, Rotterdam, or Tokyo	Gallup, Sachs and Mellinger (1999)
Landlocked	Indicator for landlocked country (1 if landlocked, zero otherwise), excluding countries in Western and Central Europe (Austria, the Czech Republic, Hungary, the Former Yugoslav Republic of Macedonia, Slovakia, and Switzerland)	Gallup, Sachs and Mellinger (1999)

PPP Purchasing power parity.

Table 3. *Summary statistics for the full sample (74 countries)*

Variable	Mean	Standard deviation	Minimum	Maximum
Log gross FDI inflows	24.453	2.833	17.859	30.371
Log total population	16.381	1.387	13.323	20.850
Log GDP per capita	8.415	1.145	6.168	10.192
Openness of economy	60.165	39.450	11.546	361.179
Bureaucratic quality	3.415	1.977	0	6
Corruption in government	3.613	1.872	0	6
Life expectancy	64.577	11.104	35.196	78.837
Log education	-2.561	1.316	-6.624	-0.580
Telephones	149.455	184.731	0.700	680.800
Distance to major markets	3.890	2.774	0.140	9.280
Landlocked	0.135	0.343	0	1

Table 4. *Correlation matrix for the full sample (74 countries)*

	Log gross FDI inflows	Log total population	Log GDP per capita	Openness of economy	Bureaucratic quality	Corruption in government	Life expectancy	Log education	Telephones	Distance to major markets	Landlocked
Log gross FDI inflows	1										
Log total population	0.398	1									
Log GDP per capita	0.813	0.029	1								
Openness of economy	0.105	-0.448	0.177	1							
Bureaucratic quality	0.718	0.169	0.743	0.165	1						
Corruption in government	0.592	0.055	0.644	0.227	0.864	1					
Life expectancy	0.811	0.096	0.901	0.207	0.598	0.572	1				
Log education	0.720	0.104	0.797	0.111	0.554	0.463	0.785	1			
Telephones	0.731	0.052	0.834	0.137	0.786	0.733	0.703	0.691	1		
Distance to major markets	-0.510	-0.154	-0.571	-0.147	-0.413	-0.325	-0.527	-0.470	-0.540	1	
Landlocked	-0.436	-0.179	-0.457	-0.077	-0.337	-0.231	-0.512	-0.405	-0.294	0.361	1

Table 5. *Full sample (74 countries)*
dependent variable: log gross FDI inflows

	(1)	(2)	(3)	(4)
Constant	-5.057**	-2.492	-1.187	-1.063
	(1.991)	(1.783)	(2.314)	(2.657)
Log total population in base year	0.840***	0.761***	0.756***	0.768***
	(0.116)	(0.095)	(0.093)	(0.093)
Log GDP per capita in base year	1.655***	0.970***	0.898***	0.785***
	(0.126)	(0.235)	(0.249)	(0.297)
Openness of economy in base year	0.009*	0.007**	0.007**	0.008***
	(0.005)	(0.003)	(0.003)	(0.003)
Bureaucratic quality	0.196*	0.324***	0.319***	0.381***
	(0.103)	(0.105)	(0.106)	(0.127)
Corruption in government	0.015	-0.057	-0.044	-0.171
	(0.106)	(0.100)	(0.099)	(0.114)
Life expectancy in base year		0.070***	0.065***	0.075***
		(0.022)	(0.022)	(0.024)
Log education in base year			0.120	0.110
			(0.154)	(0.125)
Telephones in base year				0.001
				(0.001)
Distance to major markets				0.018
				(0.043)
Landlocked				0.247
				(0.333)
Dummy 1990–2000	1.027***	0.921***	0.903***	0.751***
	(0.206)	(0.198)	(0.206)	(0.202)
Observations	137	137	137	130
Adjusted R-squared	0.85	0.86	0.86	0.86

Note: Heteroskedastic-consistent (White) standard errors are in parentheses.
* Significant at the 10% level.
** Significant at the 5% level.
*** Significant at the 1% level.

Table 6. *Low- and middle-income country sample (51 countries) dependent variable: log gross FDI inflows*

	(1)	(2)	(3)	(4)
Constant	-6.385**	-0.078	0.590	-2.112
	(3.017)	(3.017)	(3.280)	(3.723)
Log total population in base year	0.912***	0.685***	0.682***	0.739***
	(0.176)	(0.148)	(0.148)	(0.151)
Log GDP per capita in base year	1.654***	0.663**	0.643*	0.795*
	(0.162)	(0.329)	(0.332)	(0.439)
Openness of economy in base year	0.015**	0.009	0.009	0.014**
	(0.007)	(0.007)	(0.006)	(0.006)
Bureaucratic quality	0.311*	0.553***	0.538***	0.542***
	(0.167)	(0.146)	(0.153)	(0.165)
Corruption in government	-0.149	-0.343**	-0.320**	-0.360**
	(0.151)	(0.130)	(0.146)	(0.179)
Life expectancy in base year		0.093***	0.089***	0.091**
		(0.027)	(0.029)	(0.035)
Log education in base year			0.067	0.021
			(0.191)	(0.206)
Telephones in base year				-0.002
				(0.007)
Distance to major markets				0.036
				(0.081)
Landlocked				0.293
				(0.473)
Dummy 1990-2000	1.133***	0.949***	0.936***	0.869**
	(0.301)	(0.276)	(0.289)	(0.330)
Observations	90	90	90	86
Adjusted R-squared	0.71	0.74	0.73	0.72

Note: Heteroskedastic-consistent (White) standard errors are in parentheses.
* Significant at the 10% level.
** Significant at the 5% level.
*** Significant at the 1% level.

Table 7. *High–income country sample (23 countries)*
dependent variable: log gross FDI inflows

	(1)	(2)	(3)	(4)
Constant	1.298	0.378	-2.744	-1.409
	(6.173)	(9.971)	(11.346)	(11.443)
Log total population in base year	0.821***	0.822***	0.791***	0.848***
	(0.094)	(0.099)	(0.106)	(0.269)
Log GDP per capita in base year	0.952	0.921	1.238	1.527
	(0.700)	(0.749)	(1.093)	(1.004)
Openness of economy in base year	0.005	0.005	0.005	0.005
	(0.004)	(0.004)	(0.004)	(0.015)
Bureaucratic quality	0.180	0.196	0.174	0.101
	(0.204)	(0.260)	(0.249)	(0.280)
Corruption in government	0.235*	0.230	0.258	0.319**
	(0.137)	(0.151)	(0.161)	(0.134)
Life expectancy in base year		0.015	0.019	-0.066
		(0.124)	(0.124)	(0.116)
Log education in base year			-0.202	-0.513
			(0.303)	(0.312)
Telephones in base year				0.002
				(0.002)
Distance to major markets				(0.026)
				0.091
Landlocked				0
				0
Dummy 1990-2000	0.856***	0.832***	0.802***	0.719**
	(0.233)	(0.252)	(0.256)	(0.321)
Observations	45	45	45	43
Adjusted R-squared	0.84	0.84	0.84	0.80

Note: Heteroskedastic-consistent (White) standard errors are in parentheses.
* Significant at the 10% level.
** Significant at the 5% level.
*** Significant at the 1% level.

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NOTES

[1] Lucas (1990) conjectures that differences in human capital could account for the failure of international capital flows to equalize capital-labor ratios across countries.

[2] In addition to normal risks, foreign investors and their managerial staff may lack resistance to disease, either acquired or inherited, that the host country population enjoys. For example, a significant portion of the population in Africa carries the sickle cell trait. This condition confers protection from severe malaria and is much less common among European descendants (Pasvol, Weatherall, and Wilson, 1978).

[3] Indeed, preliminary evidence supports this hypothesis. A global business survey on HIV/AIDS sponsored by the World Economic Forum (Bloom *et al*., 2003) suggests that half of all business leaders in low-income countries believe HIV affects their country's access to FDI. Similarly, Gallup and Sachs (2001) conjecture that malaria deters FDI.

[4] The interest in human capital is partly attributable to recent trends in investment flows away from the primary goods sector toward the services sector, thereby increasing the demand for skilled labor inputs. Thus investigators have hypothesized that locations where the accumulated level of human capital is high may attract greater FDI inflows (Blomström and Kokko, 2003; Noorbakhsh and Paloni, 2001). However, most cross-country studies identify human capital narrowly with education, ignoring strong reasons for considering health as an integral component of worker productivity, and hence important for determining the distribution of FDI.

[5] Globerman and Shapiro (2002) do regress FDI on the human development index (HDI), which is a composite of the following: GDP per capita, educational literacy, and enrollment and life expectancy at birth. We directly investigate the effect of health on FDI.

[6] The 20 major petroleum producers are Algeria, Angola, Bahrain, Brunei Darussalam, Republic of Congo, Gabon, Indonesia, Islamic Republic of Iran, Iraq, Kuwait, Libyan Arab Jamahiriya, Nigeria, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, Trinidad and Tobago, United Arab Emirates, Venezuela, and Yemen (based on the classification by the United Nations Conference on Trade and Development—see http://www.unctad.org/Templates/WebFlyer.asp?intItemID=2162&lang=1).

[7] We calculated gross FDI inflows using the following two relationships:

gross FDI (% GDP) = gross inflows FDI (% GDP) + gross outflows FDI (% GDP)

and

net inflows FDI (%GDP) = gross inflows FDI (% GDP) – gross outflows FDI (% GDP)

Hence,

gross FDI inflows (% GDP) = [gross FDI (% GDP) + net inflows FDI (% GDP)] /2

We multiply this by GDP (constant 1995 US$) to obtain gross FDI inflows.

[8] Because data are not available for 1980, we used the earliest available data (usually around 1983 to 1987) for the index of corruption and quality of bureaucratic institutions for both time periods. Geographic and distance variables are constant.

[9] In the World Bank (2003) categorization, the low- and middle-income group (all developing economies) includes those countries in which the 2001 gross national income per capita was US $9,205 or less, as measured in current US dollars. The high-income economies are those in which the 2001 gross national income per capita was US $9,206 or more.

[10] For example, taking regression 1, the *F*-test (distributed as a chi-square (7, 121)) yields a statistic of 2.18, which leads us to reject the hypothesis that the coefficients reported in the two sub-samples are the same at the 5% significance level. We also reject the commonality of coefficients in regression specification 2, but cannot the null hypothesis of equality for regression specifications 3 and 4.