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The Distribution of Fixed Capital in the Multinational Firm

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Based on industry-level data for majority-owned U.S. foreign affiliates in 49 countries, this paper identifies the determinants of the cross-country distribution of fixed capital within multinational companies. Controlling for market size and trade openness, it is shown that U.S.-owned capital stocks are high in countries with a history of high profitability and low earnings variability. Similarly, the formation of fixed capital is encouraged in host countries with low variable costs, low political risks, and open trade regimes. At the same time, capital expenditures in the late 1990s appear to be insensitive to contemporaneous changes in risk and market shares, underlining investors' sluggish response to the changing characteristics of their host markets. These findings underline the importance of risk in deterring fixed capital expenditures in—and by implication capital flows to—developing countries. [JEL F21, D81]

Despite the high share of foreign direct investment (FDI) in private capital flows to developing countries—on average about 53 percent over the years 1995–2000—the uneven distribution of FDI across developing countries is still only poorly understood.[1] The period since the mid-1980s has witnessed the rapid liberalization of investment regimes, yet in many low income countries the

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[1]The average share is based on net long-term flows in World Bank (2000a and b).

response by foreign direct investors has been little more than lackluster.[2] In part as a result of this disappointing outcome, governments increasingly resort to costly investment incentives, either in the form of fiscal measures or by granting preferential access to their markets.

This paper examines the distribution of fixed capital expenditures by multinational companies, which provide insights into the determinants of investment decisions that are as important as those derived from the FDI flows that are almost exclusively studied in the empirical literature. The results demonstrate that country-specific risk, emanating from political uncertainty, plays a significant role in explaining the distribution of foreign investment activity. The paper thereby sheds some light on the potential role of multilateral agreements that render national investment regimes more predictable, as is currently being discussed within the World Trade Organization.

These findings represent an important extension of previous work on the geographic distribution of foreign direct investment, as existing theory of the multinational enterprise has not taken the effects of country risk into account. One strand of the literature postulates the conjunction of ownership-specific advantages, internalization benefits, and of certain location factors as necessary conditions for the presence of multinationals.[3] The second and more recent set of theoretical articles has integrated multinational firms in the general equilibrium theory of international trade under imperfect competition.[4] However, recent advances in the theory of investment that specifically model the effects of risk have not yet been incorporated. Inadequate theory is reflected in ambiguous empirical results. Schneider and Frey (1985), for instance, found a significant negative relationship between FDI flows and political instability as measured by the number of political strikes and riots. By contrast, Wheeler and Mody (1992) found that country risk variables are insignificant in explaining the country distribution of capital expenditures by U.S.-owned affiliates in a sample of 41 industrialized and developing countries. More recently, Wei (2000) confirmed the adverse effect of corruption on FDI, and Henisz (2000) examined the effect of political risk on the market entry mode of multinationals.

Empirical work in this area is relevant for a better understanding not only of private capital flows, but also of investment and growth in developing countries. Recent growth theory portrays foreign direct investment as a means of technology diffusion that enhances the variety of capital goods in the host economy, thereby lowering the investment costs for domestic investors and stimulating domestic investment and growth.[5] Private investment in developing countries has attracted considerable attention in the empirical literature.[6] However, it is rarely noted that in small developing countries foreign direct investment enterprises may account for a substantial share of corporate capital formation. The determinants of capital

[2]See, for instance, Emery and Spence (1999) for an account of how bureaucratic delays have held back FDI in Africa in the context of what on the surface appear to be liberal investment regimes.

[3]Dunning (1993).

[4]Markusen (1995).

[5]Barro and Sala-i-Martin (1995), and empirical studies in Borenzstein, De Gregorio, and Lee (1994) and Fry (1993).

[6]Blejer and Khan (1984) or Greene and Villanueva (1991).

expenditures by this important subgroup of investors is the subject of only two comparable empirical studies known to this author.[7]

I. Investment by U.S. Multinationals in Developing Countries

For an analysis of the effects of the host country policy environment—and more specifically of risk—on the investment activity of multinational companies, capital expenditures by foreign affiliates rather than FDI represent the relevant dependent variable. It is the formation of fixed, and in large part irreversible, capital that gauges the expansion of foreign-owned production capacity, and that is most likely to reflect the deterrent effects of an uncertain macroeconomic and regulatory environment in the host country.

Despite its importance for capital flows to and for domestic investment and growth in the host economy, only a handful of articles have attempted an empirical analysis. As is common in the research on the multinational enterprise, this is mainly due to a lack of sufficiently comprehensive data. The statistics on capital expenditures by majority-owned foreign affiliates (MoFAs) of U.S. companies published by the U.S. Commerce Department are the only comprehensive source for this variable (see the Appendix for data sources and definitions). By limiting the analysis to majority-owned foreign affiliates, several alternative ways in which multinational companies access foreign markets are omitted. To the extent that host country risk induces, for instance, joint ventures or licensing, rather than operations in which the investor has managerial control, the effects found here will understate the impact of risk on multinational involvement.

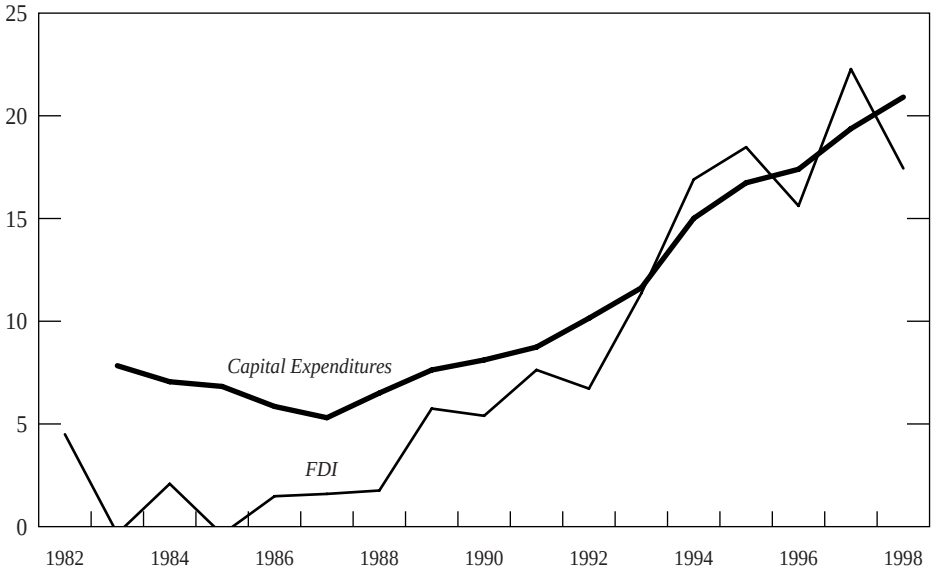
It is likely that the preoccupation in the literature with FDI flows has obscured many empirical relationships. Foreign direct investment represents the provision of capital—in the form of equity, debt, and reinvested earnings—from foreign investors to enterprises that they control but that are domiciled in the host country. FDI is, therefore, no more than a change in the intra-firm liabilities of the foreign affiliate's balance sheet. Such financing could be used for several purposes other than capital formation, such as the acquisition of existing enterprises, of intangible assets, or for trade finance.[8] The balance sheets of U.S. affiliates are indeed highly liquid, with net fixed capital accounting for no more than 17 percent of total assets.[9]

[7]Wheeler and Mody (1992) and Stevens (1994). Gross foreign direct investment inflows account for up to 30 percent of private investment in a number of developing countries. However, the relevant comparator would be capital formation in the corporate sector, which is typically between a third and one half of total private investment.

[8]UNCTAD (2000), however, notes that even if all corporate acquisitions in developing countries were financed through FDI, acquisitions would account for no more than 40 percent of total FDI flows to developing countries. Greenfield investment is therefore regarded as the predominant motive for FDI in developing countries.

[9]This surprisingly small ratio is for all industries and was calculated as the ratio of net property, plant and equipment over total assets net of equity investments in other affiliates. The ratio for world manufacturing affiliates is 28 percent. This figures includes fixed assets held by indirectly owned foreign affiliates, as long as the ultimate U.S. equity participation exceeds 50 percent. The ratio is higher in emerging markets at about 35 percent (based on Bureau of Economic Analysis Tables III B3 and III B1 "Balance Sheets of Affiliates," industry by account and country by account, 1998).

Figure 1. Alternative Measures of U.S. Affiliate Investment, 1982–98, 23 Developing Countries
*(in billions of U.S. dollars)**



*Capital expenditures are for majority-owned foreign affiliates only.
Source: U.S. Commerce Department.

Conversely, capital formation by the foreign affiliate need not necessarily be financed through the parent company. Other financing sources could be depreciation charges, capital markets in the host economy, or in third countries.

Figure 1 demonstrates that the correlation between the two variables is in no way perfect. Up to 1991, capital expenditures by U.S. MoFAs exceeded total U.S. FDI flows by a significant margin. In a number of years when FDI financing almost dried up entirely, U.S. foreign affiliates continued to invest, an observation that is also underlined by the country shares presented in Table 1. The concentration of capital expenditures within the five largest emerging markets is significantly larger for U.S. affiliates in the manufacturing sector. In sum, the magnitude of—and trends in—FDI flows to a country may differ substantially from capital expenditures by foreign affiliates located in that country.

II. Determinants of Affiliate Capital Expenditures

The Capital Allocation Process in the Multinational Firm

Like capital flows, the capital expenditures of foreign-owned affiliates are a function of both "supply" factors in investor countries and of factors specific to the recipient country. In a stylized view of the multinational firm's capital budgeting process, after-tax profits and the required dividend payout ratio determine the following

Table 1. Shares in U.S. FDI Outflows to and Capital Expenditures by Majority-Owned U.S. Affiliates

(in percent)

	1983–86		1995–98	
	CPX	FDI	CPX	FDI
20 OECD Countries	71.8	70.1	67.8	67.9
Sample of 23 Developing Countries	19.3	5.1	21.8	18.4
of which				
Argentina	0.8	0.4	1.5	1.4
Brazil	3.7	1.2	4.1	5.0
Mexico	1.7	–0.7	2.8	4.0
China	0.3	0.4	1.7	1.1
Malaysia	1.1	–0.5	1.7	0.5

Source: U.S. Commerce Department.

period's reinvested earnings. Once the debt-equity ratio is set for the entire multinational group, the funds available for capital expenditures are fully determined.[10]

This process would be consistent with the observation that the parent firm of a multinational company typically extends a guarantee for the liabilities of its foreign affiliates. In this case, the credit rating of the multinational firm is evaluated on the basis of its consolidated balance sheet—in particular the debt-equity ratio—which includes all assets and liabilities held by the foreign affiliates. To maintain what is in most cases a privileged credit rating, the parent firm will hence retain control over the financing and the asset expansion of its foreign affiliates. A number of empirical studies have confirmed that affiliate capital expenditures are indeed coordinated centrally by the parent firm, allowing only limited autonomy for individual affiliates: a fixed total investment volume is allocated across all existing foreign affiliates, based on the relative expected payouts in the various host countries.[11]

Based on this capital allocation process, it is assumed that gross affiliate capital expenditures in any one host country i are determined by two sets of variables: a vector of variables in U.S. and international markets $\boldsymbol{w}$, and a vector of host country variables $\boldsymbol{h}^i$. Let CPX^w denote gross world capital expenditures by U.S. majority-owned foreign affiliates (hence excluding investment in the U.S. home base) and CPX^i those in host country i. CPS^i, the share in world capital expenditures attracted by country i, is then defined by the following identity and will form one of the dependent variables in the empirical section below.

$$CPS^i = \frac{CPX^i[\boldsymbol{h}^i, \boldsymbol{w}]}{CPX^w[\boldsymbol{w}]} \tag{1}$$

[10]Feldstein (1994).

[11]Caves (1996).

Clearly, the above assumption is restrictive. By omitting the correlation between earnings in various host countries, this model will not be suitable to test the portfolio theory of foreign investment, on which, in any case, no consensus exists in the literature.[12] Another implication is that, due to the exogeneity of CPX^w, gains in the relative attractiveness of any one host country will come at the cost of all other hosts. Here, a number of empirical studies have shown that host countries indeed compete for inward investment: each country seeks to attract a larger share of some fixed world total *at the expense* of other host locations.[13]

Host Country Determinants

The share of capital expenditures attracted by the individual host country can be assumed to increase in expected profits and decrease in the expected variability of profits derived from this location. The ex-ante risk to returns is in large measure a function of country-specific risk—that is, the *subjective* probability assigned to certain adverse events that are at least partly under the control of the host country government. There are a number of issues surrounding the definition and measurement of country risk, some of which are reviewed further below. For the moment, consider the derivation of the desired capital stock and of desired net investment based on the capital allocation process outlined above.

Assume that there is zero covariance between assets in different countries. This assumption may be justified in so far as shocks to earnings are due to political risk, though it is more problematic for economic risk, which could spread to a number of countries within a region. The parent firm's utility function is increasing in world profits π_w and decreasing in their variance, denoted with σ_w^2. Under the above assumptions utility is separable in the utilities derived from the individual host countries and the portfolio allocation problem simplifies to:

$$\underset{K^i}{Max}\, U\left(\pi_w, \sigma_w^2\right) = \sum_i U\left(\pi_i, \sigma_w^2\right), \tag{2}$$

$$\text{where } \pi_w = \sum_i \pi^i\left(K^i\right) \text{ and } \sigma_w^2 = \sum_i \left(\frac{K^i}{K^w}\right)^2 \sigma_i^2$$

$$\text{subject to } K_t^w = \sum_i K_t^i = (1-\delta)K_{t-1}^w + CPX^w[w], \tag{3}$$

where δ denotes the depreciation rate of fixed capital. If affiliate operations exhibit constant returns to scale, the desired net capital stock $\bar{K}_t^i$ in host country i will be proportional to the world market share s of the host location: s would be limited by the size of the host market where trade barriers are high, but could be significantly larger where affiliate sales are directed to export markets. The scaling function f

[12]Agmon and Lessard (1977) argue that multinational companies serve as tools for diversification, a finding that is disputed in Jacquillat and Solnik (1978).

[13]Guisinger and Associates (1985) and Wheeler and Mody (1992).

would be increasing in relative expected profits, and decreasing in ex-ante risk *v*, each measured relative to the world average:

$$\overline{K}_t^i = f\left[\frac{E\left(\pi_{t+1}^i\right)}{E\left(\pi_{t+1}^w\right)}, \left(\frac{v^i}{v^w}\right)\right] s^i K^w, \quad \text{with} \quad \partial f/\partial \pi_i > 0 \quad \text{and} \quad \partial f/\partial v_i < 0. \tag{4}$$

If risk and return were the same for all countries, desired capital stocks would be distributed in line with market shares: $f(1,1) = 1$. Desired capital stocks will deviate from this distribution given by market shares to the extent that a country exhibits expected returns or risks different from the world average.

If, in response to changing host country attributes, capital stocks adjust fully to the steady state as represented by equation (4), desired *net* investment in an individual host location will be:

$$\bar{I}^i = \frac{d}{dt}\overline{K}^i = s^i f^i \dot{K}^w + \dot{f}^i s^i K^w + \dot{s}^i f^i K^w. \tag{5}$$

The first term reflects the familiar supply side effects from the investor country investment cycle in which country *i* participates in line with its market share and risk-return characteristics. In addition, the investor will reallocate capital towards those host locations whose market shares grow—for instance due to trade liberalization—and to those whose risk-return characteristics become more attractive relative to the rest of the world. Therefore, the implication of equation (5) is that apart from variables that control for the levels of risk, profitability, and market shares, the empirical specification should also include *changes* in the risk-return characteristics and growth in market shares. This is a consideration that is typically absent from cross-country analyses of foreign direct investment flows.

Multinational investment will react only sluggishly to changing host country attributes and market growth, due to the considerable lags that are inherent in the approval and implementation of foreign investment projects. However, it is expected that over the four-year period for which the dependent variable will be averaged these changes will have worked through.

While equation (4) is based solely on the standard risk averse utility function, the effects of country risk may be especially pronounced where the fixed investment of foreign affiliates is irreversible—the investment can only be liquidated at considerable cost—but could be delayed to a later point in time. If the investor delays his investment by one period, he loses the returns on his project during that time but gains the option of doing what is right in the subsequent period, having observed the outcome of an uncertain macroeconomic and regulatory environment. In this case, the cost of investment at an earlier point is the sum of sunk costs and the option value of waiting. Investment in any one location may therefore be more sensitive to risk than would be suggested by the usual portfolio approach.

It is likely that the real option theory of investment has some relevance in the case of direct investors' fixed capital expenditures. Following an investment approval by the host country authorities, the implementation of investment is often delayed for many years. Moreover, direct investment in developing countries—where country risk is particularly prominent—is predominantly market seeking:

in the case of U.S. affiliates, the share of sales directed to host country markets is about two-thirds. Host country markets, however, can usually be accessed through exports to unaffiliated parties, or through a simple wholesale operation. While this may be less profitable, and impede many of the learning effects associated with a commercial establishment in a foreign market, this alternative market access route would only require a much lower fixed capital expenditure and would be subject to much lower uncertainty. Changes to trade regimes are, for the most part, governed by the provisions entered into under the auspices of the WTO, which also offers recourse against noncomplying parties. It is this dichotomy in the risks associated with alternative market access modes that will render market-seeking direct investment especially sensitive to host country risk.[14] Whether this is merely due to higher costs of capital or to a real option effect can only be determined by examining the risk sensitivity of investment in sectors that are typically associated with a large degree of irreversibility.

III. Empirical Analysis

The Data

The sample comprises 49 host countries for which comprehensive data have been disclosed by the U.S. Commerce Department. These countries accounted for 94 percent of total world capital spending in 1995–98 and can be considered the principal "investment universe" of U.S. multinational companies.

Three dependent variables are examined: (i) *PPQS*, the host country's share in the net value of world property, plant, and equipment on the balance sheets of U.S. majority-owned affiliates (here, as in all "world" totals, excluding the U.S. home base); (ii) *CPNS*, the country share in net capital formation; and (iii) *CPS*, the host country's share in *gross* capital expenditures. All three dependent variables were averaged over the period 1995–98. While the cross-country regressions reported below will therefore omit any potentially interesting within-country effects, averaging the dependent variables opens up greater sector-level detail. For CPS, the country shares in U.S. gross capital formation, a total of 405 observations were available in nine industrial sectors. Pooling the observations is also sensible in economic terms, as the cross-country distribution of capital expenditures is independent across sectors (affiliates in different sectors are managed by different parent firms—in other words, holding firms that would simultaneously expand assets in several sectors are the exception among U.S. firms).

The right-hand-side variables need to control for risk, profitability, and market shares, and for this purpose, two alternative approaches are employed. First, profitability and variability in returns can be measured directly through the measures for return on sales (*ROS*, or operating margin) and its variability. However, observed profitability may itself be a function of risk. To avoid potential collinearity effects, a second set of regressions therefore includes a proxy for the variable costs of affiliate operations: *WAGR* is the wage rate paid by U.S. affiliates.

[14]See Lehmann (1999) for a more detailed model.

In principle, the market shares of U.S. affiliates in any one country could be measured through their share in total world sales of U.S. affiliates. As this would introduce an endogenous variable on the right-hand side, host country market size is proxied through the host country share in world income (*GDPS*).

Yet, scale economies may also arise through sales directed to markets outside the host economy. The host economy's openness to international trade will be measured through two alternative variables: an index developed by the IMF that measures the restrictiveness of the tariff and non-tariff barriers on a scale of 1–10 (10 being the most restrictive); and the more conventional measure of trade intensity, defined as the sum of imports and exports over GDP (variable *OPN*). In the regressions of gross capital formation, a more sector-specific openness variable can be included: the share of affiliate sales directed to the local host country market (denoted *SL*). While *SL* may potentially contain information from other explanatory variables, most notably the relative wage rate and country risk, a regression of *SL* on these two variables did not produce significant coefficients. Finally, in the regressions of the gross investment shares *CPS*, depreciation will be controlled for by including the previous period's stock of fixed capital, again in proportion to the world total (*PPQS*). Except for the risk variables and relative wage rates, all variables have been lagged by one period to avoid potential endogeneity problems (see the Appendix for data sources).

Measurement and Predictive Power of Country Risk Ratings

Among the control variables, a key issue will be the measurement of country risk and the interpretation of its effects. Country risk is a subjective concept and is inherently difficult to measure. A common approach is to average the rankings assigned by international consultancy firms for individual aspects of the political and regulatory environment. These indices can be rightly criticized for being slightly removed from the reality in the individual country, which could be more readily evaluated through surveys of those involved in local business. However, these drawbacks are compensated for by the greater comparability across countries and the availability of a longer time series. The index of political risk that will be used here (denoted *PRISK*) is from the International Country Risk Guide (ICRG) that aggregates 13 aspects of the political, legal, and regulatory environment. ICRG also publishes indices of financial and economic risk, though these are highly correlated with those for political risk.[15] The ICRG indices are the most comprehensive and among the longest running.

Given the rapid decline in expropriations of foreign-owned assets, international investors are now mainly concerned with the stability of earnings. The empirical literature now focuses on the effects of so-called "regulatory takings" and of corruption that are inherent in the often highly discretionary investment policies in developing countries. Foreign affiliate earnings could be affected by unexpected revisions of a contract entered into with the host country government, or through more subtle regulatory changes, new taxation, and the loss of intellectual property

[15]See Lehmann (1999) for factors underlying these indices.

Table 2. Bivariate Regression Coefficients of Standardized Variability in Returns on Risk Indices[1]

	ROA			*ROS*		
	Coeff.	*t*-Stat.	R^2	Coeff.	*t*-Stat.	R^2
Political Risk	–0.02	–2.52	0.12	–0.08	–2.02	0.08
Economic Risk	–0.06	–3.42	0.20	–0.25	–2.30	0.10
Financial Risk	–0.03	–2.69	0.14	–0.14	–2.05	0.08

[1]Results of a bivariate regression with constant term. The dependent variable is computed as the standard deviation of return on sales (assets) over the arithmetic average over the period 1983–98 in a sample of 48 countries. The right-hand-side variables are the values of the three risk variables in 1983.

rights protection. Corruption at the level of the local bureaucracy, of course, impedes the day-to-day operations of both foreign- and domestically owned enterprises, but may bias the market access decision of foreign firms away from a wholly owned subsidiary, the subset of affiliates covered in the dependent variables.

It is, of course, questionable whether subjective ex-ante risk assessments by commercial providers indeed predict future variability in the earnings of foreign investors. To examine this issue, earnings variability was computed as the standardized variability in return on sales and return on assets. Table 2 lists the results of bivariate regressions on the three risk measures. While the coefficients for all three risk indices are significant and negative as expected, the overall fit of all three regressions is low (20 percent at most). Still, the fact that these risk indices are widely used in the assessment of individual investment locations, nevertheless justifies including them in the regressions below.

Regression Results

Fixed capital stocks

In a first step, the cross-country distribution of net fixed capital stocks is estimated, based on equation (4). For the basic sample of 49 countries, a history of earnings observations going back to 1983 is available, and relative profitability and risk have been proxied through the average levels of and variability in operating margins over the period 1983–94. All variables are in logs, and three countries with negative average earnings have been excluded.

Regression 1 shows that, after controlling for relative market size, historical profitability has a positive effect, and historical variability in returns has a negative effect on the host country's share in net fixed capital. This result can also be obtained, once the observed variability in returns is replaced by the average historical rating for political risk (regression 2, higher values of *PRISK* representing *lower* risk). If the variability of returns is also included in regression 2, this variable does not yield a significant coefficient. Similar results hold when a proxy for the restrictiveness of the trade policy regime is included: as expected, after controlling for all other determinants of capital stocks, more open markets attract

Table 3. Regression Results for the Distribution of Net Fixed Capital Stocks, 1995–98 (*t* ratios under the coefficient estimates)

Dependent Variable: log(*PPQS*9598) 46 observations	1	2	3
log(*ROS*8394)	0.993*** 2.920	0.743*** 3.348	0.709*** 3.261
log(*VARROS*8394)	–0.379** –2.313		
log(*GDPS*)	0.709*** 5.537	0.728*** 6.238	0.778*** 7.480
log(*PRISK*)		3.689*** 3.635	2.712*** 3.260
Trade restr. index			–0.249*** –3.710
R^2	0.540	0.584	0.666

a larger share of the fixed capital within multinational corporations (regression 3). Regression 3 is robust to the inclusion of an alternative measure of trade openness (the trade intensity) and to the inclusion of an alternative profitability measure (*ROA*, the return on assets).

Country shares in world net investment

Data for the book values of net investment stocks are, of course, plagued by the well-known valuation problems, which are likely to obscure the effects of past profitability and risk; this may explain why the results in Table 3 could not be replicated for individual industrial sectors. Moreover, expectations may not be stationary: while past earnings variability may deter foreign capital formation, perceptions may change in the context of regulatory reform in the host country. Hence, an analysis of flows—rather than stocks—is more likely to pick up investors' sensitivity to changing host country attributes.

For the moment, ignore the last two terms in equation (5). Once changes in host country market shares and in risk return attributes are left out, dividing the equation by world net investment results in an equation that explains country shares in *net* fixed capital formation (the dependent variable *CPNS*). The functional specification for this variable is now the same as that used in Table 3.

For the purposes of a comparison, regression 3 from the table above was run for the country share in fixed capital (*PPQS*) and for *CPNS*. Table 4 shows that, with the exception of the profitability measure *ROS*, all coefficient estimates for *CPNS* lie within half a standard deviation of those for the previous regression. This simply

Table 4. Regression Results for Country Shares in Net Capital and in Net Capital Formation, 1995–98 (*t* ratios under the coefficient estimates)

Dependent Variable	log *PPQS*9598	log *CPNS*9598	log *CPNS*9598
Independent Variables			
log(*ROS*9194)	0.468**	0.352*	0.361*
	2.389	1.983	1.779
log(*PRISK*94)	2.561**	2.269**	2.110*
	2.469	2.035	1.692
log(*GDPS*9194)	0.759***	0.724***	0.739***
	6.297	6.371	6.309
*OPN*94	0.005***	0.005***	0.005**
	4.064	4.494	2.664
*PRISK*98–*PRISK*95			0.010
			0.534
*OPN*9598–*OPN*9194			0.002
			0.292
*ROS*9598–*ROS*9194			–0.015
			–0.226
No. of observations	48	47	46
R^2	0.614	0.601	0.600

reflects the high correlation between the cross-country distribution of net capital expenditures and the distribution of net fixed capital in the previous period—on average, about 88 percent in the 1990s. Still, changes in host country attributes and growth in market shares may be important determinants of capital expenditures. To test for this, changes in the political risk rating, the change in profitability, and the change in trade openness were included in regression 3. None of these variables yielded a significant coefficient, even when they were included individually.

The unresponsiveness of net capital expenditures to the changing host-country attributes—in particular, to the changing profitability and to the improvements in country risk—is, of course, at odds with equation (4), support for which was found in the regressions presented in Table 3. This apparent contradiction may be reconciled in one of two ways. Firstly, regressing average investment on the difference in profitability in two four-year periods may not adequately pick up the lag structure with which multinational companies react to changing performance in the various host countries. Indeed, there is evidence that investors have continued foreign investments that have proved unprofitable for a long time.[16] Secondly, the

[16]Gestrin, Knight, and Rugman (2000).

apparent insensitivity to attribute changes may be evidence that past stocks of fixed capital determine future profitability, along the lines suggested by Markusen (1990) who hypothesized that direct investment may be self perpetuating due to a reduction in the variable costs of production. This should, however, ultimately show in the profitability measures that would justify continued investment. Both explanations would call for a more in-depth time series analysis.

Sector-specific regressions

Finally, the U.S. data can be exploited at the level of individual industrial sectors. As depreciation charges are only available in aggregate for all industries, the dependent variable is now *CPS*—the country share in gross investment—and the depreciation effects are controlled for through the inclusion of the lagged stock of fixed investment on the right hand side. Now a log linear form is no longer sensible, and all variables are included in linear terms.

Regression 1 in Table 5 reports the results of the regression that pools the observations from the nine industrial sectors, with common coefficients for all five independent variables and a common intercept. Trade openness is now proxied through the lagged sector-specific share of local sales (*SL*9194*j*, with the suffix *j* indicating a sector-specific variable). Significance and signs of the regression results are as before, though due to the different specification, coefficient values cannot be compared. To avoid potential collinearity effects (between risk, profitability, and export shares) regression 2 again proxies openness through the lagged trade share, and host country costs through the wage rate paid by U.S. affiliates. Interestingly, this specification yields a significant coefficient for financial risk (*FRISK*), though not for economic risk (*ERISK*; see regressions 2 b and c). Once sector-specific coefficients are allowed for the lagged capital stock, coefficient estimates are largely unchanged, and the overall fit is improved. Lastly, regression 4 tests whether the effects of host country risk differ by industry. Of the nine coefficients only one is significant, and hence no evidence for differential effects of risk between "footloose" industries and those with high degrees of irreversibility emerges, as would be suggested by the real options theory of investment.

IV. Conclusions

Capital formation—rather than capital acquisition—is the one aspect of multinational companies' activities that is most likely to confer the benefits commonly sought by capital importers. Using cross-country capital expenditure data, this paper identified determinants of foreign investment that have greater relevance to multinational activity than those resulting from more commonly conducted empirical studies of foreign direct investment flows. Whereas the former represents a long-term investment decision, FDI represents a financial flow that is a function of numerous financial variables.

In essence, affiliate capital formation could be explained on the basis of a traditional portfolio allocation model. Past profitability or low wage costs show the expected positive effect; host countries that are perceived as politically risky

Table 5. Regression Results for Country Shares in Gross Capital Formation, 1995–98

Dependent Variable: *CPSj*	1		2 a		b		c		3		4	
	Coeff.	*t*-Statistic	Coeff.	*t*-Statistic	Coeff.	*t*-Statistic	Coeff.	*t*-Statistic	Coeff.	*t*-Statistic	Coeff.	*t*-Statistic
*GDPS*9194	0.129	2.753***	0.134	3.361***	0.135	3.274***	0.133	3.196***	0.121	3.158***	0.133	3.337***
*SL*9194*j*	–0.004	–1.869*										
*OPN*9194			0.003	2.962***	0.003	3.095***	0.003	2.875***	0.003	2.642***	0.003	2.995***
*ROA*9194*j*	0.006	2.002**										
*WAGR*9598			–0.306	–2.724***	–0.271	–2.440**	–0.287	–2.514**	–0.323	–2.924***	–0.308	–2.730***
*PRISK*9598	0.007	2.853***	0.003	1.969**								
*ERISK*9598					0.005	1.578						
*FRISK*9598							0.005	1.682*				
*PPQS*9194*j*	0.765	18.860***	0.799	18.843***	0.800	18.700***	0.800	18.779***				
Chemicals									0.767	13.435***		
Transportation									0.876	8.008***		
Electronics									0.800	6.953***		
Equipment									0.943	4.351***		
Food									0.848	15.588***		
Metals									0.465	1.517		
Petroleum									0.729	25.913***		
Services									0.919	9.815***		
Wholesale Trade									0.802	13.508***		
*PRISK*9598												
Chemicals											0.003	1.358
Transportation											0.004	1.045
Electronics											0.003	0.906
Equipment											0.007	1.529
Food											0.004	1.813*
Metals											0.002	0.139
Petroleum											0.001	0.665
Services											0.006	1.476
Wholesale Trade											0.003	1.494
R-squared	0.789		0.797		0.797		0.797		0.835		0.798	
Number of observations	322		402		402		402		402		402	

deter capital formation. While it is clear that commercially disseminated country risk ratings have little power in predicting future earnings variability, the results presented here suggest that such perceptions are indeed relevant in driving actual investment decisions. By contrast, the improvements in such risk ratings over recent years have yet to translate into investment decisions. This suggests that investors' initial negative perceptions take a long time to overcome, even though the justification for such risk perceptions in terms of future earnings variability is questionable at best. On the other hand, a small domestic market need not be an impediment to foreign investment where open trade regimes allow foreign affiliates to access international markets. While trade barriers are often thought to raise the return on capital—and in many cases are designed to attract such capital—the positive effect of open markets on foreign investment is still present when only domestic wage costs, risk, and host country market size are controlled for.

Using detailed industry-level affiliate data, this study was able therefore to confirm a number of hypotheses for multinational investors, which often account for an important share of corporate fixed investment in developing countries. The effects of regulatory risk on fixed investment are already well established in the empirical literature on private investment, but have not been conclusively demonstrated in empirical studies of FDI flows. Consistent investor-side data on affiliate operations in a large country sample are hard to come by—the U.S. dataset is unique in its coverage and time span—but a rich set of issues awaits further empirical research.

The adverse effect of country risk that has been confirmed here comes against the background of an unprecedented liberalization of investment regimes in developing countries. The fact that crude perceptions of political and regulatory uncertainty continue to deter fixed capital formation may lend added impetus to the ongoing multilateral efforts to make national investment regimes more transparent and predictable.

APPENDIX

Data Definitions and Data Sources

The derived variables are defined as follows, based on the data series provided by the Bureau of Economic Analysis (BEA) at the U.S. Commerce Department, as listed further below:

Country share in net capital formation: $$CPNS_t^i = \frac{CPX_t^i - DEP_t^i}{CPX_t^w - DEP_t^w}$$

Profit margin: $$ROS = \frac{NIND_t}{SLS_t^i}$$

Return on assets: $$ROA_t = \frac{NIN_t}{AST_t^i}$$

Share of affiliate sales to local market: $$SL = \frac{LSL}{SLS}$$

Wage rate: $$WAGR = \frac{WAG}{EMP}$$

Published figures for net income (*NIN*) include indirectly owned foreign affiliates. As sales (*SLS*) are for directly owned affiliates only, income had to be corrected to *NIND* to compute *ROS*.

For all variables the numerical suffixes indicate the period over which the variable has been averaged, for example, 8394 for 1983 to 1994.

All BEA data have been downloaded from http://www.bea.doc.gov/bea/uguide.htm#_1_24.

Affiliate data refer only to the majority-owned non-bank affiliates of non-bank U.S. parents and all data items refer to the entire affiliate, that is, including assets held by and income accruing to host country residents or third parties. All flow data are reported in current U.S. dollars, converted at the average exchange rate.

Variable Name	Definition	Source
CPX	Gross capital expenditures	*Capital Expenditures by Affiliates*
DEP	Depreciation and depletion charges	*Income of Affiliates*
EMP	Number of employees	*Selected Data for Foreign Affiliates*
PPQ	Net property, plant, and equipment	*Balance Sheet of Affiliates, Country by Account*
LSL	Local sales	*Sales by Affiliates, Country of Affiliate by Destination*
NIN	Net income of affiliates. This is income after costs and expenses and foreign income taxes. It includes capital gains and losses (which are normally less than 1 percent) and other nonoperating items	*Income Statement of Affiliates*
NIND	*NIN* minus the sum of capital gains, income from equity investment in other affiliates, and income from other equity investment	*Income Statement of Affiliates*
SLS	Total sales of directly owned affiliates	*Sales by Affiliates, Country of Affiliate by Destination*
WAG	Compensation of Employees	*Selected Data for Foreign Affiliates*

Other variables were obtained from the following sources:

Variable Name	Definition	Source
ERISK	Economic risk rating for the month of January	ICR country risk ratings
PRISK	Political risk rating for the month of January	ICR country risk ratings
FRISK	Financial risk rating for the month of January	ICR country risk ratings
GDPS	Share in world income, country and world incomes measured at market prices in constant 1987 U.S. dollars	World Development Indicators

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