WP/99/133

INTERNATIONAL MONETARY FUND

Policy Development and Review Department

Country Risks and the Investment Activity of U.S. Multinationals in Developing Countries

Prepared by Alexander Lehmann[1]

Authorized for distribution by Robert Sharer

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IMF WORKING PAPER

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Abstract

This paper develops a simple real options model that demonstrates the role of country-specific risk and sunk costs in determining a multinational's choice between exports and foreign investment. The hypotheses from the model are tested for the distribution of capital expenditures by U.S.-owned foreign affiliates in 29 developing countries during 1984–95. Political and economic risk ratings are identified as deterrents to foreign capital formation; scale economies, unit wage differentials, trade openness, and agglomeration effects are found to be stimulating. These findings provide an additional rationale for a multilateral investment agreement that could function as an agency of restraint.

JEL Classification Numbers: F21, D81

Keywords: Foreign investment, investment under uncertainty

Author's E-Mail Address: alehmann@imf.org

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[1] This paper draws on various sections of my doctoral dissertation. Comments from Steve Bond, Valpy FitzGerald, Bronwyn Hall, Natalia Tamirisa, David Vines, Andrew Walter, and from participants in the Gorman Seminar at Nuffield College are gratefully acknowledged. Data work has been greatly assisted by Raymond Mataloni of the Bureau of Economic Analysis at the U.S. Commerce Department. Mary Jo Marquez provided outstanding editorial assistance. All errors and omissions are of course my own.

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I. INTRODUCTION

Despite the high share of foreign direct investment (FDI) in private capital flows to developing countries—on average about 54 percent over the years 1995–98—the uneven distribution of FDI across developing countries is still only poorly understood.[2] The period since the mid-1980s has witnessed the rapid liberalization of investment regimes, yet in many low income countries the response by foreign direct investors has been little more than lackluster.[3] In part as a result of this disappointing outcome, governments increasingly resort to costly investment incentives, either in the form fiscal measures or by granting competition-reducing exclusivity.

This paper finds that country-specific risk, emanating from political and macroeconomic uncertainty, plays a significant role in explaining the distribution of foreign investment activity. It thereby sheds some light on the potential role of a multilateral investment agreement, an agenda item for the upcoming world trade round. By locking in a certain set of investment policies, such a treaty could overcome the inability of national governments to credibly signal a commitment to such policies; the investment agreement would act as an "agency of restraint."

These findings represent an important extension of previous work on the locational determinants of foreign investment, as the 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.[4] The second and more recent set of theoretical articles has integrated multinational firms in the general equilibrium theory of international trade under imperfect competition.[5] However, recent advances in the theory of investment, which would allow to assess 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) find 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.

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[2] The average share is based on net long-term flows in World Bank (1999).

[3] 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.

[4] Dunning (1993).

[5] See Markusen (1995) for a survey.

This paper will address these shortcomings by first developing a simple real options model of a multinational company seeking access to a market through exports or through sales of a local subsidiary (in Section 2). In the model tariffs are known with certainty; taxes on local production are subject to policy risk. These assumptions reflect a real-world dichotomy between the two principal modes of market access open to multinational companies. Variations in tariffs are usually constrained through the World Trade Organization (WTO) schedules of most-favored-nation tariffs. Investment policy, by contrast, is largely within the autonomy of national governments and hence subject to political risk. The model leads to intuitive conclusions regarding the need for policy credibility as a precondition for investment liberalization to show the desired effect. Section 3 then presents capital expenditures by foreign affiliates as the appropriate variable for empirical purposes. The United States is the only country that provides comprehensive data on the foreign capital expenditures of its multinationals, and Section 3 also sketches some salient differences to the more commonly used FDI figures. The hypotheses that are derived in Section 2 are then tested in Section 4, using panel data on industry-level capital expenditures of majority-owned U.S. foreign affiliates in 29 developing countries over the years 1984–95. In the light of the ongoing discussion about international investment rules, Section 5 concludes by reviewing some of the implications for international investment disciplines.

II. Market Access Decisions Under Imperfectly Credible Investment Liberalization

Neoclassical investment theory predicts that firms invest once prices rise above long-run average costs and exit the industry once prices falls below average variable costs.[6] In practice, prices rise above significantly higher "hurdle rates" before firms consider investing. Modern investment theory therefore stresses the importance of uncertain returns, irreversibility and delayability of the investment project.[7] 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. The cost of investment at an earlier point is the sum of sunk costs and the option value of waiting.

This so-called real option theory has been tested with some success in the context of domestic investment.[8] An application to the investment activity of foreign-owned firms has not been undertaken so far. This is surprising, given that capital expenditures by foreign-owned firms are primarily financed by—and a motivation for—the financial flow that is

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[6] Tobin (1969).

[7] Dixit and Pindyck (1995).

[8] See, for instance, Servén and Solimano (1992).

recorded as "FDI." Moreover, the theory's assumptions are particularly relevant in oligopolistic industries that are characteristic for the emergence of multinationals. By virtue of its market power the multinational is in a position to wait—often for years—between the approval and the implementation of any given project. Upon investing the multinational commits considerable sunk costs and, compared to domestic investors, is likely to be exposed to several additional sources of risk, as for instance currency fluctuations or regulations specific to foreign firms. Even though multinational firms have significant risk diversification and risk management capabilities at their disposal, the rationale of the real options approach will apply irrespective of the investor's risk preferences.

Local production and exports as alternative market access modes

In the model below exports to and local production in a foreign market are assumed to be alternative modes of market access. This assumption is justified by the high share of local sales in the total sales of U.S. foreign affiliates in developing countries, a ratio that amounted to about two-thirds in 1994.[9] Also, profits from exporting are assumed to be risk-free and above the returns from risk-free financial assets in the multinational corporation's (MNC) home market; the return on capital employed for exports therefore constitutes the relevant alternative to local production in the host market. In addition it is assumed that MNCs operate in imperfectly competitive markets where costs and returns are unaffected by the MNC's decision to delay the investment; a partial equilibrium analysis will therefore suffice.

Demand and market structure in the host economy

Further assume that home and host markets are segmented so that production decisions in the two markets can be considered independently. The MNC contests a foreign market either through exports or local sales; demand in the foreign market is defined by the inverse demand curve $p(x) = a - bx$ and assume there is no threat of market entry by local firms. The multinational firm operates at constant variable costs c in both the firm's home country and in the host economy. Exports are shipped at constant costs τ (for tariffs and transport) and the firm operates with firm-specific fixed costs F and plant-specific fixed costs G. By building a plant in the host economy the investor incurs sunk costs: G is a nonrecoverable entry cost. The investment policy is defined by a tax on local production, δ,

[9] The average was computed for the 25 largest developing countries, based on U.S. Department of Commerce (1994), Table III.F.13. The high share of local market sales of U.S. foreign affiliates contrasts with that of Japanese foreign affiliates which are highly integrated in the international production chains of their parent firms and in 1995 exported nearly 75 percent back to the Japanese home market (Kumar, 1996).

which at its original level is sufficiently high to discourage local investment and make profits from exporting exceed profits from producing locally:

$$\pi^i - G = x(p(x) - c - \delta) - G < \pi^e = x(p(x) - c - \tau)$$

where π^i and π^e denote variable profits (i.e., before fixed costs) of investment and exports respectively. The necessary condition for profit maximization $\delta\pi^i/\delta x=0$ yields an equivalent condition for the above inequality of profits:

$$\frac{1}{4b}(a-c-\tau)^2 > \frac{1}{4b}(a-c-\delta)^2 - G \qquad (1)$$

Therefore, under complete certainty about the market access regime (defined in the parameters δ and τ) FDI becomes more likely where plant-specific fixed costs G are low. With the above parameter restrictions $\partial\pi^e/\partial\tau=-(a-c-\tau)/2b<0$ and higher tariffs will make local production more likely.

Policy liberalization and uncertainty

Now assume that the host country government has embarked upon investment liberalization and abolished the production tax from the beginning of period 0 (it set $\delta=0$). Further assume that the abolition of the tax was sufficient to raise profits from local production above those from exports: $\pi_0^i = (a-c)^2/4b - G > \pi^e(\tau)$; profits from lower variable costs of local production now outweigh the extra plant-specific fixed costs G. In period 0 the foreign firm thus faces the choice of investing in the foreign market. Still, foreign investors attach a (subjective) probability q to the potential reintroduction of the tax at the original level in period 1. This probability is exogenous, so it is independent from other developments within the host economy. At first, the assumption that the tax on local production is either "on or off" appears arbitrary, however it corresponds closely to the dichotomous nature of many investment restrictions. A performance requirement is either binding or it is not. A ban on investment in upstream activities increases variable costs; its abolition puts foreign affiliates on an equal footing with local firms.

Let π^i_{1l} denote the operating profits in period 1 from investment under the restrictive investment regime and π^i_{1h} those under policy liberalization:

$$\pi_1^i = \begin{cases} \pi_{1l}^i = \frac{1}{4b}(a-c-\delta)^2 \text{ with probability q} \\ \pi_{1h}^i = \pi_0^i = \frac{1}{4b}(a-c)^2 \text{ with probability 1 - q} \end{cases} \qquad (2)$$

Whereas future returns on investment are hence uncertain, exports always yield a risk free profit (the left-hand side of 1). Based on our earlier assumption in equation 1 we can restate the inequality for profits as $\pi^i_{1l}<\pi^e<\pi^i_{1h}$. Throughout this section parameter restrictions

(derived from permissible ranges for x) apply: a-c'>0, where c'=c+τ in the case of exports and c'=c+δ for local production.

The investor's decision process

Now consider the investor's decision problem. If the investment opportunity is only available in period 0 the investor will simply compute the expected value of operating profits discounted to period 0.[10]

$$V_0 = \pi_0^i + [q\pi_{1l}^i + (1-q)\pi_{1h}^i]\sum_{t=1}^{\infty}\frac{1}{(1+r)^t}$$

$$V_0 = \pi_0^i + [q\pi_{1l}^i + (1-q)\pi_{1h}^i]\frac{1}{r} \qquad (3)$$

Clearly, in this case the investor will only commit his capital in period 0, if the expected profits from investing now (net of investment costs) exceed the present discounted value of all future profits from exporting; he will continue to export otherwise. Now assume that the investment is delayable and that the same investment opportunity exists in period 1. By continuing to export and waiting to take the right decision in period one, the multinational will forego higher period 0 returns on investment. He will however gain information about the eventual state of policy and take the optimal decision once all uncertainty is resolved. By committing his capital in period 0 he foregoes this opportunity and incurs an additional cost that is equal to the value of the option to invest. The relevant decision rule will hence have to compare the expected present value from investing in period 0 to the expected profits from doing what's best in period one. Given a realization of tax policy and corresponding profits from investment π^i_1 the profits discounted to period one will be:

$$V_1 = \sum_{t=0}^{\infty}\frac{\pi_1^i}{(1+r)^t} = \pi_1^i\frac{1+r}{r} \qquad (4)$$

with π^i_1 taking the two realizations specified in (2). The continuation value (i.e., the present value of all future profits from taking the optimal decision in 1) in period 1 terms is:

$$F_1 = \max[V_1 - G, \pi^e\frac{1+r}{r}]$$

Under the above assumptions, the firm will undertake the investment in period one if the liberal investment regime persists (V_1-G exceeds discounted profits from exports) but will

[10] The following derivation uses the notation and terminology of Dixit and Pindyck (1994).

continue to export if the tax is reintroduced. The expected value of F_1 based on information in period 0 is simply the probability weighted average:

$$E_0[F_1] = (1-q)(\pi^i_{1h}\frac{1+r}{r} - G) + q\pi^e\frac{1+r}{r} \tag{5}$$

The multinational will only invest in period 0 if the net expected present value of investing now exceeds that of the discounted expected continuation value plus profits from continued exports in period 0:

$$V_0 - G > \frac{1}{1+r}E_0[F_1] + \pi^e \tag{6}$$

Substituting from 3 and 5 and bearing in mind that investment profits in period 0 equal those in period 1 under a liberal investment regime this yields a necessary and sufficient condition for investment in period 0:

$$\pi^i_0 + \frac{1}{r}[q\pi^i_{1l} + (1-q)\pi^i_{1h}] - G > \frac{1-q}{1+r}[\pi^i_{1h}\frac{1+r}{r} - G] + \frac{q}{1+r}\frac{1+r}{r}\pi^e + \pi^e$$

$$\pi^i_{1h} - \pi^e > G[1 - \frac{1-q}{1+r}] + \frac{q}{r}(\pi^e - \pi^i_{1l}) \tag{7}$$

This inequality compares profits and investment costs in period 0 terms and has an intuitive interpretation. The left hand side shows additional period 0 profits, which represent the gain from investing right away. Investment at that point is only efficient if $\pi^i_0 = \pi^i_{1h}$ outweighs the extra costs of bringing investment forward. These costs are represented on the right hand side. The first term shows the costs from investing now (for certain) rather than in period 1 with probability 1-q; the second term shows the costs from foregoing profits from exports for the smaller profits from investment in a restrictive regime with probability q in all future periods from period 1.

Liberalization, sunk costs and policy credibility

Based on this simple model, what is the relationship between the magnitude of investment liberalization and the need for credibility? Inequality 7 turns into an equation for values of q* and δ at which an investor will just invest right away in period 0. Substituting from 2 and taking total differentials yields:

$$\frac{dq^*}{d\delta} = -\frac{\frac{q^*}{r}\frac{a-c-\delta}{2b}}{\left(\frac{G}{1+r} + \frac{\pi^e - \pi^i_{1l}}{r}\right)} < 0$$

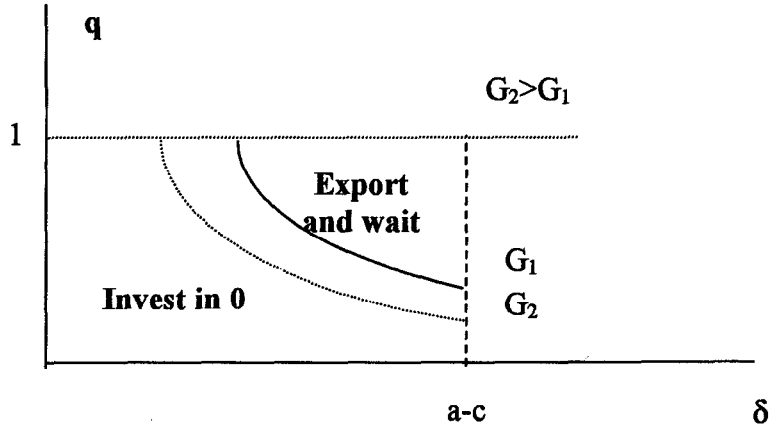
With the given parameter restrictions (a-c-δ>0) and the assumption of $\pi^e > \pi^i_{11}$, the derivative dq*/dδ is unambiguously negative. Denoting the denominator as D>0 we get

$$\frac{d^2q^*}{d\delta^2} = \frac{q^*}{2br}\frac{D + \frac{(a-c-\delta)^2}{2br}}{D^2} > 0$$

as D'=dD/dδ=(a-c-δ)/2br>0. The relationship between q* and δ can therefore be depicted as in Figure 1. The right hand side of 7—representing the expected value of the cost of bringing investment forward—increases in the probability q (of this being a mistaken decision) and in δ, the potential wedge between marginal costs in the exporting and investment modes. To the northeast of the line in Figure 1 the firm will continue to export and delay investment, to the southwest it will invest right away.

The downward slope of this line shows that the larger the size of the potential reversal to a restrictive investment regime (i.e., the more ambitious the initial reform), the more need there is to create an environment of policy credibility. Conversely, given some initial reform (and magnitude of potential reversal), the more credible policy environment is more likely to elicit the desired investment response. The right hand side of 7 also increases in G for which the curve in Figure 1 shifts downward: given some initial reform, larger firm-specific sunk costs require a more credible policy environment.

Figure 1: Market Access Decisions with Exogenous Policy Uncertainty



This simple model demonstrates a straightforward trade-off between the magnitude of potential investment restrictions and the need for policy credibility. The structure of the model only depends on the relative size of profits under exports and investment in the liberal

and restrictive regimes. The conclusions therefore also hold in the more general case in which the initial investment tax is only partially abolished.

III. U.S. Investment Activity in Developing Countries: Affiliate Capital Expenditures and FDI Financing

Ideally, an empirical analysis of the effects of risk on foreign investment activity would use total foreign capital expenditures within a host economy as a dependent variable. Such data would correspond to our fixed investment variable G in the above model and, as a component of private corporate investment, would also allow to detect an important determinant of economic growth. However, as national accounts do not normally record capital expenditures by foreign-owned firms, FDI figures from the national balance of payments statistics are typically used as a proxy for foreign investment activity. Such a substitution could be highly misleading: capital expenditures represent changes in the fixed assets of foreign affiliates; FDI flows, by contrast, merely record the provision of finance from foreign investors to host country firms in which they hold a certain minimum equity share.

Data published by the U.S. Commerce Department on the operations of U.S. multinationals are the only comprehensive source for foreign capital expenditures in developing countries (see Appendix I for data sources and definitions). Capital expenditure data have been collected since the mid 1950s and, following revisions in 1982 and 1989, now cover about 30 developing countries and 15 industrial sectors.[11] As part of the operational statistics, capital expenditure data are only recorded for majority-owned foreign affiliates (MOFAs), that is, those affiliates which are unambiguously controlled by U.S. residents. Data for U.S. outward FDI, on the other hand, cover the entire universe of U.S. affiliates and, consequently, no direct comparison between the two series is possible. Still, Blomstrom (1990) showed that majority-owned affiliates account for the largest part of U.S. direct investment in developing countries and the two series are plotted in Figure 2. Up to 1991 capital expenditures by U.S. MOFAs exceeded total U.S. FDI flows by a wide margin. In a number of years when FDI financing almost dried up entirely, U.S. foreign affiliates continued to invest.

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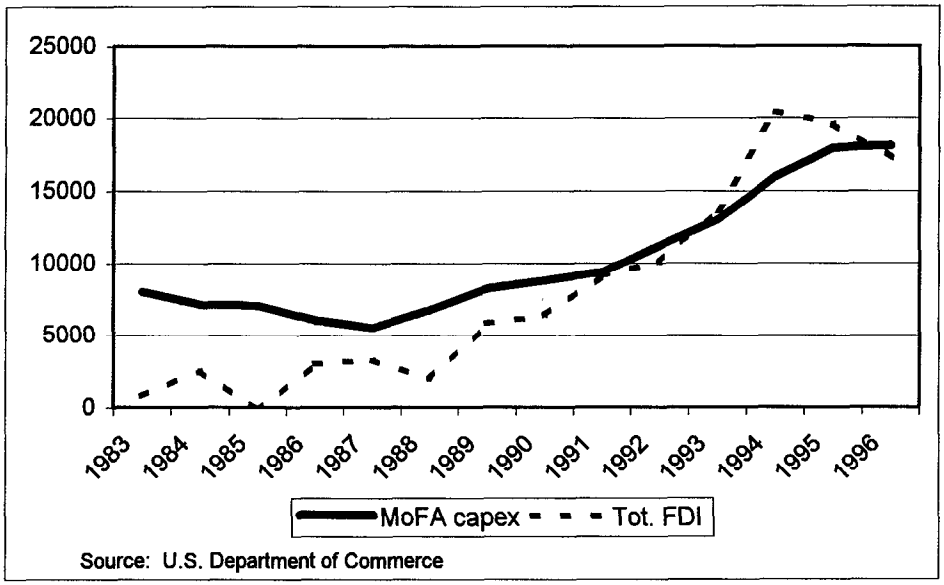
[11] Capital expenditures in the BEA statistics record "all expenditures that are charged to capital accounts and are made to acquire, add to, or improve property, plant, and equipment," This hence represents *gross* investment (Fahim-Nader, 1994).

Figure 2. Alternative Measures of U.S. Affiliate Investment, 1983–96, 19 Developing Countries
(in millions of US$)



This difference comes as no surprise, given that FDI and capital expenditures overlap only partially. Foreign direct investment is spent on several purposes other than capital formation by affiliates, as, for instance, the acquisition of existing enterprises, of intangible assets or for the financing of inter-company trade flows. Non-FDI sources of finance for capital expenditures (i.e., outside the parent-affiliate financial relationship) lie in home or host country debt markets, and in international capital markets. The data in Table 1 below indeed show that residents in Brazil and Mexico—the two most significant developing country hosts to U.S. outward investment—hold assets in local U.S. affiliates on a scale commensurate with that for U.S. foreign investment overall, 48 percent in the case of Brazil and 42 percent in Mexico. As for the world average, most of these assets are held as debt instruments; equity is heavily concentrated in the hands of U.S. parents which appear unwilling to share control over their operations with local investors. For both Brazil and Mexico, a notable difference to the world average is the low share of funds from countries other than the United States and the host country. Despite ongoing financial liberalization in both Brazil and Mexico, third

Table 1. External Financial Position of Majority-Owned Foreign Affiliates of U.S. Nonbank Companies in 1994
(Origin of funds in percent) 1/

	External Funds			
	Total	Current Liabilities and long-term debt	Owners' equity excluding retained earnings	Receivables & financial investments
All Countries				
All Industries, $million	1,539.042	1,152,655	386,387	736,132
U.S. parents	27	14	67	13
Other U.S. persons	2	3	0	2
Persons in affiliate's country of location	48	58	20	56
Other foreign persons	23	26	13	29
Manufacturing, $million	361,651	248,135	113,516	167,733
U.S. parents	31	15	66	10
Other U.S. parents	1	2	0	1
Persons in affiliate's country of location	50	63	23	62
Other foreign persons	18	21	10	26
Brazil				
All industries, $million	22,218	12,390	9,828	7,814
U.S. parents	45	16	81	6
Other U.S. persons	1	2	0	0
Persons in affiliate's country of location	48	72	16	82
Other foreign persons	7	10	3	12
Manufacturing, $million	15,399	7,828	7,572	5,011
U.S. parents	46	15	78	8
Other U.S. persons	1	2	0	1
Persons in affiliate's country of location	45	70	20	77
Other foreign persons	8	13	3	15
Mexico				
All industries, $million	20,090	13,425	6,665	8,585
U.S. parents	46	29	81	17
Other U.S. persons	5	7	0	2
Persons in affiliate's country of location	42	57	13	72
Other foreign persons	7	7	6	10
Manufacturing, $million	12,699	7,968	4,731	4,426
U.S. parents	50	32	79	30
Other U.S. persons	6	10	..	3
Persons in affiliate's country of location	37	51	14	55
Other foreign persons	7	7	6	13

1/ U.S. Department of Commerce (1994 Benchmark Survey), Tables III.C 1, III.C 7. External funds exclude MOFA retained earning; this table therefore relates to financing that is not internally generated.

country financing does not yet figure prominently in the assets of U.S. affiliates in these countries.

This evidence suggests that the magnitude of—and trends in—FDI flows to a country may differ substantially from capital expenditures by foreign affiliates located in that country. The following section therefore limits the analysis to the distribution of capital expenditures by U.S. foreign affiliates.

IV. The Risk Sensitivity of Capital Expenditures by U.S.-Owned Affiliates

Empirical studies on the determinants of capital flows show that flows to any one country are a function of both "supply" factors in investor countries and of country-specific factors.[12] Similarly, we assume that total capital formation by U.S. foreign affiliates in any one host country i depends on two sets of variables: a vector of variables in U.S. and international markets $\mathbf{w}$, and a vector of host country variables $\mathbf{h}^i$.

We denote total world capital expenditures by U.S. majority-owned foreign affiliates (MOFAs) as CPX^w, and host country i's relative share in this total investment as CPS^i. For the purposes of estimation, a homothetic structure for U.S. capital expenditures in country i (CPX^i) is assumed:

$$CPX^i[\mathbf{h}^i, \mathbf{w}] = CPS[\mathbf{h}^i]CPX^w[\mathbf{w}] \qquad (8)$$

with

$$CPS_t^i \equiv \frac{CPX_t^i}{CPX_t^w}$$

Hence, we assume that, given unchanged country attributes $\mathbf{h}^i$, variations in total U.S. foreign capital formation will affect U.S. investment in individual countries equi-proportionally. By only estimating the effects of host country variables on country investment shares CPS^i, spurious effects due to trends in overall U.S. investment can be omitted.[13]

Multinational companies enjoy privileged access to international capital markets. The risk rating of credit extended to multinationals is evaluated on the basis of their consolidated

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[12] Calvo, Leiderman, and Reinhart (1993).

[13] Elsewhere it was shown that the real effective dollar exchange rate, the U.S. real interest rate and the lagged average return on capital of foreign affiliates are significant determinants of overall trends in U.S. foreign capital formation (Lehmann, 1999).

balance sheets, including all assets and liabilities held by their foreign affiliates. To maintain the standard of that rating, the parent firm will hence retain control over the financing operations of its foreign affiliates; world financing and investment decisions remain centralized at headquarters. The above assumption of homotheticity hence reflects this idea of allocation of some fixed world total investment across foreign affiliates.[14] Indeed, this assumption is supported by a number of empirical studies which have shown that developing countries compete for inward investment. Guisinger and Associates (1985) found that the countries in their sample tailored incentives to attract individual projects. Wheeler and Mody (1992) also refer to so-called "location tournaments" between potential host countries. Each country seeks to attract a larger share of some world total at the expense of other host locations.

A. Model Specification

To determine a sensible functional form for estimation, first assume that earnings expectations and risks are the same all over the world. Host country i with share $GDPS^i$ in world income will attract $CPS_t^i = (GDPS_t^i)^{\alpha_1}$, that is for $\alpha_1=1$ we expect capital expenditures to be distributed evenly according to market size. In the estimation below we will keep α_1 unconstrained and expect to find $\alpha_1>1$, due to scale economies that make larger markets relatively more attractive. In practice, a country will deviate from this pattern to the extent that expected returns and risk make it more or less attractive *relative* to the rest of the world outside the United States. In the function f in equation 9 below country i's share in total U.S. foreign capital formation depends positively on relative expected per unit profits (denoted by π) and negatively on some measure of ex ante risk (denoted by σ):

$$CPS_t^i = \lambda^i f\left[\frac{E_t(\pi_{t+1}^i)}{E_t(\pi_{t+1}^w)}, \sigma_t^i\right](GDPS_t^i)^{\alpha_1} \qquad (9)$$

Clearly, this specification omits a number of policy related variables, most notably the restrictiveness of the investment regime. A country-specific intercept λ^i will, however, pick up fixed effects due to investment barriers. The risk variable could be measured in two ways, either based on the variability of past actual returns, or by means of some subjective assessment of the probability of certain future events. Data on the profitability of foreign affiliates are highly unreliable, both because of the questionable quality of disclosed earnings, and because of the conceptual difficulties involved in estimating the capital stock. Here the estimations will therefore utilize risk data from the *International Country Risk*

[14] This assumption is not necessarily at odds with the ongoing regionalization of multinational activity.

Guide, a publication which since 1984 provides monthly ratings of political, economic and financial risk for 134 countries (the methodology is summarized in Appendix II). While such risk ratings are a more accurate gauge of investor sentiment, they say nothing about the correlation of returns in various foreign markets, or whether any one market could serve as a hedge for the profits cycle in the U.S. home market. Hence, while any significance of the risk variable would be consistent with the real options theory set out in Section 2, it does not necessarily discriminate against a portfolio model.

It is assumed that expectations about future returns are formed in a myopic way, based on present returns. The estimated equation therefore fully specifies the principal determinants of affiliate profitability by including the following independent variables (see Appendix I for data sources and definitions):

Relative unit wage costs, WAGR, will measure the attractiveness of any one host country on the grounds of labor costs relative to all other investment locations *outside* the United States (increases in U.S. labor costs would raise world total capital expenditures, though not necessarily the distribution across foreign investment locations). World average unit wage costs have been constructed as an average of unit wage costs in the 10 largest investment locations, weighted with their 1990 U.S. manufacturing investment stocks. As this variable already incorporates a productivity measure, we need not include a skill variable. We expect a negative coefficient.

The country share in total U.S. outward investment stock, STK. Markusen (1990) modeled the self-reinforcing nature of foreign investment. Previous investment patterns might be perpetuated where FDI promotes specialized inputs, for instance in the form of country-specific intermediate inputs or skilled labor. STK is measured as the stock of the United States, rather than total international investment, to measure the effects specific to U.S. business.[15] This variable refers to *total* U.S. investment (it is therefore a broader measure than accumulated capital stocks), is lagged by one period and can therefore be assumed to be predetermined. We expect economies with a higher share of U.S. outward investment to attract a larger share of U.S. capital expenditures in the following year.

Trade openness dummy, TOPD. Trade openness has been estimated as a relative measure through the residuals in a gravity type equation (see Appendix III). The country sample has been divided into four quartiles according to trade openness with the most open economy attributed the highest value on a scale of 1 to 4. This dummy will sufficiently obscure the specific numeric nature of the residual to allow an estimation whether more open economies are deemed more or less attractive for U.S.

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[15] A variable measuring the total current foreign investment stock has been found significant in Wheeler and Mody (1992).

capital formation. Given the aggregation over market seeking and efficiency seeking investment, the effect of this variable is ambiguous.

For the estimation, the function f in equation 9 will be represented by a first-order approximation that is linear in the natural logarithms of its arguments:

$$\ln CPS_t^i = \delta^i + \alpha_1 \ln GDPS_t^i + \alpha_2 \ln RISK_t^i + \alpha_3 \ln WAGR_t^i + \alpha_4 \ln STK_{t-1}^i + \alpha_5 TOPD_t^i + \varepsilon_t^i \quad (10)$$

where the variable ln(RISK) is a linear combination of the logs of political risk PRISK, economic risk ERISK and financial risk FRISK.

B. Estimation Results

Equation 10 was estimated for the 339 observations in our pooled dataset; observations with any one of the variables missing were excluded and the estimation procedure accounted for the unbalanced nature of the sample.[16] By normalizing over world wide U.S. capital expenditures we account for time-specific effects that are common across all countries; country-specific effects are captured in the intercepts δ^i for which we also assume cross-section heteroskedasticity. Clearly, we cannot detect the nature of the variance-covariance matrix and have therefore adopted White heteroskedasticity as the most general form: [17]

$$E[\varepsilon\varepsilon'] = \begin{bmatrix} \Omega_1 & & 0 \\ & \ddots & \\ 0 & & \Omega_{29} \end{bmatrix} \quad \text{, with } \Omega_i = \begin{bmatrix} \sigma_{i1}^2 & & 0 \\ & \ddots & \\ 0 & & \sigma_{i12}^2 \end{bmatrix}$$

Regressions for both total and manufacturing capital expenditures have been run with a high degree of statistical significance (adj. R^2 at 91 percent). However, before going into specifics we first verify our assumption of country-specific effects by testing the hypothesis that all intercepts (bar one) are zero:

$$H_0 : \delta^1 = \delta^2 = \cdots = \delta^{28} = 0.$$

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[16] Nine observations were missing for overall and 14 for manufacturing investment.

[17] The econometric software (Eviews 3.1) performed a weighted least squares estimation, which was found to be more efficient compared to OLS. The software estimated the standard errors in a first stage from a pooled OLS regression and then iterated to achieve convergence at the level of the fourth decimal point.

We reject H_0 with 99 percent confidence as the test statistic

$$F = \frac{[RRSS - URSS]/(N-1)}{URSS/(J-N-K)} > F_{0.99}(N-1, J-N-K),$$

holds for all regressions (RRSS is the restricted sum of squares under the null hypothesis, URSS is the sum of squares under H_1 and J, N and K are the total number of observations, number of cross section units and number of regressors respectively). The joint significance of the intercepts is evidence for country-specific effects that were not captured in the economic and trade policy variables which we have included. We expect that these intercepts conflate both natural and policy-induced barriers to investment.

Total capital expenditures

We first run equation 10 for country shares in total U.S. capital expenditures, CPS. The first regression in table 2 reports the most general case, including all three risk ratings. In the presence of the other two risk ratings, financial risk (FRISK) does not appear to provide any additional information and, hence, is dropped in regression 2. Here the remaining six regressors are significant. This regression verifies the importance of market size, though the coefficient for GDPS is only marginally above one. As expected, unit wage differentials are also significant in attracting U.S. investment. The positive and significant coefficient for the previously existing U.S. investment stock verifies the importance of agglomeration effects. Despite the largely market-seeking nature of U.S. investment, more open economies (with a higher proxy TOPD) also appear to attract U.S. investment; this suggests that the benefits of a more open and less distorted economy outweigh the rents appropriated behind trade barriers. Political and economic risk discourage affiliate capital expenditures (lower risk being measured by higher ratings). The insignificance of financial risk ratings in regression 1 is somewhat surprising. However, U.S. affiliates typically have privileged access to international capital markets and need not necessarily be disrupted by financial crises in their host economies.

On the basis of the above results political risk appears to be marginally more important than economic risk in discouraging U.S. investment (the estimated coefficients represent partial elasticities, so that different scaling factors can be ignored). The relative importance of the three ratings is confirmed where the ratings are included individually in regressions 3–5. The coefficient estimated for PRISK in regression 2 suggests that a country like India (with an average political risk rating of 50 out 100) could increase its share in U.S. investment by 50 percent in the—admittedly hypothetical—case of a total elimination of all political uncertainty.

Table 2. Determinants of Capital Expenditures by U.S.-Owned Affiliates in 29 Low- and Middle-Income Economies, 1984–95

Dependent Variable: lnCPS														
no. of obs. 339														
Regr.	1			2			3			4			5	
	coef.		*t*	*coef.*		*t*	*coef.*		*t*	*coef.*		*t*	*coef.*		*t*
lnGDPS	1.0463	***	10.7553	1.0550	***	11.1777	1.0995	***	9.9382	1.1488	***	15.8279	1.0623	***	10.9357
$lnSTK_{t-1}$	0.4191	***	11.2392	0.4151	***	11.5630	0.3979	***	10.1353	0.3768	***	11.3215	0.3978	***	10.0723
lnWAGR	-0.2398	*	-1.7642	-0.2332	*	-1.7141	0.1037		0.9482	-0.1970		-1.5123	-0.0367		-0.2933
TOPD	0.0725	***	3.0038	0.0755	***	3.1731	0.1138	***	4.1500	0.0755	***	3.1304	0.0726	***	2.6439
lnPRISK	0.4901	***	3.4074	0.5096	***	3.7724	0.8227	***	7.1431						
lnERISK	0.3948	***	3.5079	0.4206	***	4.5696				0.5873	***	7.6016			
lnFRISK	0.0283		0.5132										0.3037	***	6.6605
R-sq	0.9180			0.9178			0.9192			0.9145			0.9177		
adj R-sq	0.9085			0.9086			0.9104			0.9052			0.9088		

Capital expenditures by manufacturing affiliates

Table 3 reports the regressions for U.S. foreign affiliates in the manufacturing sector. Regression 1 shows that economic and financial risk are insignificant when all three ratings are included. When only political risk is included in regression 2, this risk category is found significant with a markedly higher coefficient estimate at 0.9 than in the case of total capital expenditures in regression 2 of Table 2. Unlike in the regressions for total capital expenditures, we now also find significant scale effects with the coefficient for GDPS at around 1.6. The estimated coefficient for pre-existing investment is about the same size as that found for total capital expenditures. Again, more open economies appear to encourage capital formation by U.S. manufacturing affiliates. The coefficient for unit wage differentials has the right sign but is insignificant.[18]

[18] The significance and magnitude of the coefficient estimates in regressions 2-4 do not change once WAGR is excluded from the regressions.

Table 3. Determinants of Capital Expenditures by U.S.-Owned Manufacturing Affiliates in 29 Low- and Middle Income Economies, 1984–95

Dependent variable: lnCPMS								
no. of obs=334								
Regression	1		2		3		4	
	coef.	*t*	*coef.*	*t*	*coef.*	*t*	*coef.*	*t*
LnGDPS	1.6369 ***	11.9531	1.6503 ***	13.0954	1.7576 ***	13.3533	1.5442 ***	11.5221
$lnSTK_{t-1}$	0.3828 ***	8.0884	0.3836 ***	8.6421	0.3098 ***	6.7935	0.3520 ***	7.5751
LnWAGR	-0.0858	-0.7803	-0.1016	-1.0707	-0.1073	-0.9843	-0.1488	-1.4997
TOPD	0.1029 ***	3.6208	0.1057 ***	3.8749	0.0737 **	2.4722	0.0557 **	2.0837
lnPRISK	0.8913 ***	6.6940	0.9234 ***	8.5020				
lnERISK	-0.1369	-1.2174			0.2405 ***	2.8700		
lnFRISK	0.0881	1.1213					0.3028 ***	5.4008
R-sq	0.9357		0.9355		0.9329		0.9335	
adj R-sq	0.9281		0.9284		0.9255		0.9262	

The effects of sunk costs

We also tested for the effect of investment irreversibilities on the capital expenditure function by running regression 2 from Table 3 for two manufacturing subsectors. The chemicals sector is associated with large scale fixed investment in production plants; it is highly capital intensive with an average value of $78,000 in property, plant and equipment per employee in 1994, compared with only $46,000 for the manufacturing sector as a whole.[19] By contrast, manufacturing technology in the electronics sector is less capital intensive ($20,000 capital per employee); previous studies have shown that capital equipment is easily transferable to other locations, thereby reducing the sunk cost component of capital expenditures.[20] While other manufacturing sectors would be interesting too, missing data problems become pervasive and would yield spurious estimation results.

Based on our results for total manufacturing investment we have omitted economic and financial risk from the regressions that are reported in Table 4. Regression 2 excludes all insignificant variables for the chemicals sector and regression 4 represents a comparable specification for affiliates in the electronics sector. The results confirm the expected relative role of scale economies: relative market size is a more important factor in the chemicals sector which exhibits a coefficient estimate for GDPS slightly above that for the total manufacturing sector; the corresponding estimate for the electronics sector is well below that

[19] Tables III.B7 and III.H3 in Department of Commerce (1998).

[20] Flamm (1984).

average. In both sectors market openness stimulates investment, though the relative magnitude of scale economies suggests that the chemicals sector is much more dependent on host market sales than the electronics sector.

While existing U.S. investment (STK) is a significant determinant of capital formation in the chemicals sector, it is much lower and insignificant for investment by electronics affiliates. This finding is at odds with our original hypothesis that existing investment reduces the input costs for new investment. A skilled workforce and good infrastructure induced by previous U.S. investment in the host economy should be particularly important for export-oriented electronics production. Our finding would however be consistent with an interpretation of electronics as a "footloose" industry: irrespective of the current U.S. share in the host country's economy, production facilities are easily shifted to alternative locations. Such an interpretation would be in line with earlier work by Flamm (1984) and Wheeler and Mody (1992).

In both sectors improvements in political risk ratings exert a significant and positive influence on investment activity. It is interesting to compare the relative magnitudes: the coefficient estimate for the chemicals sector is slightly higher, that for electronics affiliates slightly lower than for the manufacturing sector overall. We hesitate to offer support for the real options model on the basis of just two regressions. However, our finding here is consistent with this theory's prediction that investors' risk sensitivity goes up in sectors with significant plant-specific sunk costs.

Table 4. Determinants of Capital Expenditures by U.S.-Owned Chemicals and Electronics Affiliates in 29 Low- and Middle-Income Economies, 1984–95

	Chemicals Affiliates, lnCPCHS no. of obs. = 310						Electronics Affiliates, lnCPECS no. of obs=205					
Regression	1			2			3			4		
	coef.		*t*	*coef.*		*t*	*coef.*		*t*	*coef.*		*t*
LnGDPS	1.8995	***	6.7555	1.7154	***	6.4335	0.7280	***	2.9776	0.8140	***	5.4459
$LnSTK_{t-1}$	0.2539	***	4.1089	0.2605	***	5.7238	0.1167		1.1443	0.1158		1.5492
LnWAGR	0.1601		0.8756				-0.3446		-1.2738			
LnPRISK	0.9607	***	4.4332	1.0104	***	7.4589	0.9061	***	3.4443	0.7865	***	4.5670
TOPD	0.1327	***	2.7202	0.1487	***	5.0921	0.1259	*	1.8213	0.1572	***	3.7654
R-sq	0.8753			0.8743			0.9252			0.9255		
Adj R-sq	0.8604			0.8598			0.9133			0.9141		

We have also run regressions for manufacturing investment by U.S. affiliates in a sample of 16 industrialized countries and generally found insignificant coefficients for the three risk ratings: unlike in developing countries, industrialized countries show insufficient

variation in the risk ratings to pick up any part of the movements of capital expenditure shares over time.

V. CONCLUSIONS

Capital expenditures by foreign affiliates represent the principal motivation for foreign direct investment in developing countries. The rate of foreign capital formation in any one country is partly determined by factors on the side of the investor country (home country interest rates and the real exchange rate) and partly by a number of host country attributes. Using data for the capital formation of U.S. foreign affiliates in developing countries, this paper has identified unit wage differentials, market size and agglomeration effects stemming from previous foreign investment as stimulating host country factors. The positive effect of trade openness suggests that foreign investment is increasingly integrated into international production networks and discouraged by the inefficiencies associated with trade protection.

Contrary to the only other comparable study by Wheeler and Mody (1992), this paper has also substantiated the role of economic and political risk in discouraging capital expenditures by foreign affiliates. Theory suggests that ambitious investment liberalization will be ineffective where investors attach even a small probability to such reforms being reversed. As predicted by the real options model, the U.S. data appear to show that this problem becomes more acute in sectors in which plant-specific sunk costs are more prominent. Still, in the absence of data on the variability of actual returns on investment we were unable to assess the relative importance of the real options model and of portfolio theory in explaining affiliate investment. Future work on this question will depend on better data on affiliate investment returns becoming available.

The findings in this paper have a number of policy implications. The significance of economic risk in deterring investment highlights the importance of macroeconomic stability for sustained capital inflows. The deterrent effect of political risk underlines the role of host country institutions in providing transparent and predictable investment policies. For the most part, developing countries espouse investment regimes that are conducive to foreign business activity. In practice, obscure approval procedures and administrative discretion in the regulation of existing foreign establishments cloud the true nature of investment policies. Even where a host country government intends to fully implement a liberal investment regime, it is often unable to credibly signal such a commitment to foreign investors. An international investment agreement, acting as an "agency of restraint," could offer the institutional framework for doing so.

A growing literature explores the potential of agencies of restraint in stimulating domestic investment by providing a predictable set of incentives.[21] Foreign investors are

[21] See, for instance, Servén (1997) or Collier and Pattillo (1998).

concerned about broad notions of country risk, that is the *subjective* probability of certain adverse outcomes. Host country membership in an international investment agreement is likely to allay such concerns, even where the agreement only makes existing host country regulations fully transparent and the government abides by an obligation under international law to keep such regulations in place. The institutional venue for an international investment agreement needs to be evaluated on the basis of three criteria: firstly, a large number of host countries should be covered, thereby reducing the transaction costs that arise for multinational companies in the context of the multitude of often inconsistent bilateral and regional investment treaties. Secondly, conflicting interpretations of obligations need to be settled through effective dispute settlement procedures. Thirdly, credible sanctioning instruments need to be at hand for what is ruled noncompliant conduct (as developing countries hold little outward direct investment assets, a multilateral investment agreement that is disjoint from other areas of international commerce would lack such sanctioning instruments). The World Trade Organization is uniquely positioned to meet all three requirements.

Despite the close interaction of trade and investment flows, so far the WTO has made only piecemeal progress on foreign direct investment. The TRIMs Agreement under the Uruguay Round covered only a small subset of performance requirements imposed on foreign investors; market access issues (the scope and extent of foreign ownership), standards of nondiscriminatory treatment and investment protection are as yet untouched for the largest part of trade in goods. By including investment rules in a future package of agreements under the next WTO round of negotiations, investors stand to gain more transparent and predictable investment rules across a range of important host countries. Developing countries, for their part, would benefit through enhanced investment inflows, even without necessarily opening more sectors to foreign ownership. Moreover, developing countries could offer concessions in the area of FDI regulation in return for gaining improved market access for their goods exports to industrialized countries, thereby making further investment liberalisation a viable undertaking among their political constituencies.

Data Definitions and Data Sources

- Variables not listed below have been defined in the text.
- WB denotes World Bank (1998): *World Development Indicators.*

CPCH(S)	(Share of) capital expenditures by majority owned affiliates of U.S. companies in the chemicals sector	*Survey of Current Business,* various September issues, column 5.
CPEC(S)	(Share of) capital expenditures by majority owned affiliates of U.S. companies in the electronics sector	*Survey of Current Business,* various September issues, column 8.
CPMX	Capital expenditures by majority owned manufacturing affiliates of U.S. companies	*Survey of Current Business,* various September issues, column 3.
CPX	Total capital expenditures by majority owned affiliates of U.S. companies	*Survey of Current Business,* various September issues, column 1.
ERISK	Economic risk rating for the month of January	ICR country risk ratings
FRISK	Financial risk rating for the month of January	ICR country risk ratings
GDPP	GDP at market prices per capita in 1987 constant $	WB
GDPS	Share in world income, country and world incomes measured at market prices in constant 1987 US$.	WB
POP	Total population	WB
PRISK	Political risk rating for the month of January	ICR country risk ratings
STK	Stock of U.S. investment at historical cost over world total	Department of Commerce: U.S. Direct Investment Abroad: Balance of Payments and Direct Investment Position Estimates 1982–1996.
TI	Exports and imports of goods and services in percentage of GDP	WB
TOPD	Trade openness dummy	Assigns the value 4 to the top quartile of countries in the table in Appendix 3; 3 to the next quartile and so on.
WAGR	Unit wage cost (average wage including supplements over value added per worker) as a ratio of average unit wage costs outside the United States; the latter has been computed as an average of unit wage costs in Canada, the United Kingdom, Germany, France, Brazil, Japan, Italy, Mexico, The Netherlands and Australia (the 10 largest hosts to U.S. manufacturing investment) weighted with their 1990 U.S. manufacturing investment stocks. Missing data between the benchmark years 1980, 1985, 1990 and 1995 have been filled through linear interpolation.	UNIDO, *Industrial Development,* 1997.

The *International Country Risk Guide* Ratings

Political Risk Services Inc. publishes a monthly *International Country Risk Guide* (ICRG) which specifies three ratings—economic, financial, and political—and a composite rating. Five financial, 13 political, and 6 economic factors are assessed. Maximum ratings are 100 for political risk and 50 for financial and economic ratings. A higher score indicates lower risk.

Political	
Economic expectations versus reality	6%
Economic planning failures	6%
Political leadership	6%
External conflict	5%
Corruption in government	3%
Military in politics	3%
Organized religion in politics	3%
Law and order tradition	3%
Racial and nationality tensions	3%
Political terrorism	3%
Civil war	3%
Political party development	3%
Quality of bureaucracy	3%
Total Political Points	50%
Financial	
Loan default or unfavorable loan restructuring	5%
Delayed payment of suppliers' credits	5%
Repudiation of contracts by government	5%
Losses from exchange controls	5%
Expropriation of private investments	5%
Total Financial Points	25%
Economic	
Inflation	5%
Debt service as a percent of exports of goods and services	5%
International liquidity ratios	3%
Foreign trade collection experience	3%
Current account balance as percent of goods and services	8%
Parallel foreign exchange rate market indicators	3%
Total Economic Points	25%
Overall Points	**100%**

A Generated Regressor for Trade Openness

TOPD has been generated through the ranking of the estimated residuals in the equation:

$$\ln TI_t^i = \alpha_0 + \alpha_1 \ln GDPP_t^i + \alpha_2 \ln POP_t^i + \varepsilon_t^i$$

where TI represents trade intensity, GDPP per capita income and POP population. This equation was estimated for the three period averages 1983-85, 1988-90 and 93-95, with common intercepts and coefficients. This methodology, due originally to Balassa (1985), assumes that by correcting for the structural determinants of trade intensity, the residuals will provide an improved measure of the restrictiveness of trade policy.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.590162	0.967564	6.811089	0.0000
NPOP	-0.214474	0.036904	-5.811734	0.0000
NGDPPC	0.139780	0.064943	2.152333	0.0340
R-squared	0.439194			

Rank	TOPD	1983-85		1988-90		1993-95	
1	4	Singapore	1.284	Singapore	1.261	Singapore	1.064
2	4	Hong Kong	0.935	Hong Kong	1.012	Hong Kong	1.029
3	4	Malaysia	0.690	Malaysia	0.837	Malaysia	1.008
4	4	Indonesia	0.603	Nigeria	0.599	Panama	0.651
5	4	Korea, Rep.	0.443	Thailand	0.503	Philippines	0.603
6	4	Egypt	0.428	Panama	0.469	China	0.591
7	4	Panama	0.394	Indonesia	0.455	Thailand	0.547
8	4	Jamaica	0.319	Philippines	0.400	Indonesia	0.429
9	3	Philippines	0.310	China	0.337	Jamaica	0.348
10	3	Thailand	0.259	Egypt	0.200	Nigeria	0.331
11	3	China	0.170	Korea, Rep.	0.181	Egypt	0.183
12	3	Portugal	0.114	Jamaica	0.162	Honduras	0.131
13	3	South Africa	0.055	Dominican Republic	0.088	India	0.128
14	3	Nigeria	0.007	Chile	0.026	Korea, Republic of	0.047
15	3	Peru	-0.071	Portugal	0.002	Mexico	-0.016
16	2	Chile	-0.089	Ecuador	-0.044	Costa Rica	-0.092
17	2	Barbados	-0.103	South Africa	-0.083	Dominican Republic	-0.097
18	2	Costa Rica	-0.123	Mexico	-0.094	Portugal	-0.181
19	2	Dominican Republic	-0.154	Honduras	-0.096	South Africa	-0.189
20	2	Honduras	-0.157	Venezuela	-0.105	Turkey	-0.202
21	2	India	-0.172	Costa Rica	-0.148	Venezuela	-0.207
22	2	Spain	-0.177	India	-0.154	Ecuador	-0.217
23	2	Turkey	-0.197	Turkey	-0.299	Chile	-0.221
24	2	Ecuador	-0.220	Colombia	-0.398	Trinidad & Tobago	-0.348
25	1	Mexico	-0.333	Guatemala	-0.430	Colombia	-0.382
26	1	Venezuela	-0.351	Spain	-0.440	Guatemala	-0.392
27	1	Trinidad & Tobago	-0.436	Trinidad & Tobago	-0.445	Spain	-0.401
28	1	Greece	-0.462	Peru	-0.537	Peru	-0.604
29	1	Brazil	-0.483	Greece	-0.545	Barbados	-0.637
30	1	Colombia	-0.544	Barbados	-0.557	Greece	-0.665
31	1	Guatemala	-0.745	Brazil	-0.965	Brazil	-0.901
32	1	Argentina	-1.193	Argentina	-1.190	Argentina	-1.339

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