Japanese and U.S. Firms as Foreign Investors: Do They March to the Same Tune?

Ashoka Mody; Krishna Srinivasan

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Japanese and U.S. firms as foreign investors: Do they march to the same tune?

ASHOKA MODY World Bank
KRISHNA SRINIVASAN International Monetary Fund

Abstract. During the 1980s, U.S. and Japanese multinationals were attracted by some similar country characteristics: low wage inflation, low country risk, good infrastructure, and an educated work force. Both groups of investors displayed a persistence, being strongly attracted to locations with significant past investment. Japanese firms started the decade as somewhat more fluid, but as their investment levels surged, they became much more persistent. Overall, U.S. firms were more influenced by domestic market conditions and moved contrary to changes in host country trade intensity. Japanese investment had a somewhat greater affinity for trade, reflecting their long-standing interest in East Asia. Some limited evidence suggests that factors driving the two groups of investors converged in the second half of the 1980s. JEL Classification: J441, J442

Les entreprises japonaises et américaines en tant qu'investisseurs étrangers: marchent-elles à la même cadence? Au cours des années 1980, les multinationales américaines et japonaises ont été attirées par les mêmes caractéristiques dans les pays qu'elles investissaient: bas taux d'inflation des salaires, risques socio-politiques faibles, bonne infrastructure, et main d'oeuvre instruite. Ces deux groupes d'investisseurs ont aussi montré beaucoup de persistance: ils ont été fortement attirés par les pays où ils avaient investi dans le passé. Les entreprises japonaises ont commencé la décennie avec des stratégies plus fluides, mais à mesure que le niveau des investissements a crû, les investissements sont devenus plus persistants. De manière générale, les entreprises américaines ont été davantage influencées par les conditions du marché interne et se sont déplacées dans le sens contraire des changements dans l'intensité du commerce du pays hôte. L'investissement japonais a une affinité plus grande avec les flux de commerce, et réfléchit l'intérêt à long terme des Japonais pour l'Asie de l'Est. Les auteurs mettent au dossier des éléments d'information qui suggèrent que les facteurs

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qui animent les deux groupes d'investisseurs ont convergé dans la seconde moitié des années 80.

1. Introduction

Japanese firms emerged as a major presence on the international scene with substantial new investments in the mid-1980s and have contributed in a significant way to the large investment flows since then (figure 1). The flows of Japanese investment almost quadrupled between 1985 and 1988, stabilizing at those high levels in 1989 and 1990. Over the same period, U.S. investments also rose, approximately doubling between 1985 and 1988. The outstanding stock of Japanese foreign investment remains lower in absolute value than that of the United States – the dominant international investor – but has almost caught up in relative terms. According to the Japan External Trade Organization, one-fifth of production by Japanese firms is located overseas, compared with 25 per cent for U.S. firms.

As the two principal investing nations, how do Japan and U.S. allocate their investment host country destinations? We begin by analysing the differences in investment flows over time *within particular countries* and the investment allocations *across countries*. With that as background, we ask a series of questions. Do investors from Japan and the United States value the same country attributes? As late-comers to international investing, are Japanese investors more risk averse? Over time, is there a 'convergence' in the factors driving U.S. and Japanese foreign investors?

Certain similarities exist in Japanese and U.S. allocations of investment: a heavy concentration of investment persists in developed or high-income countries, while middle-income countries receive a modest share of investment (table 1).[1] The surge of investment in the second half of the 1980s was also accompanied by a further focus on high-income countries. For both Japanese and U.S. investors, interest in developing countries outside East Asia and Latin America is truly limited. However, certain important differences also exist in the patterns of Japanese and U.S. investment flows. Over half the Japanese investment flows have been to the United States, and the U.S. share of Japanese investment grew during the investment surge in the second half of the 1980s. In contrast, U.S. investments are concentrated in the major European countries. Japanese investors had a somewhat greater interest in developing (middle- and low-income) countries in the first half of the 1980s. Within the set of developing countries, Japanese investors have had a strong interest in East Asia; U.S. investment in East Asia, though low, has steadily increased over the past two decades.

Research has focused on factors determining the outflow of U.S. investment rather than the *allocation* of such investment across a range of countries (Scaperland and Balough 1983; Lipsey 1988; Kravis and Lipsey 1992; Barrell and Pain 1996). In a study that examines investment allocation, Wheeler and Mody (1992)

1 The definitions of country-groups are based on World Bank categories, defined in the annual *World Development Report*. See appendix A.

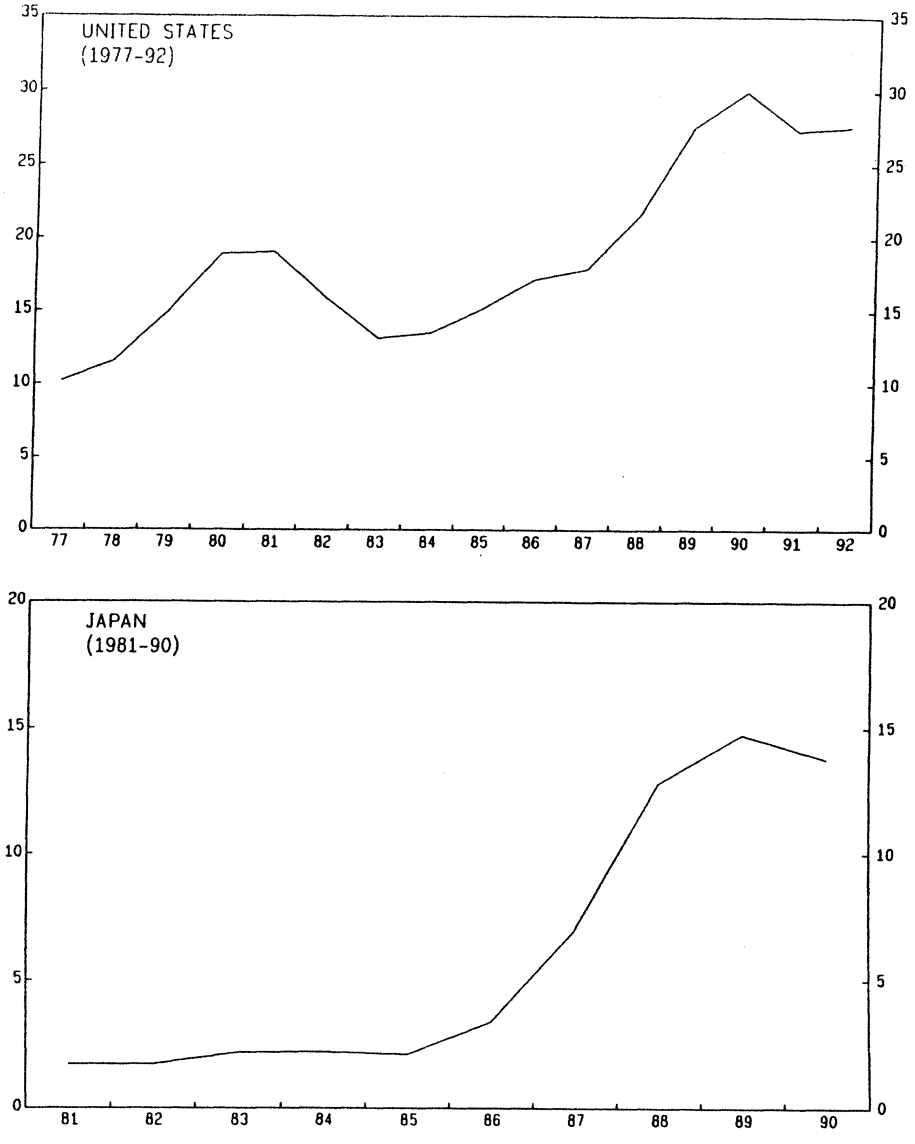

FIGURE 1 Trends in foreign investment outflows (billions of U.S. dollars)
SOURCES: United States: Bureau of Economics Analysis, Department of Commerce. Japan: Ministry of Finance and Ministry for International Trade and Industry

found that good infrastructure, large market size, and an economy relatively closed to trade attracted U.S. investors. A particularly interesting feature of the analysis was the strong persistence exhibited by U.S. investors – past investment in the country was a strong predictor of new investment. That persistence was attributed

TABLE 1
Allocation of foreign direct investment across country groups (percentage)

	1977–80	1981–85	1986–90
United States, 1977–92			
Developed countries	81.9	77.6	78.7
European Economic Community	57.3	53.9	54.7
Other high income	24.6	23.7	24.0
Developing countries	18.1	22.4	21.3
Latin America	12.9	14.4	11.3
East Asia	4.9	7.7	9.7
Other middle income	0.1	0.1	0.2
Other low income	0.2	0.2	0.1
Japan, 1981–90			
Developed countries		64.9	82.3
European Economic Community	–	10.6	15.1
Other high income	–	54.3	67.2
Developing countries		35.1	17.7
Latin America	–	18.1	4.0
East Asia	–	16.4	13.4
Other middle income	–	0.1	0.2
Other low income	–	0.4	0.1

SOURCES: United States: Bureau of Economic Analysis, Department of Commerce. Japan: Ministry of Finance and Ministry for International Trade and Industry

to the favourable effects of agglomeration, but it could include cascading effects due to observation of other investor decisions (Kinoshita and Mody 1997). We examine whether this persistence carries over to Japanese firms. A growing literature also is concerned with the determinants of Japanese foreign investment. Recent examples include Kogut and Chang (1996), who show that past investment does indeed increase the probability of future investment. Belderbos and Sleuwaegen (1996) study the allocation of Japanese investment across North America, Europe, and East Asia and find that the Asian investment is driven by factors quite different from those of the 'west-bound' investment. Using an approach similar to ours, Eaton and Tamura (1994) examine the factors driving Japanese and U.S. direct foreign investment; they, however, focus on a limited set of explanatory variables (population density, per capita income, human capital, regional dummies) and do not distinguish between the time-series and cross-sectional variations in the allocation decisions.[2]

In this paper we exploit the panel features of the data (several observations

2 Other relevant studies examine specific determinants of foreign investment flows; see, for example, Slemrod (1990) and Cummins and Hubbard (1995), who test the reaction of investment flows to host-country tax rates.

on individual countries) to draw inferences on factors driving investments *within* countries over time (sometimes referred to as short-run estimates) and factors that cause investors to differentiate *between* countries (the long-run estimates). The goal is to explain the shares of foreign investment received by a set of host countries (thirty-five hosts for U.S. investment over the period 1977–92 and twenty-nine hosts for Japanese firms over 1981–90). A specially constructed data set on country attributes consistent over time and across countries is used. Careful attention is paid to the inefficiencies and biases that arise when panel data are used.

In section 2 we present a framework of analysis. The sources of variation in the data are highlighted in section 3 by an examination of four different estimates for the United States that are possible in a panel data setting; specifically, a distinction is made between country attributes that change significantly over time versus those that remain relatively unchanged. In section 4 the random-effects model is used to draw the principal contrasts between the determinants of U.S. and Japanese investment allocations. The estimates are repeated for the first and second half of the 1980s in section 5 to determine if factors influencing investment have changed over time and, in particular, if the two sets of investors are increasingly responding to the same country attributes. In a final section we summarize and conclude.

2. The framework of analysis

We define f_{it} as the *share* of host country i in the total investment flowing out of supplier country (which is either the United States or Japan) in year t. The basic equation estimated relates the host country's investment share to a set of attributes that characterize the country. The host countries are pooled in the analysis, but separate equations are estimated for the two supplier countries. The decision to pool the data across countries was inevitable, since the number of observations for any one country is too small. While pooling creates obvious limitations by forcing the regression coefficients across countries to be the same, pooled data also present opportunities for interesting and useful insights by allowing consideration of within-country and between-country dimensions.

Certain assumptions underlying the analysis need to be spelled out. Consider a (U.S. or Japanese) firm making the decision to invest abroad. We postulate a two-step process: the firm decides first on the extent of total investment abroad (Barrell and Pain 1996) and then on the allocation of that investment across countries. The allocation process is the one we focus on: in this second step, the investment shares of the various host countries are determined by the country attributes. Two apparently reasonable assumptions are required to facilitate the econometric estimation. First, like Wheeler and Mody (1992), we assume that the factors determining the aggregate foreign investment (such as profitability in domestic operations) do not influence the allocation across countries and so can be omitted from the analysis; a weaker form of this assumption, consistent with our analysis, would be that these omitted factors are not correlated with host-country attributes.

Second, the decision to invest abroad is made by several individual firms, based

on expected profits and the risks they face. Our data do not distinguish the individual investments but rather are the aggregate investment by a large number of U.S. and Japanese firms. A danger exists that heterogeneity among firms (of different sizes and in different industries) may lead in such aggregative analysis to biased conclusions. Most foreign investment studies implicitly assume that aggregation is, in fact, possible (Barrell and Pain 1996). Firm-level studies of foreign investment are becoming more common but are typically restricted in industry and host country coverage. Kogut and Chang (1996), for example, study investment by Japanese electronics firms in the United States. There is a trade-off, therefore, between a full analysis of firm heterogeneity and the ability to identify country attributes attractive to foreign investors. In this paper, we continue with the assumption that the individual investments can be aggregated such that a country's share in U.S. or Japanese investment represents the decisions made by the firms. In effect, therefore, we assume that all firms are motivated by the same essential set of country characteristics. The share of a 'representative' U.S. (or Japanese) firm's investment in country i is thus proxied by the share of all U.S. (Japanese) investment in that country. This may be thought of as a measurement error in the dependent variable, which we assume, once again, is not correlated with the country attributes, and hence no bias results.

The basic equation, estimated separately for the United States and Japan, may be characterized as follows:

$$f_{it} = \beta X_{it} + U_{it}, \qquad i = 1, 2, \ldots, n;\ t = 1, 2, \ldots, T,$$

where $i = 1, 2, \ldots, n$ is the list of host countries, and $t = 1, 2, \ldots, T$ are the years over which observations are available for each country. f_{it} represents the share of investment in country i in period t from either the United States or Japan. X_{it} is the $(K \times 1)$ vector of regressors representing the values of the country attributes that potentially influence foreign investment. The important feature of this model is the error structure, which has two components:

$$U_{it} = \mu_i + v_{it}$$

The first term, μ_i, represents a set of influences specific to a country, and the other, v_{it}, is white noise, the traditional error term in a regression equation with zero mean and variance σ_v^2 and uncorrelated with the regressors.

As is well known, each of the different estimators for pooled data suffers from certain limitations. To recapitulate briefly, the ordinary least squares (OLS) estimator will lead to biased estimates where unobserved country effects, μ_i, are correlated with the observed explanatory variables. Panel data, in principle, provide a solution for this problem. The *within-estimator* (or the fixed-effects model) is obtained when, for each country, each variable is measured as the actual value in the different years *minus* the mean value of that variable (over time in the specific country). By thus 'extracting' the mean value prevailing in a country over the time

period under consideration, the variation in the data that arises from different mean levels across countries – and hence the influence of 'fixed' and unobserved country characteristics – is eliminated. With the bias thus eliminated, the regression coefficients reflect responsiveness of foreign investment to changes within a country, over time. For this reason, within-estimates are sometimes referred to as *short-run* estimates (Baltagi and Griffin 1984; and Caballero and Lyons 1991). While country attributes such as infrastructure do not change much between one year and another and so will not influence foreign investment in the short run, other attributes, such as labour and capital costs, are more likely to influence foreign investment from one year to the next. Besides potential biases of its own, such as the assumption of strict exogeneity[3] and the aggravation of measurement errors because of the differencing process,[4] the procedure entails substantial loss in cross-sectional information, since the differences between countries are ignored.

At the other extreme, only the variation across countries is considered in the *between-estimator*. Here, each variable is represented by the country's mean observed value over the years for which the data are available. Between-estimators, which relate a country's average investment share to its average attribute values over time, can be thought to reflect *long-run* investment decisions. The bias due to omitted variables, correlated with included variables, remains in the between-estimator. By ignoring the within-variation, this estimator fails to utilize all available information.

Thus, though both the within- and the between-estimators ignore certain information in the data, they provide different perspectives, and we use them initially, along with the OLS estimates, to describe the variation in the data. In a fully specified model and under equilibrium conditions, the within- and between-estimators should give the same estimates (Mairesse 1990). However, large shifts in investment during this period make it unlikely that the investment allocation process is in equilibrium. Equilibrium in this context would imply that the new investment is simply replacing the depreciation of the stock of past investment, which is clearly not the case, especially for Japan. Moreover, many qualitative country characteristics (such as the ease of doing business) can only be measured with error, and full model specification thus is difficult to achieve. In particular, any attempt to use the between, or cross-sectional, variation in the data implies the possibility of bias because of the correlation between the error term and the regressors; hence, it is useful to consider what the nature of this bias may be. Essentially, the concern

3 Although the country-specific component of the error term disappears, potentially, a new problem is created. The error term now is $\epsilon_i - \frac{1}{n}\Sigma_{j=1}^{n}\epsilon_j$. Subtraction of the mean of the white-noise term from its realization in period t, in effect, creates a series of error terms. Consistent estimation – 'strict exogeneity' – now requires that each realization of this error term, in past and future periods, be uncorrelated with the regressors (see Keane and Runkle 1992). Future realizations can safely be assumed to be uncorrelated with the regressors (as is typically assumed), and even past realizations are unlikely to influence major host-country characteristics. Where plausible correlations do, in fact, exist, as in the case of perceived country risk, we discuss the implications.

4 The extent of such aggravation depends upon whether the measurement error changes over time. See Mairesse (1990).

arises from the possibility that the unchanging component of the error term, μ_i, represents an important omitted variable that is correlated with one or more the included regressors. The bias then occurs because the influence of this unobserved country feature on foreign investment may be wrongly attributed to the included country attributes. An obvious candidate for such a bias is infrastructure, which changes slowly from one year to another. If the unobserved μ_i reflects general business and operating conditions in the country, it is likely that μ_i and infrastructure will be correlated. Since the cross-sectional variation in the data is important, our approach here is not to ignore that variation but rather to interpret infrastructure more broadly to include the effects of country operating conditions.

To compare the U.S. and Japanese investment determinants, we use the *random-effects model.* The choice of this model stems essentially from its *composite* nature: reflecting both the influences across countries and within countries, the random-effect model estimates coefficients that are a weighted average of the between- and within-estimates (Maddala 1983; Hsiao 1986). Unlike the situation of the fixed-effects model, where the country effect, μ_i, is a pure admission of the investigator's ignorance, in the random-effects model a specific realization of μ_i for a country can be thought of as drawn from a normal distribution with mean zero and variance σ_μ^2, and independent of v_{it}. The random-effects model assumes that μ_i is not correlated with the included explanatory variables, and the Hausmann test is used to determine the plausibility of that assumption.[5] The presence of μ_i in the error structure implies a strong serial correlation and renders the standard errors of ordinary least square (OLS) estimates incorrect. For this reason, a generalized least square (GLS) estimate is obtained based on transformation of the variables using the estimated variance-covariance matrix.

Where the model is correctly specified, the GLS estimate provides the right standard errors. The potential correlation between μ_i and the explanatory variable implies, however, that the potential of bias in the estimates remains. Tests to judge the seriousness of this bias require that the within-model lead to consistent estimates, which is not always possible. Tests are conducted, however, and are shown to provide a reasonable basis for using the random-effects model. More important, we maintain that each different type of estimate provides a specific perspective on the data and that the random-effects model, by combining the within and between perspectives, represents the best composite picture.

3. The sources of variation in the data: explaining U.S. investments

We use the different estimation techniques – the OLS, the within (or fixed-effects), the between, and the random-effects (or GLS or composite) estimators – to infer the sources of variation in the explanatory variables. The model estimates, based on the years 1977–92 for the United States are presented in table 2. U.S.

5 Where the assumption holds, the OLS estimates are also consistent, though the standard errors are not.

investment data was available for 35 countries (see the list of countries and their income and regional classification in appendix A). The country attributes considered in explaining a country's share in foreign investment are, for expository convenience, divided into six groups.

1. The relevant price variables: here we consider the *price of labour* and *the cost of capital*; the cost of capital consists of two elements: an investment price deflator, which measures the cost of investment goods in the economy, and the corporate tax rate.
2. The *size of the domestic market.*
3. The *trade propensity of the economy.*
4. The degree of *country risk* (or, its inverse, *country 'safety'*).
5. Factors enhancing productivity of the investment undertaken, such as *infrastructure* and *education*; also relevant are domestic agglomeration effects for which we have no direct measure but for which the *accumulated stock of foreign investment* is used as a proxy (though, as we shall discuss, the stock of foreign investment may influence new investment for reasons other than agglomeration effects).
6. Finally, certain unmeasured country characteristics can be controlled, for which we use *country group dummies*; for example, proximity in distance and methods of conducting business are captured by these dummies (Eaton and Tamura 1994).

Variables in any one group may condition the influence of variables in another group. For example, labour quality, as proxied by primary enrolment rates, conditions the reaction to wage costs. Potential omitted variables include the 'incentives' provided to foreign investors through, for example, reduced taxes, special dispensation of land or infrastructure, and reduced tariffs on imported inputs. We have been unable to construct a panel data set on such incentives. The analysis below proceeds on the presumption that foreign investment incentives are not correlated with the variables included in the analysis and the omission thus does not bias the results obtained; an indirect inference on tax incentives is possible, however, through examining the effect of capital costs on investments. Also, we initially included an exchange rate variable, but found that its role in influencing investment flows was extremely sensitive to model specification, and that most diagnostic tests favoured its exclusion. Hence, we converted all the relevant data into one common unit, the U.S. dollar, and excluded the explicit incorporation of the exchange rate as an explanatory variable.

The precise definitions of the variables and their sources are provided in appendix B. The variables are measured in logarithmic values (except for the regional and country dummies) and so the coefficients can be interpreted as elasticities.

Two country attributes that have a distinctly within-country quality are the country risk measure and the labour costs (table 2). The between-estimates suggest that investors do not discriminate between countries on the basis of this risk measure. In contrast, the within-estimates (as well as the random-effects estimates)

TABLE 2
Determinants of U.S. foreign investment, 1977–92 (dependent variable: host country share of foreign investment outflow)

Variable	OLS	Within	Between	Random	Random
Constant	−14.321	–	−16.309	−10.841	−9.529
Market size	0.601*(3.2)	1.312*(4.6)	1.876**(1.6)	1.093*(4.4)	1.254*(4.8)
Cost of investment	0.002(0.01)	−0.046(0.3)	−1.486(1.2)	−0.104(0.7)	−0.209(1.4)
Corporate tax rate	−0.094(1.3)	−0.077(0.8)	−0.023(0.1)	−0.054(0.6)	−0.101(1.2)
Cost of labour	−0.048(1.1)	−0.098*(2.3)	0.070(0.3)	−0.096*(2.5)	−0.082*(2.1)
Trade propensity	0.218(1.6)	−0.438*(2.1)	0.617(1.0)	−0.528*(3.4)	−0.588*(3.6)
Stock of past FDI	0.485*(12.3)	0.678*(7.5)	0.455*(2.9)	0.628*(8.8)	0.673*(8.8)
Country Risk[a]	0.975*(6.4)	1.052*(6.9)	−1.131(0.8)	1.177*(8.9)	1.083*(8.2)
Infrastructure	0.775*(13.4)	0.131(1.1)	0.955*(3.7)	0.337*(4.1)	–
Primary school enrolment ratio	2.762*(4.5)	0.575(1.1)	3.730(1.0)	0.766**(1.6)	–
Latin America	0.117**(1.6)	–	0.014(0.04)	0.256**(1.6)	0.249(1.2)
East Asia	−0.067(0.9)	–	0.159(0.4)	0.251(1.4)	0.318(1.4)
Other high income	−0.349*(6.0)	–	−0.348**(1.6)	−0.368*(2.1)	−0.361**(1.6)
Other middle income	−0.500*(5.0)	–	−0.837**(1.8)	−0.580*(2.2)	−0.780*(2.4)
Other low income	−0.519*(3.6)	–	0.226(0.3)	−0.020(0.1)	0.235(0.8)
	Adj R^2 = 0.83	Adj R^2 = 0.94	Adj R^2 = 0.84	Adj R^2 = 0.93	Adj R^2 = 0.90
		Number of Countries = 35 Number of Observations = 521 Tmax = 16 Tmin = 11 Hausman: Chi Sq(9) = 23.2			Hausman: Chi Sq(7) = 10.0

* Indicates statistical significance at the 5 per cent level.
** Indicates statistical significance at the 10 per cent level.
a The variable 'country risk' is measured on a scale of 0 to 100, with an increasing value indicating a safer country.

have a strongly significant coefficient. Recall that this measure is conventionally on a scale of 0 to 100, with a higher number indicating a safer country. Hence, the estimates clearly indicate that a rise in risk (or a fall in the degree of safety) reduces investment within a country. One interpretation of contrasting within- and between-estimates is that, while country risk measures do not affect the long-run choice of countries, they do affect the *timing* of the investment. In other words, investors do not abandon high-risk countries. Rather, they choose periods to enter, or expand in, such countries during years when they are perceived as relatively low risk.

Of interest also is the labour cost variable. It will be noted that labour costs do not show up as an important influence in either the OLS or the between results. In contrast, the within-estimates show the labour costs to be a negative influence on foreign investment. This influence also is seen strongly in the random-effects estimates, where the value of the coefficient is somewhat smaller. Recall that this coefficient is a weighted average of the small, positive between-estimate and the larger, negative within-estimate – virtually, the entire strength of the within-estimate is reflected in the random-effects model. Thus, we interpret that level of labour

costs is not decisive in choosing between one country and another, but changing costs – or wage inflation – can influence investments from one year to another. This interpretation seems plausible, since in their cross-country decisions firms use capital-intensive techniques in high-wage countries and labour-intensive techniques in low-wage countries (U.S. Department of Commerce 1996). Within a country, however, changes in capital intensity are difficult to modulate over short periods of time and, hence, wage inflation has the effect of slowing investment. For U.S. investors, the market size of the host economy is both a within- and a between-country driver. Eaton and Tamura (1994) arrive at a similar conclusion, though they use a different approach. The within-effect is statistically stronger than the between-effects (in terms of the high t-values). Note that the between-coefficient value is actually much higher, however, indicating that market size is important in making country choices. Also, the trade propensity variable (trade volume divided by Gross Domestic Product) shows a significantly negative sign in the within-dimension, indicating that U.S. investors perceive trade and foreign investment as substitutes.

Finally, the one variable that is strongly present in both within- and between-country effects is past foreign investment in the country. Thus, whether making country choices or timing decisions, investors are guided forcefully by past investments in that country. Note that, though the within-effects appear somewhat stronger, the value of the coefficients across the different estimates is quite similar, creating confidence in the statistical validity of this influence. Various interpretations of this finding are possible. Agglomeration effects, for example, availability of components for assembly in the automobile and electronics industry, favours new investment where past investment has occurred. The recent decision by General Motors to base its Asia operations in Thailand rather than in the Philippines (which offered several incentives) was partly based on an existing agglomeration of suppliers (*Financial Times*, 30 May 1996). However, the within-effects also suggest the signalling influence of other investors is important. Where other investors are believed to have private information on the country or where oligopolistic rivalry is strong, there can be cascading effects leading to discontinuous increases in investment. An empirical examination of this idea, using survey data, has been articulated in Kinoshita and Mody (1997).

In contrast, a country's infrastructure is a strong sorting variable for investors. The between, random-effects, and OLS estimates all show it to be a major influence in making country choices. Since the stock of infrastructure changes very little from one year to another, the within-effects are very weak. Thus, small increases in infrastructure from one year to the next have very little impact on foreign investors; major infrastructure investments over the years, however, signalling a sustained commitment to readily available services, can attract investors. Similarly, primary school enrolment rates show some tendency to differentiate investor interest between countries.

As discussed above, both infrastructure and primary enrollment rates could, in addition, be picking up the influence of other variables, such as country busi-

ness operating conditions, and so these variables must be interpreted to include all slowly changing country characteristics. The extent of such bias is gauged through the Hausman test, which, in effect, measures the distance between the within-estimates and the random-effect estimates. The null hypothesis here is that the within-estimates are consistent (since the effect of the unobserved variables is eliminated). For the full model, the Hausman test rejects the random-effects estimates at the 5 per cent level of significance. Since we suspect that the difference in the within-estimates and the random-effects estimates arises principally from the infrastructure and primary school enrolment rate variables, we report the random-effects model without these two variables. Now the random-effects model is accepted, with a p-value of 0.10. Note that the coefficients on the other variables change very little when infrastructure and primary enrolment rates are dropped.

The validity of the Hausman specification test, however, depends pivotally on whether the within-effects model does indeed lead to consistent estimates (Keane and Runkle 1992). While the between-estimates may be biased upward, equally the within-estimates may be biased downward (Mairesse 1990). For example, if variables are measured with error – and variables like infrastructure very probably are – then the within-estimate could magnify this error because it is based on the difference between a mismeasured variable and its mean, which itself is mismeasured. As a consequence, the within-estimates of the infrastructure coefficient could be downward biased, and hence, the distance between the within and random-effects coefficient may be exaggerated. Thus, the validity of the random-effects model is likely to be greater than is suggested by the Hausman test.

4. Japanese investors: are they different?

Keeping in mind these sources of variation in the explanatory variables, we examine the similarities and differences between the U.S. and Japanese investment patterns on the basis of the composite or random-effects estimates. But first it is useful to note that, as may be expected, the within-country variation, σ_μ^2, is about four times higher for Japan than it is for the United States (0.20 compared with 0.05). By contrast, the between-country variation, σ_ν^2, is about the same for both countries (0.10). This indicates that Japanese estimates are much more sensitive to choice of years. Hence, Japanese estimates are presented for 1981–90 and for 1981–88 (table 3). For 1981–88, the random-effects model is accepted by the Hausman test (p-value equal to 0.25) but is rejected for 1981–90. Hence, in making the comparison with the U.S. estimates, we rely primarily on the 1981–88 estimates, although it will be noted that the 1981–90 estimates are not very different. Also, while our preferred model includes dummies for countries grouped by regions (as for the U.S. estimates), alternative models with different country group dummies are presented, since the Japanese estimates are sensitive to the specific country dummies used.[6]

6 Since the United States dominates the Japanese investment allocation, estimates also were obtained after dropping the United States as an observation. Those results, however, were quite similar and are not reported here.

TABLE 3
Determinants of Japanese foreign investment: random effects estimates (dependent variable: host country share of foreign investment outflow)

Variable	1981–88		1981–90	
	Regional dummies	Income dummies	Regional dummies	Income dummies
Constant	−14.203	−15.259	−11.508	−13.524
Market size	0.395(0.5)	0.201(0.3)	−0.191(0.3)	0.488(0.8)
Cost of investment	0.147(0.3)	0.627(1.1)	−0.106(0.2)	0.217(0.2)
Corporate tax rate	−0.103(0.3)	−0.296(0.9)	−0.316(1.3)	−0.498*(1.8)
Cost of labour	−0.314*(2.0)	−0.427*(2.7)	−0.057(0.5)	−0.122(1.0)
Trade propensity	0.047(0.1)	0.793*(1.9)	0.210(0.5)	0.958*(2.5)
Stock of past FDI	0.540*(3.2)	0.582*(3.1)	0.488*(3.2)	0.523*(3.0)
Country risk	2.208*(4.3)	2.189*(4.4)	2.460*(5.3)	2.320*(5.2)
Infrastructure	0.689*(3.0)	0.738*(3.3)	0.718*(3.3)	0.673*(3.2)
Primary school enrolment ratio	2.932**(1.6)	3.775*(2.0)	1.321(0.8)	2.231(1.3)
Latin America	0.352(1.2)	–	0.375(1.3)	–
East Asia	1.097*(3.1)	–	1.001*(3.1)	–
Other high income	−0.197(0.8)	–	−0.205(0.8)	–
Other middle income	−0.492(0.9)	–	−0.486(1.0)	–
Other low income	−0.243(0.4)	–	−0.622(1.1)	–
Middle income	–	0.244(0.6)	–	0.299(0.9)
Low income	–	−0.389(0.6)	–	−0.277(0.70)
	Adj R^2 = 0.71	Adj R^2 = 0.71	Adj R^2 = 0.72	Adj R^2 = 0.70
	Hausman: Chi Sq(9) = 11.3	Hausman: Chi Sq(9) = 15.0	Hausman: Chi Sq(9) = 22.0	Hausman: Chi Sq(9) = 27.7
	Number of countries = 29		Number of countries = 29	
	N = 199 Tmax = 8 Tmin = 1		N = 247 Tmax = 10 Tmin = 1	

* Indicates statistical significance at the 5 per cent level.
** Indicates statistical significance at the 10 per cent level.

A formal test of the equality of coefficients for the Japanese and U.S. equations is rejected strongly. An F-test was conducted to measure the difference in residual sum of squares between the 'pooled' estimates – that is, when coefficients for the two investor groups were assumed equal – and the estimates with no restrictions on the coefficients. The large difference in the residual sum of squares led to a rejection of the hypothesis that coefficients are equal in size. We note below, however, several similarities in the signs of the coefficients.

4.1. Country dummies

The use of these dummies controls for certain omitted variables that characterize the country groups. Consider the regional dummies, which capture influences such as proximity and other geographical or historical connections that are not measured directly by the country attributes used in the analysis. Here, the countries of the European Economic Community (EEC) serve as the benchmark and the question of interest is whether U.S. and Japanese investors show any preference for specific

country groups once the measured country attributes are accounted for. For U.S. firms, the finding is that no country group has investment shares higher than that of the EEC after controlling for country attributes, but 'other' middle- and high-income countries have a significantly lower share (table 2). Japanese firms show a special preference for East Asia and also, though to a smaller extent, for Latin America (table 3). These results reflect the descriptive statistics presented in table 1, which showed that Japanese firms had a relatively high focus on East Asia and correspondingly low interest in European destinations.

4.2. Labour and capital costs

A certain ambiguity exists in the impact of labour costs on foreign investment. Low labour costs usually are thought to attract foreign investors. Where labour costs are high, however, capital may be substituted for labour, raising the level of investment undertaken. Also, high labour costs may reflect superior labour productivity, which would be attractive to foreign investors. While we make no direct 'correction' for labour productivity, the regression includes a proxy for labour quality – the level of primary school enrolment – which, in part, conditions the labour cost variable and hence reduces the ambiguity.

The finding is that low wage inflation is attractive to Japanese investors (for the period 1981–88) and to U.S. investors throughout. As noted above for the United States, labour costs do not discriminate between countries, but where wage inflation is high, investors are likely to be deterred. That labour costs do not help to distinguish between countries suggests that labour and capital are substitutes: since foreign investors can substitute capital for labour, low labour costs result in labour-intensive production requiring relatively little capital (see discussion above and U.S. Department of Commerce 1996). Thus, capital inflows in low-wage countries are small, even though the level of activity – especially employment – under foreign management may be large. Moreover, to the extent that firms locate specific categories of production in specific country groups (e.g., hi-tech production in high-income countries and the more rudimentary production in low-income countries), wages are unlikely to be a consideration.

The effect of cost of capital is generally weaker. Note that we split the capital costs component into two: an internationally comparable price for investment goods and the tax rate. We do not find price for investment goods to be influential in the investment decision. Both U.S. and Japanese investors react negatively to the corporate tax rate prevailing in the host economy but the effects are not statistically significant.

4.3. Domestic market size and trade propensity

Domestic market size (the Gross Domestic Product) has the expected positive and statistically strong influence on foreign investment for U.S. investors but not for Japanese investors. Thus, it would appear that Japanese investors are less interested in the home market than are their U.S. counterparts (see also Eaton and Tamura 1994, 507).

At first, it also appears that U.S. and Japanese investors differ in their overall response to the trade propensity of the host economy, which is measured here as the sum of exports and imports divided by the country's Gross Domestic Product. U.S. investors respond negatively to increases in trade-intensities, irrespective of the country dummies used. Japanese investors take a clearly positive view of trade intensity (significant at the 5 per cent level) when country dummies are by income group (or when no dummies are included). When regional dummies are used, however, the Japanese response, though still positive, becomes insignificantly different from zero. Thus, the positive sign on trade intensity (whenever regional dummies are not included) reflects the preference for East Asian economies (which also happen to have higher trade propensities); elsewhere, Japanese investors have a more ambiguous relationship with trade intensity.

The conclusion for U.S. investors seems clear: larger Gross Domestic Product and low volumes of trade (in relation to the Gross Domestic Product) encourage these investors. Japanese investors show a weaker interest in the domestic market size and display a greater keenness for in economies with a greater trade propensity, especially in East Asia. In interpreting these results, we should note that though the trade propensity of an economy is not necessarily equivalent to the extent of its 'openness,' there is a correlation between the two and the interpretations are similar. Openness refers to import restrictions and tariffs and is one factor that will determine the trade propensity of an economy. Reduced openness lowers trade propensity and protects investors from import competition. A recent report notes: 'For foreign investors in hugely expensive chemical plants, tariff protection has been a prerequisite for entry into southeast Asia. However, Trade liberalization is now threatening such supports, leaving some of the region's biggest investments looking precarious' (Young 1995). Tariff protection offers an important incentive and compensates, in part, for high costs resulting from inadequate infrastructure. The ambiguity in the results for Japanese investors suggests that this is not always a critical decision factor.

4.4. Productivity enhancement through infrastructure and educated labour

We have measured infrastructure as the availability of electric power (in kilowatt hours per dollar of GDP produced) and find that such infrastructure has a strongly positive influence on attracting investors. Japanese investors are more responsive to better availability of infrastructure. Similar, though statistically weaker, differences arise in the case of educational differences between countries. The variable that best distinguished countries in this regard was the primary school enrolment rate, which may be thought to reflect the 'trainability' of the labour force. For U.S. investors, the coefficient on enrolment rate significant at the 10 per cent level; for Japanese investors, the significance level is lower. The lack of statistical significance stems partly from the correlation between infrastructure and enrolment rates. Examining only the magnitudes of the coefficients, however, we find that Japanese investors are more sensitive to primary enrolment rates than U.S. investors are.

4.5. Persistence of investment

As noted in the introductory remarks, an important finding of the Wheeler and Mody (1992) study was the strong persistence displayed by U.S. investors as reflected in the large and significant influence of the accumulated stock of foreign investment in the country on new investment. In the analysis here, the accumulated stock of foreign investment refers to investment from all countries and in all sectors of the economy. As such, the variable measures the general attractiveness of the economy to foreign investors, over and above that implied by the directly measured variables in this analysis.

The finding is that both U.S. and Japanese investors are strongly conditioned by past investment in the country.[7] The coefficient values on past investment are somewhat higher for U.S. investors. While this difference is not large, recall that for other key variables – tax rates, infrastructure, and enrolment rates – Japanese investors showed greater sensitivity. Thus, U.S. investors display greater persistence, relying more on past investment as an indicator of investment possibilities and less on certain important country attributes.

4.6. Country risk

Country risk deters both groups of investors. Risk is much more influential in conditioning timing of Japanese investment within a country rather than in discriminating between countries. However, the effect of risk is clearly much greater on Japanese investors. Note that the coefficient on the country risk variable is about one for U.S. investors, but it is over two for Japanese investors. Thus, Japanese investment is likely to be much more volatile than U.S. investment. This finding is once again consistent with the evidence above on the greater persistence of U.S. investors.[8]

5. Is there convergence over time?

Comparing the first half of the 1980s with the second, we see considerable stability in the determinants of U.S. investments (table 4). This is consistent with the other evidence in this paper, the generally greater persistence of U.S. investment, and the relatively low within-country variance. We do see some important changes in the determinants of foreign investment, especially in the influences on Japanese investment. These changes, the evidence suggests, moved U.S. and Japanese firms closer to each other in certain respects.

The Japanese firms showed a clear preference for East Asian locations throughout

7 For reasons outlined in footnote 3, the coefficient is actually biased downwards. Also, as highlighted by a referee, the estimates obtained are the result of two competing factors: the bias on account of the endogeneity and the correlation of the stock variable with other included variables (e.g., infrastructure). In the fixed-effect estimates, because the infrastructure variable virtually drops out, that correlation is not important. In the OLS and RE estimates, however, that correlation is important and reduces the effect of the past stock of FDI.

8 If past realizations of foreign investment share influence the estimate of the country risk measure, then an endogeneity will exist. This will result in a downward bias of the estimated coefficient for the country risk measure.

TABLE 4
Determinants of foreign investment: estimates from the random effects model (dependent variable: host country share of foreign investment outflow)

	United States		Japan	
Variable	1981–85	1986–90	1981–85	1986–90
Constant	−12.889	−4.570	−17.966	−7.949
Market size	1.419*(3.5)	0.073(0.2)	0.042(0.04)	1.171(1.3)
Cost of investment	−0.187(0.9)	0.592(0.2)	0.508(0.7)	−1.243**(1.6)
Corporate tax rate	−0.159(1.0)	−0.022(0.2)	0.114(0.3)	−0.041(0.1)
Cost of labour	−0.124(1.4)	−0.082**(1.7)	−0.144(0.7)	0.357(0.2)
Trade propensity	−0.499**(1.7)	−0.820*(3.7)	−0.193(0.3)	−0.066(0.1)
Stock of past FDI	0.604*(4.8)	0.457*(4.3)	0.516*(2.3)	1.246*(5.3)
Country risk	0.464*(2.1)	1.701*(5.4)	1.571*(2.5)	1.174(1.3)
Infrastructure	0.330*(2.8)	0.252*(2.5)	0.786*(3.0)	0.270(0.8)
Primary school enrolment ratio	1.996*(1.9)	−0.847(1.0)	5.274*(2.0)	0.633(0.3)
Latin America	0.042(0.2)	0.057(0.3)	0.230(0.7)	0.580**(1.8)
East Asia	0.273(1.2)	0.099(0.5)	1.215*(2.7)	1.668*(4.5)
Other high income	−0.305(1.5)	−0.444*(2.3)	−0.411(1.2)	0.361**(1.6)
Other middle income	−0.864*(2.8)	−0.727*(2.4)	−0.193(0.3)	0.248(0.5)
Other low income	0.091(0.3)	−1.063*(2.9)	−0.322(0.4)	0.248(0.7)
	Adj R^2 = 0.95	Adj R^2 = 0.98	Adj R^2 = 0.73	Adj R^2 = 0.69
	Hausman: Chi Sq(9) = 14.0	Hausman: Chi Sq(9) = 37.6	Hausman: Chi Sq(9) = 8.5	Hausman: Chi Sq(9) = 20.0
	N = 175	N = 171	N = 125	N = 122
	TMax = 5	TMax = 5	TMax = 5	TMax = 5
	TMin = 5	TMin = 3	TMin = 1	TMin = 1
	Number of countries = 35		Number of countries = 29	

* Indicates statistical significance at the 5 per cent level.
** Indicates statistical significance at the 10 per cent level.

the 1980s, as reflected in the dummy variable for East Asia. Domestic market size was not an important consideration for Japanese investors in either the first half or the second half of the 1980s. An indication of convergence is the reduced U.S. investor interest in domestic market size in the second half of the 1980s. However, U.S. investors continued to move contrary to a country's trade intensity – if anything, this effect has increased over time. Japanese investors continued their somewhat ambiguous stance towards openness to foreign trade.

Notice that for Japanese investors the strong effect of past stock of foreign investment in the second half of the 1980s. As Japanese investment surged, investors strongly preferred locations that already had significant stocks of past investments; all other effects were consequently muted. The sensitivity to infrastructure fell for both groups of investors in the second half of the 1980s, but especially for the Japanese. The magnitudes of the coefficients in the second half of the 1980s consequently were closer to each other, but for the Japanese are not significant at conventional levels. For both groups of investors, the interest in primary school

enrolment seems to have fallen sharply (suggesting possibly a greater interest in more highly qualified workers). Investors react quite sharply to country risk in the second half of the 1980s. For U.S. investors, we see an increase in the coefficient on the country risk measure (from 0.46 to 1.7); for Japanese investors, there was some decline in the country risk effect, and coefficient is no longer statistically significant, but the magnitude of the coefficient continues to be high. Thus, the lower overall sensitivity of U.S. firms to country risk reflects primarily a difference from the first half of the 1980s.

In sum, while differences in the investment determinants remained, reduced effects of market size on U.S. investments, greater responsiveness of U.S. investors to country risk, similar coefficient magnitudes on infrastructure, and reduced emphasis on primary education all suggest some movement towards similarity in response to country attributes. It is important to caution again, however, that since the Japanese investments during this period were clearly in a transitional stage, the evidence on convergence must await data covering a longer time span.

6. Conclusions

Some similarities exist in the factors that drive U.S. and Japanese investments, though the two groups of investors vary in the degree of responsiveness to specific factors. Low wage inflation attracts foreign investors, but is more of a consideration for the Japanese; the Japanese also appear to attach greater value to labour quality. Neither the costs of investment goods nor the corporate tax rates have a major influence on investment; the latter generally has the expected negative sign. A larger stock of (electricity) infrastructure attracts investors. High country risk discourages them.

There are also some contrasts. Japanese investors seek more trade-intensive economies, though doing so reflects their predilection for investment in East Asia. U.S. investors, by contrast, tend to changes in trade intensity. Viewed over the entire period, U.S. investment tends to be much more persistent, as reflected in the strength of past investment in determining new investment in a country. Again, from the perspective of the entire period, past investment is important also for Japanese investment, but the relationship is not as strong. Japanese investment is seen to be more sensitive to the other important influences (wage inflation, infrastructure, school enrolment, and country risk). Thus, Japanese investment was for at least the first half of the 1980s, and perhaps until 1988, characterized by greater fluidity, reflecting, perhaps, the more recent emergence of the Japanese as foreign investors. In the last few years of the decade, however, most influences were weakened and a strong preference was expressed for countries in East Asia and countries with large stocks of foreign investment. There is some suggestive evidence that during this period the determinants of investment for both groups of investors converged in certain respects.

Appendix A: List of host countries for U.S. and Japanese investment

Country	*Region*	*Data Available for*
Argentina	Latin America	U.S., Japan
Australia	Other high income	U.S., Japan
Austria	Other high income	U.S., Japan
Belgium	EEC	U.S., Japan
Brazil	Latin America	U.S., Japan
Canada	Other high income	U.S., Japan
Chile	Latin America	U.S., Japan
Colombia	Latin America	U.S., Japan
Denmark	EEC	U.S.
Ecuador	Latin America	U.S.
Egypt	Other low income	U.S.
France	EEC	U.S., Japan
Germany	EEC	U.S.
Greece	EEC	U.S., Japan
India	Other low income	U.S., Japan
Ireland	EEC	U.S., Japan
Italy	EEC	U.S., Japan
Japan	East Asia	U.S.
Korea	East Asia	U.S., Japan
Malaysia	East Asia	U.S., Japan
Mexico	Latin America	U.S., Japan
Netherlands	EEC	U.S., Japan
Nigeria	Other low income	U.S., Japan
Norway	Other high income	U.S., Japan
Panama	Latin America	U.S., Japan
Peru	Latin America	U.S., Japan
Philippines	East Asia	U.S., Japan
Singapore	East Asia	U.S., Japan
Spain	EEC	U.S., Japan
Sweden	Other high income	U.S.
Thailand	East Asia	U.S., Japan
Trinidad	Other middle income	U.S.
Turkey	Other middle income	U.S., Japan
UK	EEC	U.S., Japan
USA	Other high income	Japan
Venezuela	Latin America	U.S., Japan

Appendix B: Data description and sources

1. Dependent variable

The dependent variable in all the regressions is the host country share of foreign investment outflow from the United States or Japan. In the case of the United States, foreign investment is measured as the capital expenditure of majority-owned affiliates in the host country. These data have been obtained from the Bureau of Economic Analysis, Department of Commerce. For Japan, we obtained data on actual flows (disbursements) of foreign investment from the Ministry of Finance and the Ministry for International Trade and Industry (MITI).

2. Independent variables

2.1. Market size

Per capita gross domestic product in constant dollars expressed in international prices. Summers and Heston (1993). Also see Summers and Heston (1991).

2.2. Cost of investment

We use the price deflator for investment in the host country to measure the cost of investment. The data have been obtained from the Penn World Tables (Summers and Heston 1991, 1993).

2.3. Corporate tax rate

Tax revenue collected as a share of gross domestic product is used as a measure of the corporate tax rate. To be consistent, data on both, tax revenue and GDP, were retrieved from the International Financial Statistics data base of the International Monetary Fund (IMF). The IFS data are published by the IMF on a monthly basis.

2.4. Cost of labour

Measured as earnings per employee in the manufacturing sector. Data on total worker earnings in the manufacturing sector and total number of employees, obtained from the United Nations Industrial Development Organization (UNIDO), have been used to calculate earnings per worker. Data in local currency units were converted to U.S. dollar units by using the average exchange rate tabulated by the International Financial Statistics, IMF.

2.5. Trade propensity

We use a measure of exports plus imports as a share of Gross Domestic Product to measure trade propensity. Data have been obtained from the Penn World Tables.

2.6. Stock of past FDI

Measured as the sum of all previous FDI in the host country irrespective of its origin (millions of U.S. dollars). Data have been obtained from the DEC analyt-

ical database of the World Bank. The DEC analytical database is a subset of the data compiled by the socio-economic data division of the International Economics Department at the Bank.

2.7. Country risk

Country risk is measured as a composite measure of economic, political, and social uncertainty in the host country. The index is compiled and published by Institutional Investor (II) in March and September each year and takes a value between 0 and 100 for each country, with higher values indicating lower risk.

2.8. Infrastructure

We use production/output of electricity per dollar gross domestic product as a measure of infrastructure availability. Data on the production of electricity are obtained from the *Year Book of Energy Statistics* published by the United Nations, while data on GDP are obtained from the Penn World Tables.

2.9. Primary school enrolment ratio

The ratio measures the gross enrolment of all ages at the primary level as a percentage of children in the country's primary school age group. The data have been obtained from the World Tables compiled by the World Bank.

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