World market integration through the lens of foreign direct investors

Rui Albuquerque[a],*, Norman Loayza[b,1], Luis Servén[b,1]

[a]*William E. Simon Graduate School of Business Administration, Carol Simon Hall, University of Rochester, Rochester, NY 14627, United States*
[b]*World Bank, 1818 H Street, NW, Washington, DC 20433, United States*

Abstract

This paper is motivated by the unparalleled increase in foreign direct investment to emerging market economies of the last 25 years. Using a large cross-country time-series data set, we evaluate the dependence of foreign direct investment on global factors, or worldwide sources of risk (i.e., factors that drive foreign direct investment across several countries). We construct a globalization measure that equals the share of explained variation in direct investment attributable to global factors. We show that our globalization measure has increased steadily for developing and developed countries. For the full sample of countries, the globalization measure rose by over 10-fold from 1985 to 1999. Furthermore, in recent years, developing countries' exposure to global factors has approached that of developed countries. Finally, our globalization measure correlates strongly with measures of capital market liberalization, supporting our hypothesis that increased market integration leads to a greater role for worldwide sources of risk. We discuss the implications of our results for public policies regarding capital market liberalization and policies directed at attracting foreign investment.
© 2004 Elsevier B.V. All rights reserved.

---

* Corresponding author. Tel.: +1 585 275 3956; fax: +1 585 461 3309.
  E-mail addresses: albuquerque@simon.rochester.edu (R. Albuquerque), nloayza@worldbank.org (N. Loayza), Lserven@worldbank.org (L. Servén).
  [1] Tel.: +1 202 473 7451; fax: +1 202 522 2119.

1. Introduction

Recently, there has been a strong move towards greater integration of emerging market economies into world capital markets. The process of integration starts with the removal of capital market restrictions, most notably the liberalization of foreign investors' participation in domestic stock markets, the listing of domestic firms in foreign markets, and the privatization of state-owned companies.[2] Among the main goals of these reforms are a reduction in the domestic cost of capital, an increase in foreign capital inflows and in economic activity.[3]

This paper analyzes the dynamics of foreign capital flows, particularly foreign direct investment, in response to increased integration of capital markets. We choose to focus on capital flows rather than stock prices for two main reasons. First and foremost, the success and continuity of the liberalization reforms depend on the benefits of such programs, which, on the basis of the current evidence on stock prices, might be viewed as meager by reform opponents.[4] Of course, it is possible that the noted small stock price impact reflects the reforms' imperfect credibility. If that is the case, one would expect flows to behave in a fashion similar to prices; otherwise, one would expect flows to increase significantly.

In addition, not much is known about the dynamics of international capital flows in connection with the recent period of global capital market integration. Our analysis focuses on foreign direct investment as opposed to portfolio equity flows, or total capital flows for three reasons.[5] First, foreign direct investment is the fastest growing form of international capital flows and the most important form of private international financing for emerging market economies. As a fraction of world gross domestic product, total private capital inflows to emerging markets grew from a steady annual average of 1.3% in the period from 1976 to 1989 to an annual average of 2.0% in the period from 1990 to 2000, representing a 56% increase. During this period, foreign direct investment flows increased at an average rate that was 9% points higher than that of portfolio equity and bond flows.[6] To the extent that multinational corporations are vehicles for improving risk sharing across countries (e.g., Errunza et al., 1999; Rowland and Tesar, 2004), they may be partly responsible for the small price response of domestically listed firms after

---

[2] See for example Bekaert et al. (2002a), Marston (1995), and Stulz (1999a). Beim and Calomiris (2001) report official dates of financial liberalization measures and other reforms across several countries.

[3] For example, Errunza and Losq (1985) and Bacchetta and van Wincoop (2000) give theoretical arguments for these effects to occur. See Eichengreen (2001) and Bekaert et al. (2002c) for evidence on the effects of capital account liberalization on growth.

[4] There is now considerable evidence on how the cost of capital responds to a financial liberalization program. The consensus view in the literature is that the cost of capital declines in the post liberalization era. However, this decline is not as large as theory would have predicted, in some studies, not even economically or statistically significant (e.g., Bekaert and Harvey, 2000; Henry, 2000; Chari and Henry, 2004; Stulz, 1999b).

[5] See Bekaert et al. (2002b) and Edison and Warnock (2003) for evidence on how liberalization reforms change short term portfolio equity flows.

[6] The average annualized growth rate of foreign direct investment was 17% in the period from 1976 to 2000, whereas the corresponding figure for all private nondirect investment flows was 7.6% (authors' computations using data from the World Bank World Development Indicators 2002 for low- and middle-income countries).

stock market liberalizations. Second, observed low portfolio equity inflows are perhaps more a reflection of the weak development of the domestic capital market in the emerging and liberalizing economies, than a lack of interest in pursuing greater diversification by foreign investors. In fact, many local companies in liberalizing countries have chosen to list elsewhere in order to reach foreign investors directly in their home market. While in many ways foreign direct investment behaves as equity, it does not rely on the existence of developed domestic stock markets. Third, because stock markets in emerging economies constitute a small portion of the domestic economy, it is likely that the impact in the overall economy of additional inflows of equity portfolio is muted.

The first step in our exercise is to identify the drivers of foreign direct investment. We separate these drivers into global and local factors. *Global factors* explain foreign direct investment into and from several countries. *Local factors* are country-specific and have no direct or indirect impact on foreign direct investment across countries. Global factors are not just parent or source country factors as the latter do not explain outward direct investment originating in different countries.[7] A simple equilibrium model of world foreign direct investment is developed to help define these concepts. To the best of our knowledge, this is the first paper that studies the relevance of global factors as determinants of foreign direct investment.

In the next step of the analysis, we estimate a model of foreign direct investment that explicitly accounts for global factors using a large cross-section and time-series data set of developing and developed countries. We use these estimates to get a measure of the exposure of countries to global factors. This we call the globalization measure. The globalization measure captures the explained variance in foreign direct investment that is due to variation in global factors. To construct the globalization measure, we make the natural identifying assumption that the component of the local factors that is correlated with the global factors is itself a global factor, although we show that this is not critical for our results. Our empirical approach uses both the time series and cross sectional dimension of the data. We reestimate the investment model over moving windows of 16 years of data and use the reestimated model to compute the globalization measure. This approach accommodates the difficult problem of identifying structural breaks, and possibly multiple breaks, in a large cross-section of countries and with many variables.[8]

The analysis reveals that global factors have increased in importance in explaining the dynamics of the cross section of foreign direct investment over time for developing and developed countries. For the full sample of countries in 1999, the globalization measure increased by over 10-fold since 1985. Furthermore, developing countries' exposure to global factors has increased faster than that of developed countries and the gap is narrower at the end of the 1990s. The performance of Asian and Latin American countries is quite similar. Interestingly, we find a significant decline in global factors as drivers of direct

---

[7] In related literature, Calvo et al. (1993), Fernández-Arias (1996), and Calvo and Reinhart (1996) analyze pull versus push factors in total capital flows emphasizing the role of U.S. short-term interest rates. Griffin et al. (2004) analyze pull versus push factors in portfolio equity flows. In this literature, a global factor would be a correlated push factor.

[8] See for example Bekaert and Harvey (1995) and Bekaert et al. (2002b) for alternative approaches.

investment around the time of the debt crisis of the 1980s for developing and developed countries alike, but no noticeable change due to the recent Mexican, Russian, or East Asian crises.

The third and last step of our analysis relates the driving factors of foreign direct investment to the observed increased integration of capital markets. To motivate this connection, we use the equilibrium model of world foreign direct investment developed earlier to argue that increased financial integration increases the relative importance of global factors as drivers of foreign investment. This is because some local factors, whose risk can be traded away with financial liberalization, no longer impact asset allocation decisions. Moreover, there might also be new global factors, which, before, had only a local dimension. In the model, this occurs for example when financial liberalization leads to complete international risk sharing upon which country-specific productivity shocks become part of systematic risk.

Consistent with the hypothesis of increased world capital market integration, we show that our globalization measure is explained to a significant extent by the level of financial liberalization as measured by the liberalization variables in Bekaert et al. (2002c). The increased exposure to global factors that we find is associated with increased flows of direct investment into emerging market economies. While these findings constitute evidence of greater worldwide capital market integration, we also find that growth in local productivity, trade openness, domestic financial depth, low government burden, and domestic macroeconomic stability are important local factors.

The sequence of the paper is as follows. Section 2 presents a simple equilibrium model of foreign direct investment and introduces the notions of global and local factors. Section 3 implements an empirical model of direct foreign investment encompassing local and global factors, reports basic estimation results, and constructs the globalization measure. Section 4 assesses the link between our globalization measure and capital market liberalization, and Section 5 considers extensive robustness checks on the empirical analysis. Finally, Section 6 concludes with a discussion of the public policy implications of our findings.

2. Global and local factors in foreign direct investment

This section starts by introducing a simple equilibrium model of foreign direct investment whose main purpose is to define and illustrate global and local factors as drivers of foreign direct investment. Once the notions of global and local factors have been developed, we discuss several extensions to the simple model.[9]

The model introduced in this section is used later in Section 4 to analyze the effects of financial liberalization on the role played by global and local factors in explaining direct investment patterns.

---

[9] In the working paper version (Albuquerque et al., 2003), we present three case studies of foreign investment by multinational corporations emphasizing the role of global factors in the decision-making process.

2.1. A simple model

There are two dates t and $t+1$ and three countries labelled $i=1, 2, 3$, each inhabited by a representative investor and a population of unit measure. There is a single good freely traded in the world market. Consumers in country i start with a wealth level $W_t^i > 0$, and value consumption pairs (c_t^i, c_{t+1}^i) according to $u^i(c_t^i) + \beta u^i(c_{t+1}^i)$. The functions u^i are assumed strictly increasing and concave. In period t, investment decisions are made and in period $t+1$ output is obtained. The investor in country 1 can invest in a local firm that generates output according to $y_1 = A_1 K_1^{1\alpha}$ or in a fully owned firm located in country 2 that generates output according to $y_2^1 = A_2 K_2^{1\alpha}$, where A_1 and A_2 are productivity shocks known only at date $t+1$ and K_1^1 and K_2^1 are the investments by country 1's investor into countries 1 and 2, respectively. Country 1's investor also has an endowment shock in period $t+1$ of $\omega_1 \geq 0$, with $E_t(\omega_1) = \bar{\omega}/2$. Country 2's investor makes no investment decision and gets an endowment shock in period $t+1$ of $\omega_2 \geq 0$, with $E_t(\omega_2) = \bar{\omega}/2$. We assume that ω_1 and ω_2 are perfectly negatively correlated and that $\omega_1 + \omega_2 = \bar{\omega}$.[10] Finally, the investor in country 3 can invest in a local firm that generates output according to $y_3 = A_3 K_3^{3\alpha}$ or in a fully owned firm located in country 1 that generates output according to $y_1^3 = A_1 K_1^{3\alpha}$, where A_3 is country 3's productivity shock known only at date $t+1$ and K_3^3 and K_1^3 are the investments by country 3's investor into countries 3 and 1, respectively. Country 3's investor has no endowment shock. All shocks have distributions with finite moments and display time-series dependence in their first or second moments. Without loss of generality, full depreciation is assumed. No other asset is traded.

Let $M_{t+1}^i = \beta u^{i\prime}(c_{t+1}^i)/u^{i\prime}(c_t^i)$ be investor i's intertemporal marginal rate of substitution in consumption. Then, equilibrium foreign direct investment for the representative investor in country 1 obeys,

$$E_t\left[M_{t+1}^1 R_{t+1}^{1,\text{FDI}} \right] = 1, \tag{1}$$

where $R_{t+1}^{1,\text{FDI}} = \alpha A_2 K_2^{1\alpha-1}$ is investor 1's marginal return to foreign direct investment in country 2. A similar condition holds for investor 3's direct investment in country 1. According to (1), investor 1 is just indifferent between consuming in period t and investing more abroad, thus consuming in the future out of the return from this additional investment. The optimality condition (1) can be derived using either one of the following two ways of modeling foreign direct investment decisions. One is to assume that the investor (in each country) operates the local multinational directly by choosing how much to invest locally and abroad. The other is to assume that the investor owns the multinational, but that the investment choices are made at the firm level via firm value maximization using as discount rate the investor's intertemporal marginal rate of substitution in consumption.

In equilibrium, the following consumption allocations apply:

$$c_t^1 = W_t^1 - K_1^1 - K_2^1$$

---

[10] The assumption that ω_1 and ω_2 are perfectly negatively correlated is not needed in this section and will be used only in Section 4. For this section, it is sufficient that they display nonzero correlation.

$$c_{t+1}^1 = \omega_1 + A_1 K_1^{1\alpha} + A_2 K_2^{1\alpha}$$

$$c_t^3 = W_t^3 - K_3^3 - K_1^3$$

$$c_{t+1}^3 = A_3 K_3^{3\alpha} + A_1 K_1^{3\alpha},$$

and $c_t^2 = W_t^2$ and $c_{t+1}^2 = \omega_2$. The remaining equilibrium conditions are $E_t[M_{t+1}^1 \alpha A_1 K_1^{1\alpha - 1}] = 1$ and $E_t[M_{t+1}^3 \alpha A_3 K_3^{3\alpha - 1}] = E_t[M_{t+1}^3 \alpha A_1 K_1^{3\alpha - 1}] = 1$. Note that, in equilibrium, production from multinationals is imported back to the country of nationality of the multinational. Such equilibrium allocations resemble a setting where Barbie dolls are produced in China by a U.S. multinational and imported to the U.S.

Foreign direct investment is useful for two reasons. First, because production displays decreasing returns to scale, it is optimal to spread production across the locations. Second, by investing in a different country, investors in countries 1 and 3 benefit from diversification of risk from the productivity shock in their own country to the extent that productivity levels are correlated across countries. Rowland and Tesar (2004) show that this was indeed the case for investors in Canada, Germany, and the United States for the period between 1984 and 1992.

We are now ready to define global and local factors in foreign direct investment. *Global factors* are drivers of foreign direct investment that are relevant across different representative investors (of different countries) and across their investments. *Local factors* can be relevant across investors investing in the same country, but not across investors investing in different countries. Consider the following examples. First, A_2 has both a local and a global factor in it. The local factor is the component of country 2's productivity that is unrelated to productivity in country 1 or 3. This local factor explains investment by country 1 into country 2, but not investment by country 3. The global factor is the component of country 2's productivity that is related to productivity in both countries 1 and 3. Hence, if local conditions are correlated, then they are global factors by definition. Second, in equilibrium, ω_2 is a local factor only. The reason is that country 1's foreign direct investment into country 2 responds to the properties of ω_2, being the local factor to country 2 that is negatively correlated to ω_1. However, country 3's foreign direct investment into country 1 does not respond to this factor.

Finally, we can separate global factors from parent country factors. The component of country 3's productivity unrelated to that of country 1 is a parent country factor driving direct investment out of country 3, but not a global factor as it does not affect the investment decisions of country 1's multinational. Below, we provide further discussion of global and local factors in foreign direct investment.

Our example is very stylized and constructed to formalize the concepts of global factors in foreign direct investment. In particular, we have chosen a geographic dispersion of worldwide direct investment to help make the distinction between global and local factors precise as well as to distinguish global factors from just source country factors. It is therefore legitimate to ask whether the existence of multinationals is optimal in this context. The answer is yes, as we have ignored transactions costs and have provided direct investment with the risk sharing and dispersion of production advantages noted above.

Finally, we have also assumed away most of the frictions involved in investing abroad. Different countries have different regulatory environments and tax systems, experience different and possibly uncorrelated productivity shocks, trade in different currencies with different implied inflation and exchange rate risk, and international financial contracts are not enforceable the way domestic contracts are. We explore the role of some of these frictions below.

2.2. Extensions

The optimality condition in (1) presumes that each investor manages a firm with a single subsidiary in a foreign country and funds it through parent country sources. More generally, the foreign subsidiary may be a unit of a larger multinational firm with operations in many countries. As we explain below, the multinational is more than the sum of its parts which means that the operation of each of these different subsidiaries interacts with the operation of the remaining units. This suggests representing the profits of the multinational as a function of the profits across all its subsidiaries $\Pi(\pi_1, \ldots, \pi_N)$, leading to the following modification of (1):

$$E_t\left[M_{t+1}\zeta_{n,t+1}R_{n,t+1}^{\text{FDI}}\right] = 1. \tag{2}$$

In (2), $\zeta_{n,t+1}=\partial\Pi(.)/\partial\pi_n$ is the partial derivative of overall profits of the multinational to the profits of subsidiary n and $R_{n,\,t+1}^{\text{FDI}}$ represents the marginal return from one additional unit of direct investment in subsidiary n. Conditions (1) and (2) are quite general and can accommodate many features that make investing abroad different from investing domestically.

2.2.1. More on global factors in foreign direct investment

2.2.1.1. Multisubsidiary firms. There is considerable evidence that multinationals make investment, financing, hedging, and cash management decisions at the parent company level and hence that decisions regarding one subsidiary impact those of other subsidiaries (this is the role of $\zeta_{n,t+1}$ in (2)). Caves (1996, pp. 137–140) surveys this literature and concludes that, controlling for local variables, direct investment responds to changes in such variables as the parent company's aggregate supply of liquidity, aggregate debt to equity ratio, and worldwide cost of capital and hurdle rates. Hodder and Senbet (1990) hypothesize that due to their use of different financial instruments in funding investments (i.e., debt and equity at home and abroad), multinationals might be better equipped to do tax arbitrage across countries and assets. In fact, Mills and Newberry (2002) show that worldwide tax incentives have led U.S. multinationals to shift income into the U.S. during 1987–1996 by changing their subsidiaries' leverage. Carr et al. (2001) use bilateral data to estimate an industrial organization model of foreign direct investment where characteristics of both host and parent country are relevant because of economies of scale, transportation costs, and relative abundance of skilled labor. Strictly speaking these studies identify source or parent country factors as opposed to global factors. However, our view is that some of these

source country factors have an obvious global dimension to the extent that they relate to international capital markets and worldwide productivity.

2.2.1.2. Financing constraints. The optimality conditions (1) and (2) do not hold with equality if investors in the parent country face financing constraints, say for example, because the parent country's economy is in a recession and collateral values are low. These constraints limit the amount of capital available for investment across countries.[11] Klein et al. (2002) document that foreign direct investment outflows from Japan into the U.S. declined in the 1990s, in spite of the real Dollar depreciation against the Yen, because Japanese banks were in financial stress. Although they do not analyze the impact of financing constraints faced by Japanese multinationals on their investments in other countries, a similar behavior is to be expected. In many instances also, the global nature of multinational business and the large scale of their investments (see below for two examples) requires that they tap the international capital market. In a world with market frictions, this allows them to do least-cost dealing by reaching new investors in unsaturated markets. This places a world dimension, as opposed to just a parent country dimension, to financing constraints. Hence, the global business cycle and general economic conditions can lead to fluctuations in the fund raising ability of multinationals around the world.

2.2.2. More on local factors in foreign direct investment

Here, we discuss several theories of local factors in foreign direct investment complementing our simple model above.[12] Countries that want to attract a foreign direct investor usually have to compete with other countries, which represent feasible alternatives to the investor, by offering generous benefit packages (usually this includes the country of origin of the multinational). These packages include, among other things, tax holidays, guarantees of a stable labor market generally with low or fixed nominal wage rates, and the provision of high-quality transportation or communications infrastructures.

A multinational company might also be interested in producing in a country because of the location of its input or product markets. For example, high domestic import tariffs make it too costly for the multinational to export its products from a foreign country. Alternatively, the multinational can produce domestically for the local market (see for example Kindleberger, 1966; Horst 1973). Each of these factors identifies specific ways in which the return to foreign direct investment R_{t+1}^{FDI} in Eq. (1) is affected.

Participation in international capital markets has obvious risks to investors, most notably the risk of direct or indirect expropriation arising from imperfect enforceability of international contracts which reduces the return from investing abroad R_{t+1}^{FDI}. Examples of

---

[11] Whether these constraints exist at the investor level or the multinational level (through the profit elasticity ζ_{t+1}^n) is of second order for our purposes, so long as they affect the level of direct investment.

[12] The reader is referred to Caves (1996) for a comprehensive review of theories and empirical tests on direct investment. Outside of the scope of our empirical modeling is the role of asymmetric information in promoting foreign direct investment (e.g., Razin et al., 1999; Tesar and Hull, 2000). Another issue not pursued here is the use of transfer pricing by multinationals to reduce income taxation at the parent level (e.g., Cassonm, 1979).

indirect expropriation include the levying of high profit taxes, the imposition of restrictions on capital outflows, the real devaluation of the local currency, expropriatory regulation, or contract repudiation. The risk of expropriation in turn limits the willingness of foreign investors to finance the host country because international investors may anticipate an increase in the likelihood of expropriation as more capital is funneled in (Eaton and Gersovitz, 1984; Albuquerque, 2003).

Changes in the real exchange rate affect the relative wealth levels of foreign and domestic investors and may further lead to changes in investors' actual relative purchasing power. Froot and Stein (1991) showed that in order for changes in exchange rates to change the relative purchasing power of domestic and foreign investors, these investors must be subject to binding financing constraints. If not, additional money could be borrowed that reestablishes their original purchasing power. In their setting, a real appreciation of the foreign currency increases the purchasing power of foreign investors and leads to more direct investment (see also Klein et al., 2002).

3. Basic empirical analysis

In this section, we outline a simple estimable model of foreign direct investment encompassing local and global factors, and implement it empirically using cross-country and time-series data. This allows us to examine the significance of the various theories on the determinants of foreign direct investment discussed above. Furthermore, we use the estimated model to obtain our globalization measure and then ascertain the relative importance of local and global factors in explaining the observed variation of foreign direct investment.

The section is organized in four stages. First, we describe our empirical framework. Second, we present the variables included in our empirical analysis and provide their basic descriptive statistics. Third, we discuss the results of foreign direct investment regressions for various country samples. Finally, we present the globalization measure and examine its pattern over time.

3.1. Empirical specification

In accordance with the earlier discussion, our empirical analysis of foreign direct investment is based on a framework allowing for the effects of both local and global factors. Local determinants of foreign direct investment include variables that affect the anticipated profitability from investing in the host country as well as the perceived volatility of profits: domestic productivity, expropriation risk, and tax pressure are some of the variables that we consider below.

Let us turn to the harder question of what global factors determine foreign direct investment. First, global factors affect the multinationals' opportunity cost of capital. In the empirical implementation of the model presented below we include a variety of worldwide measures of the cost of capital to proxy for an opportunity cost factor. Secondly, global factors are also likely to affect the local variables mentioned above. Indeed, those local variables are driven by (or represent) local factors only to the extent

that they are orthogonal to the global factors.[13] For example, from the presentation on global factors above we expect to find a significant role for worldwide productivity shocks: (i) the profit derivative ζ_{t+1} of foreign investment may be affected by aggregate productivity shocks, (ii) country productivity shocks are known to have significant global components (e.g., Glick and Rogoff, 1995; Iscan, 2000), (iii) worldwide productivity impacts demand conditions for firms producing for world markets, and (iv) worldwide productivity determines the pace of investment in new technologies.

Likewise, the model outlined in the preceding section showed that investors' discount factors respond to both local and global factors when markets are incomplete. We assume that the global component of the stochastic discount factor is driven by the variables that have been used to explain the cross-section of international equity returns, which are mostly industrial-country based. Under perfect integration of capital markets, this is a reasonable approach as it presumes that the top industrial countries provide a good proxy for the global portfolio held by investors. Under imperfect integration, this is less reasonable, which leads us to also include other variables like the weighted average of per capita GDP growth rates across the world and the average world equity return.

So far we have referred to variables likely to enter the global and local factors affecting direct investment inflows. How do we go from variables (which we shall denote by Z) to factors (henceforth denoted F)? Regarding global factors, we face the difficulty of identifying those that drive discount rates, productivity levels, and international investors' opportunity cost of capital. One possibility is to assume that the global factors are directly observable and represented by a set of global variables as discussed above. Hence, $F_t^G = Z_t^G$. This is our basic approach, which we will follow in the empirical exercises in this section.[14]

Another possibility is to treat these global factors as unobservable (e.g., Harvey, 1991; Campbell and Hamao, 1992). We shall take this route in Section 5 below. There, we estimate latent, or unobserved, factors F_t^G from the same set of global variables Z_t^G: $F_t^G = \mathbf{b}' Z_t^G$. The number of columns in matrix $\mathbf{b}$ indicates the number of unobserved global factors at work. For simplicity (and lack of obvious identifying assumptions), we will assume that there is a single such factor. To estimate it, a first possibility is to take a statistical approach and derive the latent global factor from a principal component analysis of our set of global variables. A second possibility is to take an econometric approach and estimate jointly the investment equation and the linear combination of global variables that generates the global factor. We shall explore both alternatives later.[15]

The same identification issues apply to local factors F_t^L, but because there is no good way of imposing restrictions on these, we assume that they are observed and described by a set of local variables Z_t^L. Hence, we shall assume throughout that $F_t^L = Z_t^L$.

---

[13] Below, we shall use this idea in constructing our globalization measure which captures the size of the global exposure in foreign direct investment.

[14] We do not include any parent country factors because our dependent variable is aggregate (across parent countries) FDI inflows into a host country.

[15] Formally, the approach followed in this section assumes $\mathbf{b}$ is the identity matrix.

For the empirical analysis in this section, we make another simplifying assumption, which will also be relaxed later in the paper. We assume that the impact of global and local factors does not vary across countries. In other words, we restrict the coefficients on all global and local variables to be the same across all countries. Hence, the extent of cross-country heterogeneity is limited to a country-specific fixed effect.

A final issue concerns the specification of the dependent variable. Rather than the absolute volume of foreign investment, we use its ratio to host-country domestic GDP to both control for country size and avoid nonstationarity problems (more on this below). Thus, the regression equation is:

$$\frac{I_{tj}}{GDP_{tj}} = \delta_0 + \delta_j + \eta^{G\prime}F_t^G + \eta^{L\prime}F_{tj}^L + u_{tj} \tag{3}$$

where the indices t and j represent time and country, respectively.

3.2. Definition of variables and descriptive statistics

We characterize the global factors using the following set of global variables Z_t^G: a weighted average of U.S., Japanese. and German interest rates, an index of total return in world stock markets, the U.S. credit spread between AAA and BAA bond rates as a measure of global bankruptcy risk, and the rate of growth of world per capita GDP, which provides a proxy for global productivity growth.[16] We also include the slope of the U.S. yield curve, which provides a proxy for global inflation risk as well as a measure of the premium on long-term assets, thus capturing the long-term nature of these investments. Besides being justified by theory, these variables summarize the array of returns faced by international investors. Also similar instruments have been used in the literature to explain the cross-section of both international and U.S. expected equity returns (e.g., Campbell and Hamao, 1992), and by constraining ourselves to these variables we are insulated from the criticism of data mining.

To transform the nominal returns in the bond rates and the stock market index into real returns, we include the average of U.S., Japanese, and German inflation among the global variables as a measure of inflation expectations. However, because realized inflation provides a noisy measure of anticipated inflation, in the regressions, we do not impose any restriction linking its coefficient with those of the nominal rates of return.

In turn, our selection of local variables reflects the variety of views on the determinants of foreign direct investment outlined earlier. In our basic specifications, we include nine local variables in Z_t^L. These are: per capita GDP growth, as a measure of domestic productivity growth; overall tax burden proxied by public consumption relative to GDP; financial depth, measured by the ratio of credit to the private sector as a percentage of GDP, to assess the role of the domestic credit sector in attracting foreign direct investment; the rate of change of the real exchange rate, to capture possible wealth effects; institutional

---

[16] The working paper version (Albuquerque et al., 2003) contains a detailed description of our data and its sources, as well as descriptive statistics on all variables.

quality, proxied by the Freedom House Civil Liberties index, as a measure of the strength of property rights and the absence of corruption, which should have a positive effect on foreign direct investment if the latter is inversely related to the probability of expropriation of foreign investors; trade openness, reflecting the recent literature on the complementarity of trade and foreign direct investment (specifically, we use the residuals from a regression of the ratio of total trade to GDP on the log of population, country area, and an oil exporters dummy); and, finally, three variables which attempt to measure uncertainty through the volatilities of the growth rates of real per capita GDP, the real exchange rate, and the terms of trade, all of which should be expected to affect foreign direct investment negatively. Later in the paper, we perform some robustness checks adding other local variables for which we have more limited data, such as the domestic wage rate and stock market traded value.

Our pooled sample of country-year observations is dictated by data availability only. We include in the data set every country possessing at least three complete annual observations for the period ranging from 1970 to 1999. This yields 94 countries with a combined total of over 1900 annual observations. Of these, close to one-fourth correspond to 20 industrial countries, while the rest correspond to the 74 developing countries in the sample.[17]

One concern when working with time-series data is the possibility of spurious correlation between the variables of interest. This commonly arises when the series are not stationary but integrated; that is, they contain stochastic trends. On conceptual grounds this is unlikely to be the case for the variables in our model given that they are either ratios or rates of change, whose variation is naturally bounded (Cochrane 1991). However, to dispel any doubts, we conducted tests of stationarity for each variable in the model.[18] In all cases, we are able to reject the null hypothesis of a unit root at conventional levels of significance.

3.3. Regression results

The results from estimation of the basic model are presented in Table 1. We work with three samples of countries—all, industrial, and developing countries—and report their results in the respective columns of the table. For the sample of all countries, the overall fit of the regression R^2=0.45 is substantial given the large number of observations (over 1900). Not surprisingly, much of it is due to the country-specific effects. In fact, the within-country R^2, which measures the ability of the model to explain the changes in the dependent variable within a given country, is 0.14. There are interesting differences between the industrial and developing country samples regarding the fit of the regression.

---

[17] The working paper version (Albuquerque et al., 2003) presents the full list of countries, grouped by level of development and geographic region, and their respective number of annual observations included in the sample.

[18] These tests are reported in the working paper version (Albuquerque et al., 2003). For the global variables, we used the Perron (1989) single-series unit-root test, including an intercept and a linear trend, and allowing for a series break in 1982 (corresponding to the international debt crisis). For the local variables, we conducted a variant of the Levin et al. (2002) panel unit-root test, which includes country-specific intercepts while imposing common trends and lag structure.

Table 1
Determinants of FDI: basic model

Variable	All countries	Industrial countries	Developing countries
Global variables			
G3 average interest rate	−0.1304**	−0.0928**	−0.1368**
	0.0286	0.0467	0.0354
World stock market return	−0.0019	−0.0008	−0.0022
	0.0038	0.0038	0.0050
U.S. yield curve slope	−0.3125**	−0.2612**	−0.3095**
	0.0518	0.0815	0.0615
U.S. credit spread	0.0106	0.2917	−0.1165
	0.1956	0.3614	0.2474
G3 average inflation	−0.0570**	−0.0853	−0.0504
	0.0270	0.0665	0.0335
World growth	−0.1118**	−0.1827**	−0.1062**
	0.0371	0.0731	0.0457
Local variables			
GDP growth	0.0354**	0.0653**	0.0325**
	0.0135	0.0250	0.0144
Trade openness	0.0099**	0.0172*	0.0090**
	0.0027	0.0096	0.0028
Financial depth	0.0055*	−0.0027	0.0114**
	0.0031	0.0045	0.0047
Government consumption/GDP	−0.0716**	−0.1975**	−0.0645**
	0.0227	0.0579	0.0249
REER growth	−0.0009	−0.0091	0.0000
	0.0038	0.0068	0.0042
Institutional quality	0.0012	0.0082	−0.0011
	0.0030	0.0055	0.0035
REER volatility	−0.0112	−0.0052	−0.0107
	0.0071	0.0149	0.0077
GDP growth volatility	−0.0933**	−0.0541	−0.0900**
	0.0204	0.0625	0.0210
ToT volatility	−0.0002	0.0267	0.0006
	0.0109	0.0204	0.0112
No. of observations	1926	482	1444
No. of countries	94	20	74
R^2 total	0.4482	0.3921	0.4529
R^2 within	0.1382	0.2303	0.1309

This table presents the estimated coefficients of the regression of FDI/GDP on various global and local variables. All regressions contain country-fixed effects. The sample consists of annual data spanning 1970–99 for all, industrial, and developing countries. Robust standard errors are shown below the corresponding coefficient estimates.
  * Statistical significance at the 10% level.
 ** Statistical significance at the 5% level.

While the overall R^2 is larger for developing than for industrial countries, the within-country R^2 for industrial countries is almost twice as large as that for developing countries. Therefore, relative to industrial countries, the changes in foreign direct investment in developing countries are less predictable by our set of explanatory variables.

Let us consider the results on the global variables. For the three samples under consideration, the results are similar.[19] The G-3 average bond rate, the slope of the U.S. yield curve, and the growth rate of world per capita GDP always carry significantly negative coefficients. An increase in any of these three variables denotes an improvement in the performance of international assets. The fact that both the G-3 bond rate and the slope of the U.S. yield curve carry negative and significant coefficients indicates that the opportunity cost for direct investment is driven by the return on both short and long-run global assets. This contrasts with the evidence on capital flows according to which only short-term interest rates matter for total private capital flows (Calvo et al., 1993). In turn, neither the index of global stock market returns nor the U.S. credit spread carry statistically significant coefficients.[20]

Turning to the local variables, the results for the three country samples are broadly similar with only a few discrepancies. In all three samples, the growth rate of GDP per capita and the measure of trade openness present positive and significant coefficients, while the size of government consumption carries a significantly negative coefficient. The size of these effects appears to be stronger in industrial than developing countries. Improvements in overall productivity (as reflected in higher economic growth) and larger trade openness serve to attract foreign direct investment into the country. Conversely, a rise in the burden of government (which can be interpreted as reflecting higher taxation) acts as a deterrent for foreign direct investment inflows. These findings are largely consistent with other studies (e.g., Singh and Jun, 1995; Fernández-Arias and Hausmann, 2000). In turn, the coefficient on the measure of financial depth is positive and significant in the full and developing country samples, but is not significantly different from zero in the industrial country regression. This suggests that improving financial development from low levels encourages foreign investment inflows, but the effect disappears as financial markets get highly developed. Similarly, in the samples of all and developing countries, the volatility of per capita output growth carries a negative and significant coefficient, implying that macroeconomic instability drives away foreign direct investment mainly in less-developed economies. In industrial countries, the coefficient is also negative but insignificant. The other measures of volatility (of the real exchange rate and the terms of trade) do not have a significant effect on foreign direct investment inflows in any of the samples. It is likely that their effect is already captured by the volatility of economic growth.

The rate of real exchange rate depreciation is likewise insignificant for all three samples. This contrasts with the evidence in Goldberg and Klein (1998), who find that foreign direct investment by both Japan and the United States in East Asian countries is significantly affected by bilateral real exchange rates, and casts doubt on the hypothesis in Froot and Stein (1991). Finally, we find no evidence that the quality of governance, as reflected in the civil liberties index, has an impact on foreign direct investment inflows in any sample.

---

[19] Because the G-3 inflation rate is only used as a control variable, we shall not discuss its coefficient estimate.

[20] The lack of significance of the index of world stock market returns could be interpreted as suggesting that direct investment flows do not respond to wealth effects in the same manner as U.S. portfolio equity flows; see Griffin et al. (2004).

3.4. A globalization measure

The regressions reported above confirm that foreign direct investment is affected by both local and global factors. Now we are interested in assessing the relative importance of the two in explaining the variation of foreign direct investment flows. Furthermore, we want to know if their respective contributions have changed over time, and whether they differ systematically across different groups of countries.

How much of the explanatory power of our empirical specifications is respectively due to local and global factors? The answer involves a basic identification problem, given that both sets of factors are not mutually orthogonal. The question is: To what factors should we attribute the common variation of global and local factors? Our view is that systematic contemporaneous fluctuations in global and local factors are attributable to global factors. For example, changes in domestic productivity reflect both worldwide productivity and a truly local productivity component (e.g., Glick and Rogoff, 1995). The truly local component comprises increases in productivity that are country specific. In practice, the resolution of this identification problem is not critical for our results as we show below.

Formally, let ρ be the coefficient of the linear projection of local on global factors:

$$\rho = \frac{Cov\left(\hat{\eta}^{G\prime}F^G, \hat{\eta}^{L\prime}F^L\right)}{Var(\hat{\eta}^{G\prime}F^G)}. \tag{4}$$

Then, the (direct plus indirect) contribution of the global factor to the explained variation in foreign direct investment is given by

$$\frac{(1+\rho)^2 Var\left(\hat{\eta}^{G\prime}F^G\right)}{Var(\hat{I})},$$

which we call globalization measure, where $\hat{I} = \hat{\eta}^{G\prime}F^G + \hat{\eta}^{L\prime}F^L$ is the predicted level of direct investment to GDP ratio (ignoring the regression constant and fixed-effects). By construction, the globalization measure lies between 0 and 1, with 1 indicating full globalization with no role for local factors. In computing the globalization measure, we exclude from the denominator country-specific fixed effects. Strictly speaking, they do not represent an 'explanation' of the observed variation in foreign direct investment, but rather a measure of our ignorance concerning *time-invariant* country-specific ingredients. Thus, the decompositions below refer to the 'within' variation of the data; that is, after removing the fixed effects.

To analyze how the roles of local and global factors have changed over time, we perform repeatedly the above decomposition by re-estimating our basic model, as specified in Table 1, over a changing time sample. One advantage of this approach is that it can account for potential sample breaks.[21] Specifically, we use a moving 16-year window

---

[21] Another way to account for time-changing coefficients is to model explicitly their time dependence by interacting them with linear and quadratic time trends. This exercise will be pursued in Section 5.

Table 2
Globalization measure: share of explained FDI variance by global and local factors

End year	Globalization measure			R^2	R^2 within
	All countries	Industrial countries	Developing countries		
1985	0.054	0.117	0.052	0.395	0.061
1986	0.067	0.121	0.071	0.423	0.072
1987	0.035	0.062	0.036	0.470	0.082
1988	0.004	0.029	0.002	0.510	0.096
1989	0.042	0.255	0.022	0.518	0.109
1990	0.134	0.348	0.106	0.580	0.131
1991	0.141	0.338	0.118	0.633	0.119
1992	0.234	0.486	0.199	0.602	0.106
1993	0.253	0.476	0.226	0.601	0.109
1994	0.472	0.626	0.446	0.592	0.105
1995	0.449	0.519	0.439	0.550	0.122
1996	0.520	0.592	0.514	0.524	0.126
1997	0.437	0.505	0.429	0.512	0.145
1998	0.516	0.657	0.494	0.512	0.167
1999	0.600	0.769	0.572	0.498	0.159

This table reports the path of the globalization measure in the sample of all, industrial and developing countries. To calculate the globalization measure, we first reestimate the basic model reported in Table 1 over moving 16-year windows, spanning 1970–99. Then, we compute the share of explained FDI variance accounted for by global factors, either directly or indirectly through their impact on local variables. The date reported in the table corresponds to the last year of each window of estimation. R^2 and R^2 within refer to the sample of all countries.

to define the relevant time sample for each reestimation.[22] In each estimation, we use the sample of all countries available in the corresponding time window. Using the parameter estimates obtained in each window, we compute the shares of variance explained by global and local factors for the samples of all, industrial, and developing countries.[23]

   Table 2 and Fig. 1 report how the globalization measure has evolved over time. There are two very clear results. The first is that the share of variance explained by global factors or globalization measure has increased notably in the last 15 years, from less than 10% to about 60%. Furthermore, the increase is statistically significant, as implied by the 95% confidence bands shown in Fig. 1, derived from a bootstrapping procedure.

   The second result is that the globalization measure is larger for industrial than for developing countries. This is natural and reassuring given that the former are arguably more integrated economies. This difference fluctuated considerably over the years but has been shrinking in the later part of the 1990s. Indeed, the same bootstrapping procedure used above shows that, in the period 1989–93, the estimates of the contribution of the global factor for industrial countries lie outside the 95% confidence

---

[22] Note that the country sample may change slightly across re-estimations due to the fact that the panel is unbalanced, and this could lead to changing coefficient estimates just because of the changing country composition of the sample. We will show later that this is not a concern by repeating the experiment using a balanced sample, which yields very similar results to those reported here.

[23] That is, for a given estimation window, we allow the data but not the estimated parameters to vary across the three country samples. For all three samples, we perform the decomposition using the parameters obtained from estimating the model on the sample of all countries over the corresponding window.
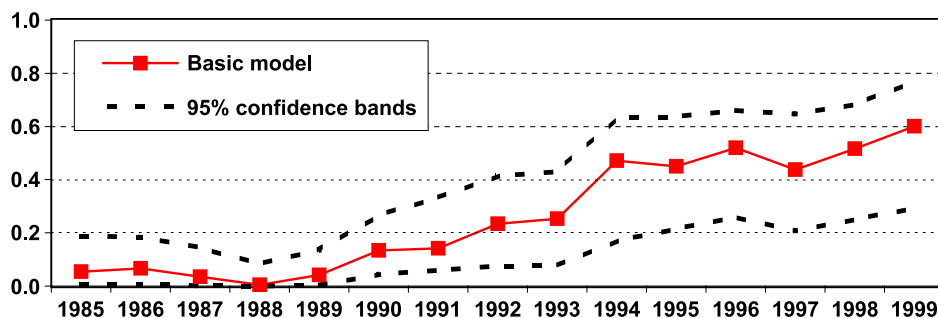
Fig. 1. Globalization measure: share of explained FDI/GDP variance accounted for by global factors. This figure reports the globalization measure over the period 1985–99 as given in Table 2 (■). The figure also shows the globalization measure's 95% confidence bands (- - -), constructed through a bootstrapping procedure using 800 replications per subsample.

bands constructed for developing countries, suggesting that the difference between the two sets of countries regarding the role of global forces was significant. After 1994, this ceases to be the case.

Where does the increased importance of the global factors come from? Fig. 2 shows that it reflects both the direct action of global factors on foreign direct investment as well as the indirect one acting through local variables. The figure plots the basic globalization measure (from Fig. 1) along with one that does not include the indirect effect; that is, computed by setting $\rho=0$ in Eq. (4). The latter measure can be interpreted as the direct contribution of global factors to the explained variation in foreign investment. It shows a rising trend, reflecting the increasing importance of the direct effect of global factors on foreign direct investment inflows. This direct effect also represents the dominant source of movement in our globalization measure which indicates that our results do not hinge on our identification scheme. Nevertheless, the difference between the two measures is also rising over time, denoting a growing importance of the indirect effect of global factors through local ones.
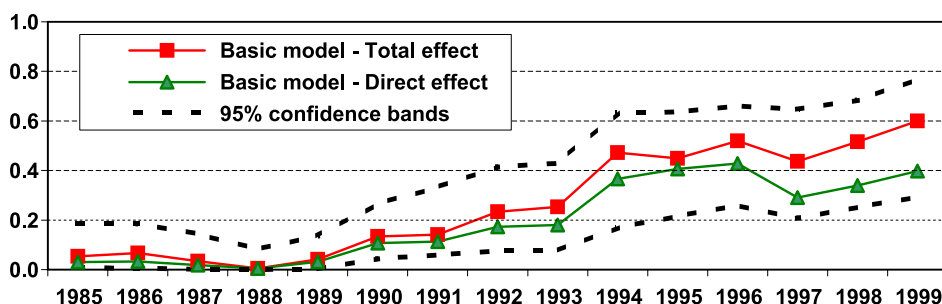

Fig. 2. Globalization measure: total (■) and direct (▲) effect of global factors. This figure reports the globalization measure for the sample of all countries and period 1985–99 both including and excluding the indirect effect on FDI of global factors through local variables. It also shows the globalization measure's 95% (- - -) confidence bands, constructed through a bootstrapping procedure using 800 replications per subsample.

We can dig one level deeper and assess whether the increasing role of global factors is mostly due to an increase in their variability (relative to that of direct investment) over time, or reflects instead a growing impact of global variables on direct investment, as measured by their respective regression coefficients. This is important because it could be argued that our globalization measure is mostly capturing a relative decrease in the variance of local factors.[24]

To examine this question, it is useful to consider the following decomposition of the change in the direct contribution of the global factors:

$$\frac{Var(\hat{\eta}_\tau^{G\prime} F_\tau^G)}{Var(\hat{I}_\tau)} - \frac{Var(\hat{\eta}_0^{G\prime} F_0^G)}{Var(\hat{I}_0)} = \left[\hat{\eta}_\tau^{G\prime} \frac{Var(F_\tau^G)}{Var(\hat{I}_\tau)} \hat{\eta}_\tau^G - \hat{\eta}_0^{G\prime} \frac{Var(F_\tau^G)}{Var(\hat{I}_\tau)} \hat{\eta}_0^G \right]$$
$$+ \left[\hat{\eta}_0^{G\prime} \left(\frac{Var(F_\tau^G)}{Var(\hat{I}_\tau)} - \frac{Var(F_0^G)}{Var(\hat{I}_0)} \right) \hat{\eta}_0^G \right],$$

where recall $\hat{I} = \hat{\eta}^{G\prime} F^G + \hat{\eta}^{L\prime} F^L$ is the predicted level of direct investment to GDP ratio. Here, the time subscripts 0 refers to the base year, and the subscript τ refers to the (end) date of each of the rolling windows over which the globalization measure is computed. The change in the direct contribution of the global factor therefore consists of two ingredients, respectively captured by the two terms in the right-hand side. First, the effect of changing parameters of the global factors in the investment regression, and second, the effect of changing variances of the global factors, relative to the variance of (explained) foreign direct investment. Fig. 3 plots these two ingredients (taking 1985 as base year), along with the change in the indirect contribution of the global factor, constructed from the preceding figure. The sum of all three ingredients equals the total change in the globalization measure relative to the base year.

It is apparent from Fig. 3 that the bulk of the increase in the globalization measure over time is due to the growing direct effect of global factors on direct investment, as captured by the rising magnitude of their regression coefficients. The indirect contribution through local factors also follows a rising trend. In contrast, the changes in the variance ratio have had a minimal effect over the sample period. In fact, their contribution to the observed change in the globalization measure has declined (becoming even negative) in recent years. Therefore, it is not the variability of the global factors that explains the rise in the globalization measure, but rather the rising exposure of foreign direct investment to global factors both directly and indirectly—and particularly the former.

It is important to note that the ability of the model to explain foreign direct investment inflows (R^2) has increased over the last 15 years of the sample, as shown in Table 2. Even more remarkable is the rise in the within-R^2, from about 6% to 16%, revealing an improved performance of the model to explain the changes in foreign direct investment inflows over time. Throughout the last 15 years, the ratio of within-to total-R^2 grew

---

[24] For example, the volatility of local variables could have declined over time reflecting the efforts at macroeconomic stabilization in many developing countries. Alternatively, the variability of global factors in the latter part of our sample might have risen reflecting the occurrence of major international financial crises.
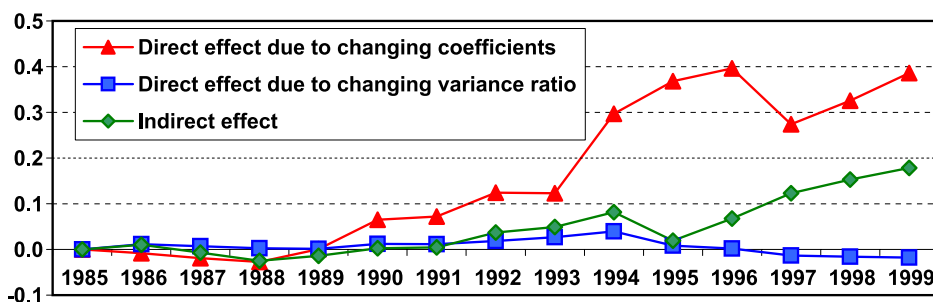
Fig. 3. The contribution of global factors: change from initial year. This figure reports the components of the change in the globalization measure relative to 1985, the base year. The components consist of the indirect effect of the global factor through local variables (♦), the direct effect due to changing coefficients in the FDI regression (▲), and the direct effect due to changes in the variance of global factors (■).

gradually from about one-sixth to close to one-third, implying that our explanatory variables gained predictive power on foreign direct investment inflows relative to the (unobserved) country-specific effects. This complements the evidence in favor of the increasing role of global factors in explaining foreign direct investment inflows.

4. International financial liberalization

This section provides a rationale for the growing relevance of global factors in explaining foreign direct investment based on the recent worldwide patterns of increased financial integration.

4.1. The theory

International financial liberalization allows countries to diversify their unsystematic risks (see Stulz, 1999a,b, for a review). This diversification effect changes investors' discount rates and asset allocation decisions, including direct investment choices, putting greater weight on systematic risks which are also global factors.

Take our model from Section 2 and liberalize financial trade between countries 1 and 2. Liberalization occurs in the following specific sense: Allow trade on a zero expected value forward contract that pays $\omega/2 - \omega_1$. Identifying financial liberalization with the establishment of a market on forward contracts on ω is done for clarity of our argument, not because we think that this is the way liberalizations proceed. An alternative liberalization strategy, which produces identical results, is to allow foreign equity ownership of the 'tree' producing the endowment ω in each country. Moreover, the results below continue to hold if full liberalization of international trade in financial assets is allowed.

Investors in countries 1 and 2 can now hedge part or all of the unsystematic risk embedded in the endowment shock ω. In the new equilibrium, optimal foreign direct investment from country 1 into country 2 does not depend on the conditional distribution

properties of ω (say its conditional variance). This is because equilibrium consumption allocations in country 1 are

$$c_t^1 = W_t^1 - K_1^1 - K_2^1$$

$$c_{t+1}^1 = \bar{\omega}/2 + A_1 K_1^{1\alpha} + A_2 K_2^{1\alpha},$$

which are achieved by having country 1's investor buying from country 2's investor the forward contract that pays $\bar{\omega}/2 - \omega_1$.

This simple exercise demonstrates how financial liberalization can eliminate the role of some local factors in explaining foreign direct investment. Still, other local factors are relevant: Flows of foreign direct investment depend on local factors embedded in the productivity levels A_i.

How general is this result? Consider first the extreme case of liberalization of financial markets towards a perfect risk sharing setting and let investors have the same initial wealth levels.[25] In the complete markets equilibrium, financial assets are traded so that marginal utilities are equalized and consumption levels across countries depend on the same sources of uncertainty. Hence, all factors are global factors. For example, country 2's local productivity shock that before was a local factor explaining investment by country 1 into country 2, (but not investment by country 3), now is a global factor as it explains investment across all countries.[26] If there is any foreign direct investment in this complete markets equilibrium, it depends solely on global factors.[27] More generally, however, one should not expect the role of local factors to be fully eliminated even if a full set of assets is available for a variety of reasons, namely the existence of nontraded goods or imperfect enforcement of international contracts, which guarantee only the existence of a constrained Pareto optimum, and investor heterogeneity due to asymmetric information.

Finally, we have not said what would happen to the composition of capital flows, particularly if the financial liberalization includes taking equity positions on the other production assets. It is possible that direct investment declines upon liberalization in favor of portfolio equity if they are substitutes, or that they both increase if they are complements (which seems to be the case empirically). Although this is an interesting question on its own, it is not the focus of this paper or of the current exercise. Here, we argue solely that whatever direct investment exists in the postliberalization period, it has a greater exposure to global factors.

---

[25] If wealth levels are different, the central planner allocates Negishi weights to each agent so that they can afford their optimal consumption plans.

[26] Country 2's specific productivity shock now drives worldwide consumption against which each investor holds a set of contingent claims.

[27] There remains the question of under what conditions would the implementation of the Pareto optimum allocations require anything like foreign direct investment. This is an interesting question that is outside the scope of this paper.

4.2. The evidence

In this subsection, we correlate our globalization measure with measures of financial liberalization. We use the liberalization measures in Bekaert et al. (2002c)—official liberalization, first sign, and investability—plus a measure of balance-of-payments restrictions reported by the International Monetary Fund. Official liberalization is a dummy variable that takes the value of one if the equity market is liberalized by the government, according to the chronology in Bekaert and Harvey (2000). First sign is a broader measure that takes the value of one if either the equity market is officially liberalized or an American Depositary Receipt and country fund are introduced.[28] Investability is the ratio of capitalization of International Finance Corporation's "investable" to "global" stocks in a country. This is the measure applied in Edison and Warnock (2003) and first used by Bekaert (1995). For balance-of-payment restrictions, we consider four types of restrictions recorded by International Monetary Fund (IMF; various issues). They are (i) restrictions on payments for capital transactions, (ii) restrictions on repatriation of foreign investment earnings, (iii) presence of multiple exchange rates, and (iv) restrictions on current account transactions. For each of these categories, the IMF records a score of 1 when restrictions apply, and 0 otherwise. Our proxy is the sum of these scores for a given country and year.

Each of these liberalization variables is country-specific, while our globalization measure applies to groups of countries. To come up with a proxy for the extent of liberalization in a particular group of countries, we compute a GDP-weighted average of each liberalization variable.

In Table 3, we report the results of regressing the globalization measure on the 4 different indices of liberalization. As expected, the signs of the coefficients are positive for the first three measures and negative for balance of payments restrictions (a high value for balance of payments restrictions indicates low liberalization). Most coefficients are significant at the 1% level, and the R^2 values from the regressions are high, particularly in developing countries (ranging from about 0.50 to 0.80) and somewhat smaller in industrial countries (about 0.23 for the first three measures and 0.60 in the case of the IMF's measure). On the whole, these results indicate that a substantial portion of the time series variation of our globalization measure is accounted for by the rise of world market integration.

One possible concern with these regressions is that their results would be spurious if the variables involved had unit roots. Conceptually, this is unlikely given that the globalization and financial liberalization measures are indices, which, by construction, are bounded (and, thus, have well-defined asymptotic means and variances). Statistically, we can test whether the two measures of interest, for the various samples considered, are indeed stationary. Their very small time-series dimension (at most, 15 observations) poses the problem of low power of the usual tests. For this reason, in the case of the financial liberalization indicators, we implemented panel unit root tests similar to those performed on all variables of the basic FDI regression, thus taking advantage of the time series and cross-sectional variation of the

---

[28] For developed countries, first sign turns out to be identical to official liberalization.

Table 3
Globalization and liberalization

Sample	Financial liberalization indicators			
	Official liberalization	First sign	Investability	Balance-of-payment restrictions
All countries	3.139**	3.640**	4.291**	−0.944**
	0.545	1.074	1.043	0.176
	0.715	0.445	0.364	0.758
Industrial countries	37.270**	37.270**	37.960**	−0.867**
	9.438	9.438	11.245	0.199
	0.229	0.229	0.230	0.490
Developing countries	0.493**	0.675**	0.759**	−0.437**
	0.067	0.162	0.114	0.072
	0.750	0.527	0.780	0.744
Asia and Pacific	0.567**	0.801**	1.366**	−0.676**
	0.065	0.292	0.239	0.110
	0.838	0.360	0.834	0.420
Latin America	0.457**	0.539**	0.579**	−0.292**
	0.079	0.172	0.120	0.054
	0.631	0.313	0.682	0.776

This table reports the regression of globalization measures on each of the following liberalization indicators: official liberalization, first sign, investability, and balance-of-payment restrictions. For each year of the period 1985–99, we compute the globalization measure for the sample of countries given below and the corresponding GDP-weighted average of each financial liberalization measure. For each regression, we report the slope coefficient, the robust standard errors and the R^2, respectively.
** Statistical significance at the 5% level.

indicators themselves. The tests' results yield a clear rejection of the null of non-stationarity.[29] For the globalization measure, we only have the time series dimension. In this case, we conducted ADF tests (for the null of nonstationarity) and the Kwiatkowski et al. (1992) tests (for the null of stationarity). In most cases (in particular for the samples of all and developing countries), the two tests coincide in validating the assumption of stationarity. In the rest, the tests yield inconclusive results (both fail to reject the null), an indication of their low power in small samples.

At any rate, to ensure that the results in Table 3 are not spurious due to stochastic or deterministic trends, we repeated the regressions expressing both the dependent and independent variables in first differences (hence, losing any long-run information embedded in the levels of the variables). The sign of the parameter estimates was preserved in the vast majority of cases (16 out of 20), although their precision (and the fit of the equations) declined considerably. Only seven (all correctly signed) remained significant at the 15% level or better, including all but one of those obtained from the regressions with First Sign as the explanatory variable.

In summary, while the results in Table 3 should be taken as tentative, given the small sample sizes involved, on the whole, they suggest that the process of increasing financial and capital market integration worldwide has contributed to a larger role of global factors

---

[29] The computed values of the test statistic were: −10.9 for official liberalization, −12.5 for First sign, −7.9 for investability, and −15.9 for BoP restrictions. All four exceed the 5% critical value.

in driving direct investment. Moreover, the increased relevance of global factors appears to be more closely connected to capital market liberalization in the case of developing countries than in the case of industrial countries.

5. Extensions and robustness

In this section, we conduct a number of extensions to the basic model with the dual purpose of presenting additional results and checking the robustness of our basic findings. Thus, each extension consists of three elements: re-estimation of the foreign direct investment regression, calculation of the corresponding path of the globalization measure, and regression of the latter on each of the four liberalization indicators.[30] We consider three kinds of extensions. In the first, we add new variables to the basic model; in the second, we treat the global factors in a variety of different ways; and, in the third, we work with alternative samples and assumptions about the properties of the regression residual.
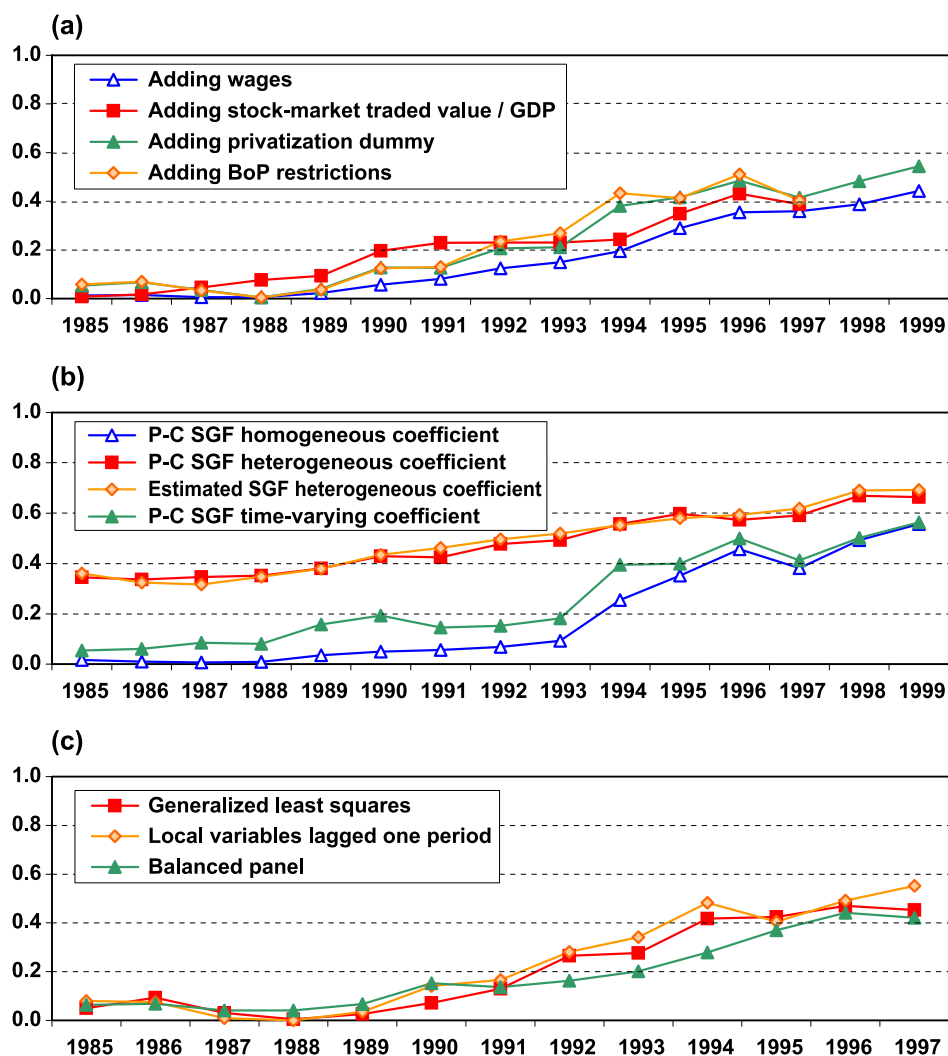
5.1. Additional explanatory variables

Although our basic model includes a large number of regressors, some potentially important explanatory variables are absent because of concerns regarding the quality and coverage of their data. Here we add them (one at a time) to the basic model. They are the local wage rate (in the manufacturing sector), the local stock-market activity (proxied by the ratio of stock market traded value to GDP), the occurrence of privatization of state-owned enterprises (as a binary variable), and a measure of balance of payments restrictions (derived from IMF statistics). Despite the addition of new variables and, in some cases, the reduction of the sample, most of the main results are qualitatively unchanged with respect to the basic specification discussed earlier. Regarding the new variables, we find that local labor costs tend to discourage foreign investment inflows, and so do balance of payments restrictions. On the other hand, both local stock-market activity and the occurrence of privatization are positively related to foreign direct investment.

Fig. 4(a) graphs the path of the globalization measure that results from each of these extensions. It shows an upward trend in all cases, similar to that of the basic model, reflecting the rising contribution of global factors—from less than 10% to over 40% of the explained direct investment variance. These globalization measures are also positively and significantly related to the indicators of financial liberalization with R^2 values ranging 0.40 to 0.80.

5.2. Alternative treatment of the global factors

In our basic empirical model we assumed that the global factors were directly observable and could be represented by a set of global variables. Here, we assume that

---

[30] This is an abridged version of our work on extensions and robustness. Further specification details, the regression tables on the determinants of FDI, the regression tables on the link between globalization and financial liberalization, and fuller discussion is provided in the working paper version; see Albuquerque et al. (2003).

(a)

(b)

(c)

Note: P-C SGF means Principal Component Synthetic Global Factor.

Fig. 4. Globalization measure. Extensions share of explained FDI/GDP variance accounted for by global factors: (a) additional explanatory variables; (b) alternative treatments of global factors; and (c) alternative properties for the sample and regression residual.

there is a unique global factor that is unobservable, but can still be proxied by a linear combination of global variables (thus, we call it synthetic global factor). Furthermore, in the basic model, we assumed that the effects of global variables were homogeneous across countries. Here we consider the possibility that the effect of the global factor on foreign direct investment be country-specific. Finally, in the basic model, we computed the path of the globalization measure through the estimation of rolling regressions. As an

alternative, here we allow directly for time-varying effects of the global factor by interacting it with linear and quadratic time trends. This allows computing the path of the globalization measure from one single regression. In summary, we consider four alternative treatments of global factors: in the first, the unobserved global factor is obtained from the principal components of the global variables, and its coefficient in the FDI regression is assumed to be homogeneous across countries; in the second, the global factor is obtained as in the first case, but now, its coefficient is allowed to be heterogeneous across countries; in the third case, the coefficients are also heterogeneous, but the global factor is derived econometrically in the process of estimating the FDI regression; finally, in the fourth alternative, we go back to the principal-component derived global factor with homogenous coefficients across countries, but this time, we allow its effect to vary with time.

In the first alternative, the synthetic global factor carries a negative and significant coefficient. This accords with the results from the basic model, in which the global variables that reached statistical significance also carried negative coefficients. As measured here, a decline in the synthetic global factor represents less attractive conditions for investment in international markets. The regression results confirm that this acts as a push force for foreign direct investment into local markets. For the second and third alternatives, we expect that allowing country-specific responses to global conditions would increase the ability of the global factor to explain the observed variation in foreign direct investment. This is indeed the case as the regression R^2 increases from 0.45 in the basic specification to 0.56 and 0.71 in the second and third alternatives, respectively. In both cases, the mean of the country-specific coefficients are significantly negative and not very different from the coefficient estimated under the assumption of homogeneous effects. The majority of the individual country estimates are negative, but they do present some dispersion. The last alternative treatment of the global effect consists in allowing it to vary over time, while restricting it to be homogenous across countries. We find that the coefficient on the synthetic global factor continues to be significantly negative, while the coefficients on its interactions with linear and quadratic time trends are positive and negative, respectively. Using the point estimates to calculate the marginal effects of the global factor over time, we observe that their absolute value describes a U-shaped path, with the lowest point occurring at the tenth year of the sample (1980). Therefore, focusing on the period 1985–99, we find that the magnitude of the global factor effect on direct investment increases over time, just as we found using rolling regressions.

Fig. 4(b) graphs the path of the globalization measure for each of the alternative ways of modeling the global factor. All of them show increasing trends. The two extensions that assume homogenous effects across countries render globalization measures that are quite similar to that of the basic model. The two extensions that allow for country-specific responses to the global factor yield globalization measures that are still upward-sloping, but less steep than that derived from the basic model. Furthermore, in these two cases, the globalization measure lies uniformly above that of the basic model, reflecting an increased explanatory power of the global factor. All these globalization measures continue to be positively and significantly related to the indicators of financial liberalization with R^2 values ranging from about 0.35 to 0.75.

5.3. Alternative sample and residuals specifications

The last group of extensions deals with alternative assumptions regarding the sample and the regression residual. Our basic model assumes that, once we control for country-specific effects, the residuals follow a white-noise process and are uncorrelated with the right-hand side variables. Furthermore, the unbalanced nature of the sample is taken to be innocuous; that is, the potentially distorting effect of a changing country sample on the coefficient estimates is ignored.

Here we relax these assumptions by conducting three additional exercises. In the first, we allow the residuals to be serially correlated and heteroskedastic. In particular, we let the residuals follow an AR(1) process with country-specific autocorrelation coefficients, and allow their variance to differ across countries. In the second, we check the robustness of our results to potential simultaneity between direct investment inflows and local variables. For this purpose, we replace the contemporaneous (potentially endogenous) values of the latter with once-lagged (predetermined) values. Finally, we verify that our main results do not change substantially if we restrict ourselves to a balanced sample; that is, one where all countries in the sample have a complete set of observations.

For these extensions, most estimation results of the FDI regression remain qualitatively the same as in the basic specification. Fig. 4(c) graphs the path of the globalization measure that results from each extension. In all cases, we find an upward trend, quite alike that of the basic model. These globalization measures are also positively and significantly related to the indicators of financial liberalization with R^2 values ranging from 0.4 to 0.8.

In sum, although there may be some quantitative differences between the estimates of the foreign direct investment regression in the basic model and those in the various extensions we have considered, the resulting globalization measures and their relationship with financial liberalization are remarkably similar. All point to a substantial increase of the relevance of global factors in explaining the variation in foreign direct investment inflows and a significant relationship between this trend of increasing globalization and the process of world financial integration.

6. Final remarks and policy implications

This paper presents strong evidence that the evolution of foreign direct investment flows in recent years reflects an increasing role of global factors in both industrial and developing countries. This increased relevance of global factors is linked to an increased integration of world capital markets following the many reforms and liberalization programs of the mid-1980s and -1990s.

Our results complement those of papers that find increases in the extent of integration (mainly) after 1990 by studying the behavior of equity returns in several emerging markets. Unique to our paper is the analysis of integration focused on capital flows as opposed to prices, and considering the process of integration for emerging as well as developed economies. In addition, the analyses in the previous literature by considering only the impact of liberalization on stock market prices in emerging

economies restricted itself to a very small portion of the overall domestic economy. Carrieri et al. (2002) show that, in the 1990s, significantly more of the variation in returns of 'ineligible' domestic securities can be explained by the world return. Similarly, Bekaert et al. (in press) find that equity returns display greater correlation with regional and world market returns after 1990, and Bekaert and Harvey (1997) show that global factors (characterized by a similar set of variables as used in this paper) have become more important after liberalizations in explaining stock return volatility in emerging markets.

The paper also makes a contribution to the literature on the determinants of foreign direct investment. We develop theoretical arguments and motivate extensively the presence of global factors as drivers of foreign direct investment. While our findings constitute evidence of the relevance of global or external factors in foreign direct investment, we also find that growth in local productivity, trade openness, financial depth, low government burden, and macroeconomic stability are important domestic drivers.

The finding that local factors have become less important in accounting for the variation in foreign direct investment should not be seen as an endorsement for a hands-off attitude of local governments towards foreign investment. Much to the contrary. First, our empirical model explains roughly 50% of the cross sectional and time series variation in foreign direct investment. It could be that some of the remaining variance in direct investment is coming from local factors that we are omitting and that are largely uncorrelated with global factors. Although we find this hypothesis unlikely due to the extensive list of variables that we use, we cannot completely rule it out, especially for developing countries where fixed-effects play a big role. Second, local factors still account for a sizeable amount of variation in foreign direct investment even after excluding the component that is due to the correlation of local and global factors. Disregarding their role could turn sour particularly in crisis periods, when the characteristics of local factors can be determinant to prevent massive outflows. Third, and related to the points above, the dynamics of foreign capital inflows will certainly always involve a cross country comparison leading to a selection that in itself is mainly driven by a direct comparison of local factors and possibly also by how these local factors relate to the multinational's own global risk factors. This is because the world economy is very far from a complete markets economy. Finally, much of the integration of capital markets comes from policy initiatives taken from within each country. In many emerging economies, the defense of existing reforms and the pursuit of further liberalization policies represents a challenge for local policy makers that cannot be put off.

Acknowledgements

References

Albuquerque, R., 2003. The composition of international capital flows: risk sharing through foreign direct investment. Journal of International Economics 61, 353–383.

Albuquerque, R., Loayza, N., Servén, L., 2003. World market integration through the lens of foreign direct investors. World Bank Policy Research Working Paper 3060.

Bacchetta, P., van Wincoop, E., 2000. Capital flows to emerging markets: liberalization, overshooting, and volatility. In: Edwards, Sebastian (Ed.), NBER Conference Volume Capital Flows and the Emerging Economies.

Beim, D.O., Calomiris, C., 2001. Emerging Financial Markets. McGraw-Hill/Irwin, New York.

Bekaert, G., 1995. Market integration and investment barriers in emerging equity markets. World Bank Economic Review 9, 75–107.

Bekaert, G., Harvey, C., 1995. Time varying world market integration. Journal of Finance 50, 403–444.

Bekaert, G., Harvey, C., 1997. Emerging equity market volatility. Journal of Financial Economics 43, 29–78.

Bekaert, G., Harvey, C., 2000. Foreign speculators and emerging equity markets. Journal of Finance 55, 565–613.

Bekaert, G., Harvey, C., Lumsdaine, R., 2002a. Dating the integration of world capital markets. Journal of Financial Economics 65, 203–249.

Bekaert, G., Harvey, C., Lumsdaine, R., 2002b. The dynamics of emerging market equity flows. Journal of International Money and Finance 21, 295–350.

Bekaert, G., Harvey, C., Lundblad, C., 2002c. Growth Volatility and Equity Market Liberalization, working paper GSB Columbia University.

Bekaert, G., Harvey, C., Ng, A., 2002. Market Integration and contagion. Journal of Business (in press).

Calvo, S., Reinhart, C.M., 1996. Capital flows to Latin America: is there evidence of contagion effects? In: Calvo, G., Goldstein, M., Hochreiter, E. (Eds.), Private Capital Flows to Emerging Markets After the Mexican Crisis. Institute for International Economics, Washington, DC, pp. 151–171.

Calvo, G., Leiderman, L., Reinhart, C., 1993. Capital inflows to Latin America: the role of external factors. IMF Staff Papers 40, 108–151.

Campbell, J.Y., Hamao, Y., 1992. Predictable stock returns in the United States and Japan: a study of long-term capital market integration. The Journal of Finance 47, 43–69.

Carr, David L., Markusen, James R., Maskus, Keith E., 2001. Estimating the knowledge–capital model of the multinational enterprise. American Economic Review 91, 693–708.

Carrieri, F., Errunza, V., Hogan, K., 2002. Characterizing World Market Integration through Time, working paper McGill University.

Casson, M., 1979. Alternatives to the Multinational Enterprise. Macmillan, London.

Caves, R., 1996. Multinational Enterprise and Economic Analysis. Cambridge University Press, Australia.

Chari, A., Henry, P.B., 2004. Risk sharing and asset prices: evidence from a natural experiment. Journal of Finance 59, 1295–1324.

Cochrane, J., 1991. Comment. NBER Macroeconomics Annual.

Eaton, J., Gersovitz, M., 1984. A theory of expropriation and deviations from perfect capital mobility. Economic Journal 94, 16–40.

Edison, H., Warnock, F., 2003. A simple measure of the intensity of capital controls. Journal of Empirical Finance 10, 81–103.

Eichengreen, Barry, 2001. Capital account liberalization: what do the cross-country studies tell us? The World Bank Economic Review 15, 341–365.

Errunza, V., Losq, E., 1985. International asset pricing under mild segmentation and segmentation hypothesis. Journal of Finance 40, 105–124.

Errunza, V., Hogan, K., Hung, M., 1999. Can the gains from international diversification be achieved without trading abroad? Journal of Finance 54, 2075–2107.

Fernández-Arias, E., 1996. The new wave of private capital inflows: push or pull? Journal of Development Economics 48, 389–418.

Fernández-Arias, E., Hausmann, R., 2000. FDI: Good Cholesterol? Paper prepared for the seminar The New Wave of Capital Inflows: Sea Change or Just Another Tide. Annual Meeting of the Board of Governors, Inter-American Development Bank and Inter-American Investment Corporation.

Froot, K.A., Stein, J., 1991. Exchange rates and foreign direct investment: an imperfect capital markets approach. Quarterly Journal of Economics 106, 1191–1217.

Glick, R., Rogoff, K., 1995. Global versus country-specific productivity shocks and the current account. Journal of Monetary Economics 35, 159–192.

Goldberg, L.S., Klein, M.W., 1998. Foreign direct investment, trade and real exchange rate linkages in developing countries. In: Glick, Reuven (Ed.), Managing Capital Flows and Exchange Rates: Perspectives from the Pacific Basin. Cambridge University Press.

Griffin, J., Nardari, F., Stulz, R., 2004. Are daily cross-border equity flows pushed or pulled? Review of Economics and Statistics 86, 641–657.

Harvey, C., 1991. The world price of covariance risk. Journal of Finance 46, 111–158.

Henry, P.B., 2000. Stock market liberalization, economic reform, and emerging market equity prices. Journal of Finance LV, 529–564.

Hodder, J.E., Senbet, L.W., 1990. International capital structure equilibrium. Journal of Finance 45, 1495–1516.

Horst, T., 1973. The simple analytics of multinational firm behavior. In: Connolly, M.B., Swoboda, A.K. (Eds.), International Trade and Money. Allen & Unwin, London.

Iscan, T.B., 2000. The terms of trade, productivity growth and the current account. Journal of Monetary Economics 45, 587–611.

Kindleberger, C.P., 1966. European integration and the international corporation. Columbia Journal of World Business 1, 65–73.

Klein, Michael W., Peek, Joe, Rosengreen, Eric S., 2002. Troubled banks, impaired foreign direct investment: the role of relative access to credit. American Economic Review 92, 664–682.

Kwiatkowski, D., Phillips, P.C.B., Schmidt, P., Shin, Y., 1992. Testing the null hypothesis of stationarity against the alternative of a unit root: how sure are we that economic time series have a unit root? Journal of Econometrics 54, 159–178.

Levin, Andrew, Lin, Chien-Fu, Chu, Chia-Shang James, 2002. Unit root test in panel data: asymptotic and finite-sample properties. Journal of Econometrics 108, 1–24.

Marston, R.C., 1995. International Financial Integration: A Study of Interest Differentials Between the Major Industrial Countries. Cambridge University Press, Cambridge, UK.

Mills, L., Newberry, K.J., 2002. Do worldwide tax incentives affect the income reporting and capital structure of foreign-controlled US corporations? working paper University of Arizona.

Perron, Pierre, 1989. The great crash, the oil price shock, and the unit root hypothesis. Econometrica 57, 1401–1631.

Razin, A., Sadka, E., Yuen, C., 1999. Excessive foreign direct investment flows under asymmetric information, NBER working paper no. W7400.

Rowland, P., Tesar, L., 2004. Multinationals and the gains from international diversification. Review of Economic Dynamics 7, 789–826.

Singh, H., Jun, K.W., 1995. Some new evidence on determinants of foreign direct investment in developing countries. Policy Research Working Paper, vol. 1531. The World Bank.

Stulz, R., 1999a. International portfolio flows and security markets. In: Feldstein, M. (Ed.), International Capital Flows. The University of Chicago Press, Chicago.

Stulz, R., 1999b. Globalization (corporate finance) and the Cost of Capital. Journal of Applied Corporate Finance 12, 8–25.

Tesar, L., Hull, L., 2000. The structure of international capital flow, working paper University of Michigan.