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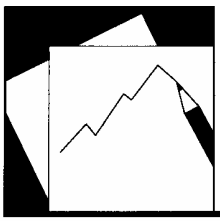

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Multinational Affiliates and Local Financial Markets

Alexander Lehmann, Selin Sayek, and Hyoung Goo Kang

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Policy Development and Review Department

Multinational Affiliates and Local Financial Markets

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Abstract

We use data on the sources of debt finance of U.S. majority-owned foreign affiliates in 53 countries over the period 1983 to 2001 to examine the role of financial market development, and exposure to host country-specific risk on the financing choices of these affiliates. We find that total balance sheets are about four times as large as the cross-border component of foreign direct investment (FDI). The extent of financial leverage through local debt is positively related to host-country corporate tax rates, exchange rate variability, local currency-denominated sales, and financial development. Factors that further the role of local debt reduce that of parent company debt, and through this substitution overall leverage increases.

JEL Classification Numbers: F23, F36, G32

Keywords: Multinational companies, financial development, capital structure

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Contents Page

I. INTRODUCTION

It is a common implicit assumption in international macroeconomics that the stock of foreign direct investment (FDI) is synonymous with the stock of foreign-controlled assets, and hence a good measure of the extent of international production sharing. Enterprises established through such investment—variously called multinational subsidiaries or foreign affiliates—are also portrayed as a conduit for international capital flows, even in financially underdeveloped economies that lack access to other asset classes. According to this view, both the initial investment in the foreign affiliate and the subsequent expansion of its balance sheet can be financed from foreign sources by virtue of the affiliate's unfettered access to the multinational's internal capital market.

Several studies in the international finance literature have demonstrated that these assumptions are mistaken. Feldstein (1994), for instance, showed that U.S. foreign affiliates extensively access financial markets in their host countries, for the purpose of utilizing the tax deductibility of interest expenses and as a natural hedge against fluctuations in future local currency earnings. Up to the early 1990s, outward FDI from OECD countries reduced investment in the home countries of parent firms almost one for one, largely due to the integrated capital budgeting process within the multinational company. Host country borrowing by foreign affiliates hence allows access to funds that would not otherwise have been available to the investor country. This is an interesting contrast to portfolio capital where hedging transactions appear to offset gross flows, as is evidenced in the high savings retention coefficients that were first observed by Feldstein and Horioka (1980).

These stylized facts are rationalized in the corporate finance literature, which suggests that the mix of financing from external and host country sources is a function of relative costs and of the risk characteristics of the enterprise. The desire on the part of the foreign investor to hedge local currency exposure through comparatively expensive local finance may outweigh the opportunity cost of foregoing cheaper finance, either directly from the parent company in the form of FDI or from third parties on the basis of a parent guarantee. In extremis, local market-oriented FDI may be discouraged in the absence of such hedging opportunities in domestic financial markets, and existing FDI enterprises may remain financially independent, without recourse to guarantees from the parent firm. By contrast, investors whose revenues are denominated in foreign currency, notably in the extractive sector industries, are likely to give less attention to the development of local financial markets.

In this paper we demonstrate that foreign-controlled assets could be as much as three times as large as FDI stocks, and four times as large if only the cross-border component of FDI is considered. We then use a unique data set to examine the determinants of the financing choices of multinational subsidiaries in 53 countries over the period 1983 to 2001. The contribution of host country finance appears to go up with the extent of exposure to local currency revenues, variability in the host country exchange rate, and financial development in the host economy. This is an effect that has not been picked up by the previous empirical literature which examined the effect on FDI flows of exchange rate variability, and,

separately, of host country financial development. As these papers examined only one component of financing, they arguably utilized an inappropriate dependent variable.

Our findings provide some insight into the cross-country determinants of financial linkages by multinational investors, which in many countries represent the most important foreign asset class. The importance of currency and financial risk in driving the extent of exposure to host country financial markets is prima facie evidence that hedging is an important motive for these linkages. While underlying investments are typically highly illiquid, foreign direct investors have often been observed to borrow from local financial markets with the objective of reducing their exposure to host country currency or other risk. Our findings also have a number of implications for host country policies. Typically, investment policies aim at maximizing the extent of foreign-controlled activity, not just the stock of foreign direct investment. Only financial liberalization aimed at facilitating access by foreign investors to *all* financing sources will ensure that host countries fully utilize the positive spillovers of technology, employment and managerial practices that typically emanate from foreign-owned enterprises.

The remainder of the paper is structured as follows. In the following section we provide some aggregate numbers of financing sources of U.S.-owned majority-owned foreign affiliates. We then summarize the literature from the international finance and corporate finance fields (Section III). In Section IV we set out a simple model of the hedging decision of the foreign affiliate that is financed through equity from the investor's home country, and through debt from local financial markets. Section V presents simple descriptive statistics of our data, which is followed by the econometric analysis that distills the cross-country coefficients. Section VI concludes with some policy implications for host countries.

II. The Financing of Multinational Subsidiaries

To gauge the access of multinational companies to local financial markets we use country-level data from the U.S. Commerce Department on the origin of external financing of U.S. majority-owned nonbank affiliates.[2] To our knowledge, these are the only such data that are comparable across countries, and over time. The data cover 53 countries for the years 1983 to 2001 and detail debt and external equity (other than reinvested earnings) from four sources: U.S. parents, other U.S. sources, persons in the host country, and other foreign sources.

To put our analysis into context, consider the financing instruments of U.S. majority-owned foreign affiliates that can be attributed to specific sources in Table 1. The table underlines the importance of financial sources other than FDI for total U.S.-controlled assets in U.S.-owned

[2] Majority-owned affiliates represent the overwhelming share of FDI stocks in developing countries, due to investors' objective of managerial control. In the case of U.S. outward investment, this is also explained by a number of features in the U.S. corporate tax code.

foreign affiliates. For U.S. affiliates in all countries, finance that can be attributed to U.S. parents (that is, FDI stocks) represents no more than a third of total balance sheets, and once retained earnings are excluded, cross-border FDI debt and equity accounts for only one quarter.[3] For the total universe of assets in U.S. foreign affiliates, financing sourced from host country residents accounted for 36 percent of assets—a larger share than that of U.S. parents—though such finance is primarily provided in the form of debt. These ratios of course largely reflect financing patterns in industrial countries, which are host to three-quarters of the asset value of U.S.-controlled affiliates. In developing countries, the corresponding financing shares from U.S. parents and host country residents are 45 percent and 34 percent, respectively, and only about one-quarter of total balance sheets is financed through host country debt. Finance from U.S. parents is relatively more important and is primarily provided in the form of equity.

Table 1. Origin and Instruments of Financing of U.S. Majority-Owned Foreign Affiliates, 1999 [1]
(in percent)

		U.S. Parents			Host Country Residents			Other U.S. Persons	Third Countries
	Total assets, $ billion	External equity	Share in retained earnings 2/	Current and long-term liabilities	External equity 3/	Share in retained earnings 2/	Current and long-term liabilities	Current and long-term liabilities	Current and long-term liabilities
All countries	4,056	15.2	8.7	9.5	4.4	2.5	29.4	1.7	14.3
Industrial countries	3,028	12.8	7.3	9.5	4.8	2.3	34.8		
Developing countries	605	20.4	15.8	9.2	4.6	4.1	25.4		

[1] 1999 is the last so-called benchmark year for which the total stock of retained earnings has been disclosed. The group of industrial countries refers to 20 advanced countries, and that of developing countries to 30 other countries in the U.S. Commerce Department statistics (importantly, this excludes off-shore financial centers, which explains why the world total does not represent a weighted average between the two country groups). Affiliate balance sheets contain a substantial amount of debt other than current liabilities and long term debt (such as for deferred taxes), which are reflected in total assets, though not in the shares attributable to parents and host country residents.
[2] Retained earnings attributable to U.S. parents and local residents have been estimated on the basis of their respective shares in external equity stocks.
[3] Equity contributions from host country residents have been estimated based on 1998 debt equity ratios.
Source: U.S. Bureau of Economic Analysis; and authors' estimates.

How have these financing patterns changed over time? Figure 1 charts the evolution of total and host country debt to asset ratios over our sample period in six industrial and six developing countries. These ratios are of course subject to a number of valuation problems

[3] Total assets include a substantial amount of debt, such as deferred taxes, that can not be attributed to any specific source.

that are due to host country currency fluctuations against the dollar, and the accounting of the financing liabilities on the books of foreign affiliates. Given these caveats, these charts suggest that in both industrial and developing countries total leverage ratios have been fairly steady since the early 1990s at about 60 percent and 45 percent respectively.

However, over this period there has also been a decline in the relative importance of host country debt in total assets in both groups of countries, as affiliates appear to have diversified their sources of debt finance, an observation that is at odds with common notions of *increasing* local financial linkages. While we will limit our econometric analysis below to between-country effects, the observed trend is consistent with a marginal reduction in exchange rate variability over this period, though not with the rapid concurrent deepening of local financial markets. Among others, the development of more advanced hedging and other financial products may help to reconcile these trends with common perceptions.

III. THE LITERATURE

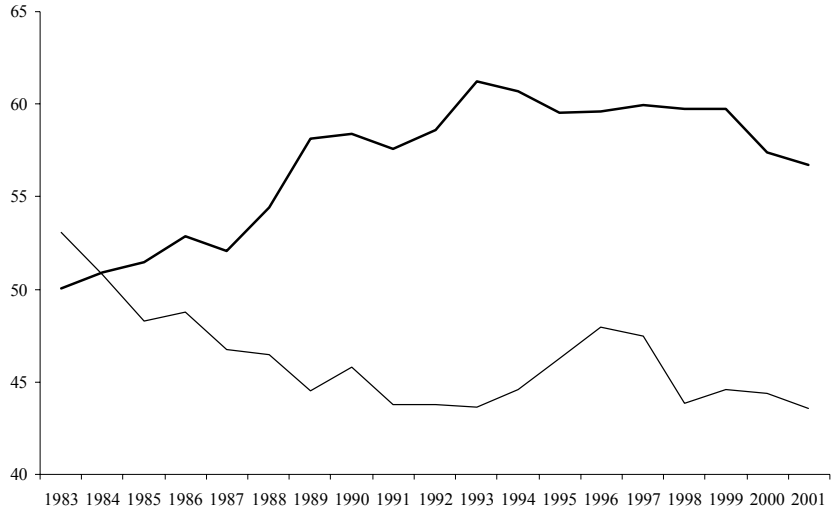
The key determinants that we will examine here—exposure to exchange rate risk and local financial development—have both been subjects of the research on multinational companies, if in rather small and separate strands of the literature.

Exchange rate variability and FDI. The perceived increase in the volatility of international exchange rates has sparked research not only into the effects on international trade but also on foreign direct investment, which often serves as a substitute for cross-border trade. Needless to say, the extent to which fluctuations in the host country's exchange rate translate into variability in the affiliate's profits in the investor's currency depends on the cost base, the distribution of sales between host country and export markets, and the investor's pricing policy in the former.

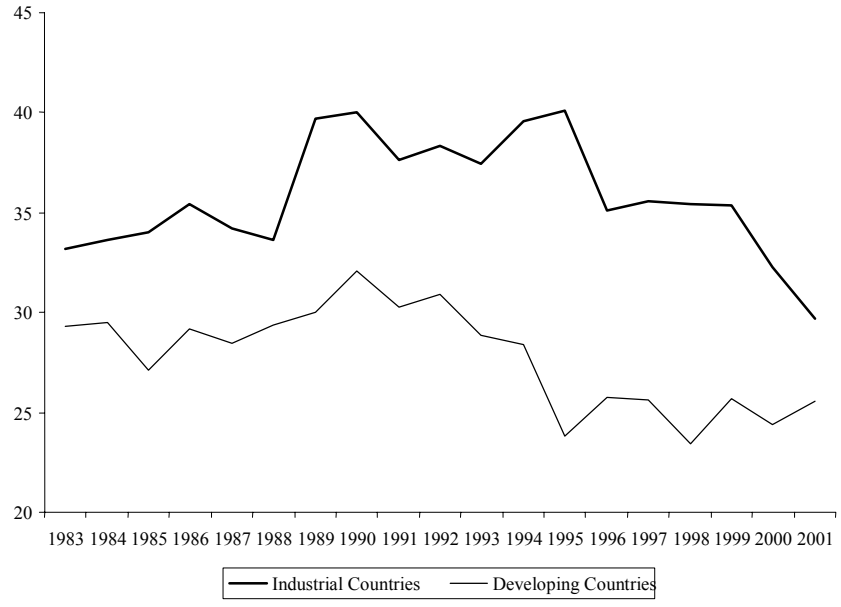
Even under the assumption of a risk-neutral investor, a perceived risk to future profits will raise the option price of an investment project, and hence induce the investor to delay engaging in a project with a sunk cost component (Campa, 1993). For the case of a risk-averse utility function, Aizenman (1992) essentially assumes that the investor first commits fixed capacity in his domestic and foreign production locations, and in a subsequent period decides on employment levels, on the basis of the realization of some random process, such as the exchange rate. Foreign production locations confer more flexibility on the investor and greater exchange rate variability may hence stimulate FDI. Goldberg and Kolstad (1995) argue that to study short-term volatility in exchange rates, the assumption of fixed factors of production is more appropriate. In this case, the impact on overall FDI depends on the correlation between production costs and revenue, though in their empirical analysis of quarterly FDI flows into and out of the United States they could not identify an effect of exchange rate variability.

Figure 1. Total Debt and Local Debt of U.S. Majority-Owned Foreign Affiliates, in Percent of Total Assets, 1983-2001 [1]

a. Total Debt to Assets



b. Local Debt to Assets



[1] Weighted averages based on the 1990 total asset position held by U.S. majority-owned affiliates. The group of industrialized countries includes Canada, France, Germany, Japan, The Netherlands, and the United Kingdom; that of developing countries Argentina, Brazil, Korea, Mexico, the Philippines, and Venezuela.
Source: U.S. Bureau of Economic Analysis; and authors' computations.

Multinational firms and host country financial systems. Despite the importance of local financing in the balance sheets of multinational subsidiaries, host country financial development has not figured prominently in the empirical literature on the determinants of FDI.[4] Rather, the interest has been in the *impact* of FDI on local financial systems. Vora (2002), on the basis of data from Morocco, identifies a crowding-out effect and attributes it to the equity participations that multinationals take in domestic firms with a superior risk quality. The equity partnership with a multinational firm hence signals superior credit quality to domestic banks, while purely domestically owned firms will be regarded as inferior. Harrison and McMillan (2003), on the basis of a firm-level data set for the Côte d'Ivoire, similarly find that foreign-owned affiliates are less credit constrained than their domestic peers, and that their borrowing aggravates credit constraints of domestically owned firms. This effect could not be explained by balance sheet characteristics, such as profitability, and is attributed by the authors to better relationships with a largely foreign-owned banking sector.

Determinants of corporate capital structures. Parent-company debt and equity are normally regarded as close substitutes, by both investors and host-country tax authorities. Financing through local debt is hence intimately related to the affiliate's leverage decision. Improved measures of institutional and financial market characteristics and of corporate financial data have sparked a small empirical literature on the determinants of corporate financial decisions in a cross section of countries. These studies normally draw on one of three theoretical approaches. The so-called static trade-off model explains a target debt to asset ratio on the basis of business (or nonfinancial) risk, the tax deductibility of interest, and bankruptcy costs. The agency theoretical framework finds the appropriate balance between the costs of financing through alternative instruments, and the costs of constraining both management and equity investors from abusing their position vis-à-vis creditors. Finally, the so-called pecking order hypothesis holds that institutional imperfections in credit markets, in particular in developing countries, favor certain instruments over others. As companies mature, they will shift funding from internal sources to increasingly information-intensive external ones.[5] Nevertheless, it has been difficult to discriminate between these alternative theories, since similar variables are relevant in all three. Booth and others (2001) find that profitability is inversely correlated with leverage in a number of developing countries, a finding that could be consistent with either agency-based approaches or with the informational imperfections from the "pecking order" theory.

These assumptions of course need to be revised for the affiliates of multinational companies. Informational asymmetries are unlikely to be a concern between parent and affiliate, though studies of the dividend repatriation behavior within multinational companies point to the

[4] Albuquerque, Loayza, and Servén (2003) find financial depth to be a determinant of FDI flows to developing countries, though not to industrial countries.

[5] See Booth and others (2001) for a survey of all three strands of the literature.

prominence of agency problems in constraining local managers, in particular in risky host countries.[6] Moreover, revenues and financing sources are available in several currencies, and there may be opportunities to diversify host country-specific risk across a larger portfolio of projects. Despite the increasing prominence of multinational investors, only a few papers have attempted to model this.[7] There are even fewer empirical studies, and only Desai, Foley, and Hines (2003) is similar in spirit to our empirical analysis. On the basis of affiliate-level data for the entire universe of U.S. multinationals in three years, they examine the effects of differences in host-country tax regimes and capital market characteristics on the financing decisions of U.S. foreign affiliates. They hypothesize that the tax deductibility of interest payments motivates the total borrowing or leverage by the affiliate. As part of a multinational group, the affiliate faces a single cost of capital, and differences in host country tax rates should therefore determine overall leverage. Because bankruptcies would be worked out under host country law, local creditor protection should determine the cost of external capital, and hence the mix between debt from internal (FDI) and external sources. They find that higher host-country tax rates raise the use of debt, though parent company debt is more sensitive to local tax rates than debt from external sources. Also, weak host-country creditor protection raises the borrowing costs, as expected. Affiliates therefore substitute parent debt for external debt, though at a rate less than one for one.

Given the dearth of empirical work in this field, there is a need to examine the effect on financing choices and balance sheet composition of host-country risk exposure, and of local financial market characteristics. As we show in our simple model below, independent from the tax sheltering effort, hedging through local borrowing may constitute an important motivation for local borrowing.

IV. HEDGING BY FOREIGN AFFILIATES

Within its multinational group the foreign affiliate overcomes the informational asymmetries that normally impede the access to foreign credit of domestically owned enterprises. Debt financing from the parent—a component of FDI capital—or debt from third parties backed by a parent guarantee is typically available at long maturities, and at costs charged to highly rated corporate borrowers. Nevertheless, the largest share of foreign affiliate sales is still to host country residents, and in the case of U.S. foreign affiliates this share has been roughly

[6] Desai, Foley, and Hines (2002); and Lehmann and Mody (2004).

[7] Chowdry and Nanda (1994) explain the decision to access more expensive local financial markets with the need to obtain a benchmark borrowing rate, at which internal debt from the parent can be charged. Du (2003) explains local borrowing with domestic banks' ability to realize a higher liquidation value (in the bankruptcy codes of many countries domestic creditors are preferred over foreign creditors). Multinational investors will hence seek to have their affiliates access local finance, since this more diversified creditor base will strengthen their budget constraints and reduce agency costs.

constant at about two-thirds over the past 15 years. Accessing foreign currency finance hence incurs obvious balance sheet risks, and local currency borrowing suggests itself as a "natural" hedge.[8] Use of local debt for hedging purposes may be all the more important in underdeveloped financial markets that typically lack more sophisticated foreign exchange derivatives. Due to the lack of financial depth and insufficient creditor protection, such borrowing will come at a higher cost, though even in the absence of a parent guarantee the affiliate's superior management practices, and its potential access to foreign credit, will put it in the top class of corporate borrowers. Clearly, there are other ways to hedge—for instance, through procuring more goods and services locally—though few would award the flexibility that is inherent in borrowing from local financial markets. This situation sets the multinational subsidiary apart from domestically owned enterprises and warrants our very parsimonious model of the hedging decision that motivates our empirical work.

Our model is essentially in the tradition of the static trade-off model, in which we ignore informational asymmetries and agency problems. We model hedging through locally raised debt in a simple two-country two-period model. Assume that direct investment is in a project for which a fixed amount of local currency capital A but no other factors of production are required. For the moment assume that all sales $f(A)$ are to the domestic market and denominated in local currency at price p. In the first period, the direct investor decides on the financing structure. He raises equity capital E in his home market (for which he budgets the opportunity cost of the risk-free interest rate r^e) and raises the remainder as local currency debt D in the host country's financial market. We ignore parent company debt, which in any case is a close substitute for parent equity. For local debt the affiliate pays the higher local borrowing cost r; also assume that all local debt is guaranteed and hence borrowing costs are independent of the leverage of the affiliate. All risk emanates from the exchange rate: 1 unit of local currency costs 1 dollar in the first period, but e in period two, at which point e is distributed with mean $\bar{e}$ and variance $V(e)$. At the end of the second period the direct investor pays a withholding tax τ on its local profits, repays its local debt, and liquidates the affiliate, incurring an exchange rate loss or gain on A. It is intuitive that the investor will substitute local currency debt for home country equity up to the point at which the marginal utility gained from reduced earnings volatility just equals the utility lost from lower expected profits.

The investor maximizes expected utility through controlling leverage, as defined by a quadratic utility function:[9]

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[8] The survey of financial management practices of U.S.-based companies in Graham and Harvey (2001) confirms that issuing debt in foreign currency is primarily motivated by hedging against currency fluctuations.

[9] Of course there could be risk diversification at the level of the parent firm, or by investors in home country equity markets. However, this view is contested in several empirical studies (for instance, Jacquillat and Solnik, 1978), and hence we assume a conventional utility function.

$$\max_{D} : Eu(\pi) = E(\pi) - \frac{\rho}{2} V(\pi).$$

For notational convenience let T=1-τ, and period-two profits in home-country currency are given by:

$$\pi = e\left[pf(A) - rD \right] T - r^{e}\left(A - D \right) + A\left(e - 1 \right)$$

Here, the first term denotes the after tax local earnings, the second the capital costs of home-country equity, and the third the capital gain on the asset due to host-country appreciation. Solving the first order condition yields the optimal level of debt:

$$D^{*} = \frac{1}{r}\left[pf - \frac{\bar{e}rT - r^{e}}{\rho r T^{2} V(e)} \right]$$

The numerator in the bracketed term represents the difference between expected after tax host-country financing costs, and the risk-free interest rate in the investor's home country. Despite the tax deduction of local interest costs, it is plausible to assume that this difference is positive. Also, assume that exchange rate variability and risk aversion are large enough for this problem to solve for a positive level of debt. In this case, the two partial derivatives with respect to *V(e)* and ρ are unambiguously positive. Also, locally contracted debt will decrease with higher local financing costs and go up with higher local taxes, which is easy to see if r^{e} is small.

A number of extensions could be easily accommodated within this simple framework. The exposure to local currency fluctuations *pf(A)* is of course diminished to the extent that sales are directed to markets outside the host economy, and in our empirical specification below we will test for the effect of the local sales ratio on hedging through local debt. Also, our assumption here has been one of "pricing to market" behavior. Multinationals price-discriminate between markets, and exchange rate fluctuations fully translate into variations in sales and profits. This pricing behavior has been documented in a number of empirical studies, such as Rangan and Lawrence (1999). Nevertheless, in some host countries sectors for tradable goods may exhibit a more responsive pricing behavior (the so-called exchange rate pass-through, under which the exchange rate and host country prices would be inversely correlated). Under this assumption, the variability in the multinational's sales and profits would be further reduced, though it is not possible to control for this effect empirically.

It is also interesting to examine the implications of uncertainty in the production function. Such uncertainty could be due to unpredictable regulatory procedures, or political interference in production or in supply and distribution relationships. In this case, the parent firm may be unwilling to take on the resulting risk to the liquidation value of the affiliate and will be unlikely to grant a full guarantee on the local borrowing of its affiliates. In the

absence of such a guarantee, local borrowing costs will increase with affiliate leverage, resulting in lower use of local debt per assets. At the same time, the parent firm's country-specific cost of capital (our variable r^e) will go up, making host-country borrowing more attractive. The net effect of country-specific risk is hence ambiguous and depends on the relative magnitude of host- and parent-company finance.

We were unable to discover information on the extent to which parent firms guarantee the debt of their affiliates. Anecdotal evidence seems to confirm that political risk—a proxy for uncertainty to the production function—is inversely related to the extent to which affiliates benefit from parent-firm guarantees. In the absence of such guarantees, the multinational affiliate will resemble more a purely domestically owned firm for which such risk aggravates the effects of informational asymmetries vis-à-vis outside creditors, impeding external financing. Yet the relationship with political risk itself will be ambiguous, since of course risks such as expropriation could be hedged through local borrowing.

V. Empirical Results

A. The Data

In our empirical analysis we will examine components of affiliate debt by origin, normalizing over the total stock of affiliate assets. The nature of our data does not allow us to convert reported dollar figures into local currency equivalents, so we will limit ourselves here to examining how the leverage decision translates into local and parent company debt to asset ratios. Even normalizing over total assets, we will run into at least two valuation problems. First, these balance sheet items of course reflect book values only. While affiliate debt is continually rolled over, book values of equity may increasingly diverge from market values, overstating debt to asset ratios at the end of our sample period in host countries with a more mature FDI stock. A second problem results from currency valuation effects. U.S. foreign affiliates typically keep their balance sheets in the local currency of their host country, and report the U.S. dollar equivalents to the U.S. Commerce Department at the end of their respective fiscal years, in line with U.S. accounting standards.[10] Local debt to asset ratios may therefore be driven purely by variations in the host country's dollar exchange rate. Given a similar problem with one of our independent variables, within-country estimators may hence suggest significant coefficients that are no more than a figment of the simultaneity bias. We will therefore limit our panel regression to between-country effects, using time-specific intercepts.

[10] Nevertheless about 12 percent U.S. foreign affiliates in industrialized countries and 20 percent in developing countries keep their books in dollars. Based on data from the 1999 survey, notable cases in which more than a fifth of affiliates report their financial statements in U.S. dollars are: Ireland and Switzerland in the OECD, and Argentina, Chile, Egypt, Hong Kong SAR, Indonesia, Nigeria, and Singapore among the developing countries. This is of course not merely a question of the currency conversion, but presumably also of the currency in which financial performance will be measured.

We will relate these debt-to-asset ratios to a number of variables that reflect the key determinants from the functional relationship illustrated in the previous section. We will proxy host-country financing costs through two measures of financial development (credit to the private sector, and bond market capitalization, both measured relative to GDP) and we expect a positive relationship with our local debt to assets ratio. Our other key variable will be the exposure to domestic currency fluctuations, which we will measure through the share of affiliate sales directed to host country residents. Exchange rate risk should raise local debt contracted. It will be measured through the standard deviation in the first difference of logarithms of the bilateral U.S. dollar exchange rate (denoted as STD, for which we use the suffix "S" or "L" to denote one- or five-year standard deviations, and "R" or "N" to denote nominal and real, CPI-based exchange rates). This is the standard measure in the literature on the effects of currency variability, which will be zero where the exchange rate follows a constant trend and changes can be fully anticipated. We will also include two subjective measures of host-country risk (each of which goes up as risk decreases). First, the financial risk variable essentially captures a sovereign rating that is based on a number of debt-, reserves-, and current account-based indicators; higher risk ratings should raise country-specific risk premia, and in countries with open capital accounts this should translate into local borrowing costs, depressing the contracting of host-country debt. Second, political risk reflects the likelihood of disorderly political change and the quality of administrative procedures. It will aggravate informational problems in local financial markets and hence raise financing costs in the absence of parent firm guarantees. Finally, so-called thin capitalization rules often constrain local affiliates in using parent company debt for reducing their tax bills. We will therefore include the local statutory corporate tax rate, and expect that higher local tax rates will raise the share of locally contracted debt.

B. Descriptive Statistics

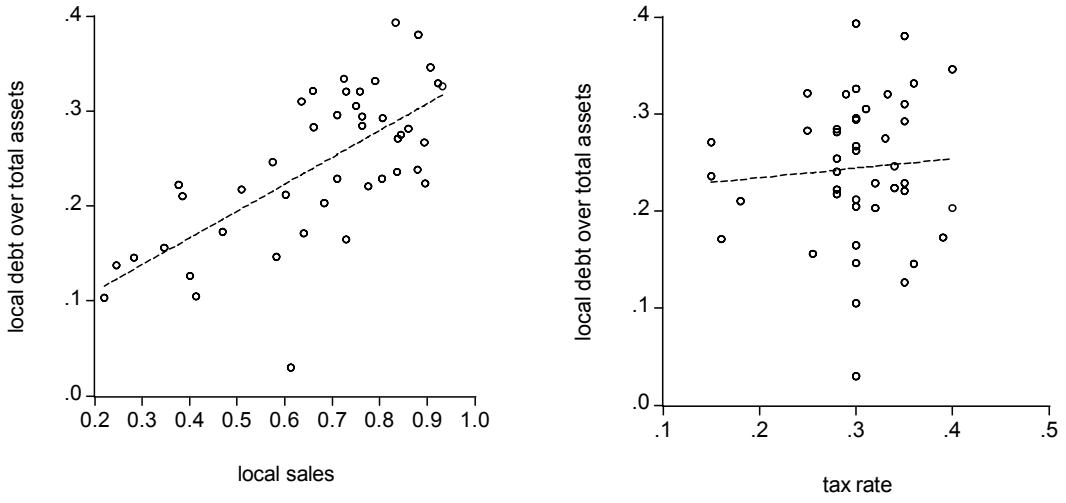
Table 2 presents a number of summary statistics for our dependent variables in industrial and developing countries. Again, it appears that local financing is higher, and parent financing lower, in industrial countries when compared to developing countries. Figure 2 below demonstrates that, as expected, there is a significant positive partial correlation between the share of host country sales and the share of locally sourced debt. This we interpret as prima facie evidence of the hedging considerations motivating the sourcing of foreign affiliates' financing. By contrast, there appears little correlation between corporate tax rates, and either the local or the total debt to asset ratios, as we would have expected based on the traditional corporate leverage model. Also, the partial correlations with measures of financial market development are only weak, so the role of these variables needs to be assessed in our panel analysis.

Table 2. Summary Statistics of Debt to Asset Ratios
(in percent, full panel 1983-2001)

	Total Debt	of which from:		
		Host Country	U.S. Parent	Third Country and other U.S. Parties
Number of Observations	903	780	884	518
Industrialized Countries	380	354	376	272
Mean	53.1	32.2	7.7	12.6
Max	78.4	59.9	33.1	47.1
Min	23.3	9.5	1.5	2.6
Stand. Deviation	9.9	10.0	3.9	5.8
Developing Countries	523	426	508	246
Mean	47.2	25.5	12.2	9.8
Max	99.2	64.5	46.7	58.9
Min	5.8	1.6	0.5	0.7
Stand. Deviation	14.0	10.5	7.5	6.1

Source: U.S. Bureau of Economic Analysis; and authors' computations.

Figure 2. Local Sales Shares, Host-Country Tax Rates
and the Share of Host-Country Debt to Asset Ratios, 2001



C. Regression Results

Our results are presented in Tables A1 to A4 in Appendix I. We have run linear regressions based on the panel data for debt to asset ratios for 1983 to 2001. We included time–specific effects to control for valuation effects resulting from bilateral exchange rate movements, as explained above. Given the essentially unpredictable nature of exchange rate movements, we used random effects throughout.

Local debt to asset ratios

To the extent that parent debt and equity are close substitutes—and are treated as such by host country tax authorities—only the host country component of affiliate debt will be subject to the effects outlined above, and we begin by identifying its determinants in Table A1. The exposure to local currency revenues shows the expected positive and significant effect. Comparing between countries, a 10 percent larger local sales share raises the host country debt to asset ratio by about 3 percent. Financial development—in this case measured through credit to the private sector over GDP—also fosters linkages between U.S. affiliates and local financial markets, and the positive and significant tax variable demonstrates that tax sheltering is accomplished partly through local debt. The coefficient estimate suggests that for every 10 percent additional statutory corporate tax rate, the local debt to asset ratio rises by about 2 percent. In regressions 1 through 4 we also experimented with a number of measures of exchange rate variability. In regressions 1 and 2 with nominal and real long term variability, respectively, and in the following two regressions with their short term counterparts (which are based on monthly data in the preceding year). We find positive and significant effects for the first two, though not for the latter two. This would suggest that investors form expectations on the basis of a prolonged history of exchange rate variability but are less concerned about short periods of fluctuations. Finally, we included the two measures of political and financial risk in regressions 5 and 6. Both variables are significant individually—though given their close correlation, not when they are included jointly. Their effect is opposite to that of exchange rate variability: less risk (expressed as a higher value) brings forth more local financing. While this is contrary to the hedging behavior that multinational affiliates exhibit in response to exchange rate risk, it is consistent with the hypothesis that less uncertainty about the production function and asset value—for instance, due to administrative interference—or the stability of the financial system will help to secure local credit on better terms.

In Table A2 we split the sample period in half and examined the results separately for the 1980s and the 1990s. The tax variable is only significant in the second half of the sample period, which reflects a 1989 change in the U.S. corporate tax code as it pertains to foreign source income. More interesting is the changing role of the risk variables that we employed here. While political risk but not exchange rate variability are significant in the 1980s, in the second half of the sample period the reverse is true, and financial risk is also a determinant. This illustrates the growing recognition of exchange rate risk as a motivation for affiliates' financing choices. For the shorter sample period in the 1990s, we can also include lending

margins in regression 5 as an alternative variable that gauges financial sector development, and we again verify the role of financial sector development.

Parent company debt to asset ratios

In Table A3 we use the independent variables from the last regression in Table A1 to estimate the distribution of parent debt to asset ratios. We find that exchange rate variability does not appear to be a significant determinant, and we exclude it in regression 2. Here, all coefficient estimates are significant and have a negative sign—opposite to their effects on local debt—though the fit of the regression is much poorer. Moreover, except for the financial depth variable, the absolute values of all other estimates are smaller than those found in the corresponding regression for local debt. This implies that changes in these variables between countries raise the share of local debt in affiliate assets, and reduce the use of parent debt by less. Given the uncertainty over financing from third countries, for which we have too few observations, the relative magnitudes of the estimated coefficients of course imply little for the total stocks of debt and assets.

Total financial leverage

Finally, in Table A4 we examine the effects on total leverage ratios. When we include the same set of variables as in regression 1.5, political risk and tax rates fail to show significance, including in the later sample period from 1992. We are hence left with the smaller set of regressors presented in regression 3. This essentially confirms the hypotheses of the static trade-off model of corporate leverage, under which risk and exposure variables, and financing costs proxied through financial development, determine financial leverage.

Robustness of the results

We were concerned that including time-specific intercepts does not fully correct for the simultaneity problem. In Table A5 we have therefore reproduced the key regressions from Tables A1, A3, and A4 based on a systems estimation in which we instrumented for the local sales ratio using trade intensity indices (total trade over GDP), together with all other right hand side variables. The signs, significance, and, to a lesser degree, the magnitude of the coefficient estimates remain broadly unchanged.

While our work lacks the firm-level detail that Desai, Foley, and Hines (2003) were able to utilize, we could confirm several of their results. In particular, less developed financial systems reduce local borrowing but raise parent company borrowing, depressing total debt to asset ratios. Also, we could confirm the effect of higher tax rates in raising leverage, though our results suggest this happens through a substation of parent though local debt. Our primary contribution is the attempt to test for the significance of the determinants of hedging—currency variability and exposure. The survey evidence cited earlier suggests that for U.S.-based companies these are the primary determinants of foreign currency borrowing, and our results suggest that this is also the case for capital structure decisions taken within the foreign affiliate.

VI. Conclusions and Policy Implications

This paper has demonstrated that in addition to parent company debt and equity, finance from host country and other external sources plays a significant role on the balance sheets of U.S. majority-owned foreign affiliates. Once all financing sources are included, the balance sheets of these enterprises are about three times as large as debt and equity attributable to parent company FDI finance would suggest. To the extent that the object of empirical research is the distribution of foreign controlled assets—as opposed to the stock of parent firm financing—cross-country differences in the contribution of these additional financing sources could throw a very different light on the magnitude and determinants of real sector linkages between countries. Coupled with the methodological problems in compiling FDI stocks in developing countries, this again underlines the need for better firm-level surveys of foreign investment.

Our findings demonstrate the role of exchange rate variability and exposure to local currency revenues in raising the share of host country debt in affiliate assets, consistent with the hedging behavior that informed our model. Two variables proved robust in underlining the role of financial development in furthering the access of foreign affiliates to host country financial markets. Lower perceptions of political or financial risk also appear to lower borrowing costs in local financial markets. Variables that raise local borrowing appear to reduce parent company financing, and for financial sector development the rate of substitution appears close to one for one.

Even though we were unable to examine our dependent variable in a time series dimension, trends in important emerging markets suggest a reduction in local debt to asset ratios since the early 1990s, possibly due to the increased use of financial derivatives. Our paper also leaves open the question of how the variables that we identified as determinants of the composition of liabilities affect total assets on affiliate balance sheets. While local currency debt may to some extent off set host country-specific risk, such hedging is of course costly in underdeveloped financial markets, and it is likely to raise the affiliate's average cost of capital. Further research could examine the role of the variables we used here on the risk-return characteristics of affiliate operations in individual countries, and on the allocation of the entire portfolio of U.S.-controlled assets.

For now, we have demonstrated the role of host country financial development, and of exposure through local currency revenues or currency variability, in expanding the share of local debt on the balance sheets of U.S. affiliates. Where exchange regimes or macroeconomic policies confront investors with country-specific risk, financial development, apart from its other benefits, will also stimulate the expansion of foreign controlled assets. Financial reform that facilitates tailoring balance sheets to risk characteristics, or allows foreign financial institutions to offer risk management instruments similar to those offered in the affiliates' home countries, is likely to have the greatest impact. This will be true particularly for those affiliates catering to the local market. To the extent that financial development fuels a substitution away from parent company finance, a reduction in FDI

flows may ensue, though, as we have shown here, this should not be interpreted as necessarily implying a reduction in the growth of foreign controlled assets in host countries.

Table A1. Dependent Variable: Host Country Debt to Asset Ratio,
Entire Sample Period, Alternative Risk Measures

	1	2	3	4	5	6
	STDNL	STDRL	STDNS	STDRL	STDNL	STDNL
Local sales share	0.333	0.326	0.337	0.329	0.338	0.339
	22.776	21.055	23.426	21.270	22.416	22.979
Private sector credit	0.081	0.083	0.077	0.078	0.068	0.048
	8.918	9.306	9.018	9.042	6.354	4.491
Corporate tax rate	0.218	0.217	0.189	0.202	0.224	0.214
	6.098	5.797	5.250	5.374	6.058	5.886
Exchange rate variability	0.166	0.249	0.040	0.094	0.168	0.225
	2.173	2.721	0.603	1.151	2.181	2.940
Political risk					0.001	
					2.425	
Financial risk						0.002
						5.490
Adj. R^2	0.502	0.500	0.517	0.501	0.516	0.534
Countries	52	52	52	52	52	52
Years	19	19	19	19	18	18
Observations	664	640	664	640	629	630

Note: All regressions are run using random effects, and a constant. STD refers to the exchange rate variability as defined in the text, with the suffixes "N" or "R" refering to nominal or real exchange rates, and the suffixes "S" or "L" refering to short-run (one- year) or long-run (five-year) variability. Russia is excluded from the regressions wherever private sector credit is included as the measure of financial development.

Table A2. Dependent Variable: Host-Country Debt to Asset Ratio, Sub-Sample Periods

	1	2	3	4	5
Local sales share	0.386	0.382	0.323	0.325	0.310
	15.894	16.303	17.070	17.388	15.474
Exchange rate variability (STDNL)	0.156		0.222	0.242	0.366
	1.276		2.286	2.515	2.921
Private sector credit	0.086	0.081	0.079	0.067	
	4.075	4.063	6.659	5.504	
Interest margin					-0.857
					-5.906
Corporate tax rate	-0.003		0.350	0.328	0.198
	-0.054		6.322	5.940	3.465
Political risk	0.001	0.001	0.000		
	1.855	1.668	0.012		
Financial risk				0.002	0.002
				1.919	2.118
Adj. R^2	0.431	0.457	0.540	0.546	0.516
Countries	47	48	52	52	52
Years	8 (1984-1991)	8 (1984-1991)	10 (1992-2001)	10 (1992-2001)	8 (1994-2001)
Observations	269	273	360	361	300

Table A3. Dependent Variable: Parent-Company Debt to Asset Ratio

	1	2
Local sales share	-0.029	-0.030
	-2.702	-2.801
Private sector credit	-0.060	-0.059
	-7.730	-7.761
Corporate tax rate	-0.119	-0.115
	-4.586	-4.522
Exchange rate variability (STDNL)	-0.048	
	-0.860	
Political risk	0.000	0.000
	-2.161	-2.074
Countries	52	52
Years	18	18
Observations	713	713
Adj. R^2	0.145	0.142

Table A4. Dependent Variable: Total Debt to Asset Ratio

	1	2	3
Local sales share	0.301	0.218	0.297
	14.957	8.032	15.500
Private sector credit	0.063	0.076	0.068
	4.339	4.567	5.930
Corporate tax rate	0.043	0.110	
	0.926	1.392	
Exchange rate variability	0.257	0.494	0.230
	2.507	3.642	2.310
Political risk	0.001	0.001	
	1.475	1.011	
Countries	52	52	52
Years	18	10 (1992-2001)	19
Observations	720	412	785
Adj. R^2	0.219	0.190	0.199

Table A5. Robustness Check of Results: Instrumental Variable Regressions

	1	2	3	4	5
Dependent Variable	Host Country Debt to Asset Ratio			Parent country Debt to Asset Ratio	Total Debt to Asset Ratio
Local sales share	0.31	0.32	0.33	-0.03	0.21
	12.34	13.18	13.56	-1.68	6.12
Private sector credit	0.09	0.07	0.06	-0.05	0.07
	10.45	7.59	5.74	-6.99	4.70
Corporate tax rate	0.21	0.20	0.17	-0.11	-0.02
	5.40	5.11	4.43	-3.74	-0.39
Exchange rate variability	0.15	0.15	0.19	...	0.24
	1.91	1.86	2.42	...	2.31
Political risk	...	0.001	...	0.000	0.001
	...	2.67	...	-2.66	2.16
Financial risk	...	...	0.002	...	...
	...	...	4.83	...	...
Countries	51	51	51	51	51
Observations	642	608	609	692	699
R^2	0.60	0.61	0.62	0.34	0.40

Note: All regressions were run using fixed effects. Exchange rate variability is measured as the variability of the long-run nominal exchange rate.

The R^2 is calculated as 1-RSS/TSS, where RSS is the sum of squared residuals and TSS is the total sum of squared.

II. Data Definitions and Sources

The country sample comprises 53 industrial and developing countries for which the dependent variables are available from the U.S. Commerce Department. In selecting the country sample we have eliminated purely oil-based economies and off-shore financial centers. Russia was excluded from the regressions, though not the descriptive statistics, because data for one independent variable were not available. The list of countries is: Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Colombia, Costa Rica, Czech Republic, Denmark, Dominican Republic, Ecuador, Egypt, Finland, France, Germany, Greece, Guatemala, Honduras, Hong Kong SAR, Hungary, India, Indonesia, Ireland, Israel, Italy, Jamaica, Japan, Korea, Malaysia, Mexico, Netherlands, New Zealand, Nigeria, Norway, Panama, Peru, Philippines, Poland, Portugal, Russia, Singapore, South Africa, Spain, Sweden, Switzerland, Thailand, Trinidad and Tobago, Turkey, United Kingdom, and Venezuela.

Data on U.S. foreign affiliates. All data refer to majority-owned nonbank affiliates of nonbank U.S. parents and are publicly available from the U.S. Bureau of Economic Analysis website: http://www.bea.doc.gov/beahome.html. The dependent variables are derived from the table *External Financing of Affiliates* (III.C.1) and are measured over total affiliate assets from the table *Balance Sheet of Affiliates* (III.B.1-2). The variable Local Sales Share refers to the share of affiliate sales in total sales derived from the table *Sales by Affiliates, Country of Affiliate by Destination* (III.F.2).

Financial system variables. Data for these have been obtained from the World Bank's Financial Structure Database. "Private Credit" refers to private credit over GDP, and "Interest Margin" to the margin between lending and deposit rates.

"Tax" refers to the top statutory corporate tax rate, obtained from the World Tax database (available on the internet at http://wtdb.org/index.html).

Political and Financial Risk refers to the January rating for each year compiled by the International Country Risk Guide. Ratings are out of 50, with higher ratings implying lower risk.

The *exchange rate variability* measures are computed as the standard deviation of the first difference of logarithms of the bilateral U.S. dollar exchange rate, based on monthly observations from the IMF's *International Financial Statistics* (IFS). The variables are denoted STD with the suffixes "N" referring to nominal exchange rates, and "R" referring to real rates, based on CPI data. "S" refers to short-run variability (the standard deviation in year preceding the observation), and "L" to long-run variability in the five years preceding the year of observation.

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