

Working Paper

Foreign Direct Investment and the Domestic Capital Stock

Mihir A. Desai
Harvard University and NBER

C. Fritz Foley
Harvard University and NBER

James R. Hines Jr.
Stephen M. Ross School of Business
at the University of Michigan
and NBER

Ross School of Business Working Paper Series
Working Paper No. 1023
January 2005

This paper can be downloaded without charge from the
Social Sciences Research Network Electronic Paper Collection:
<http://ssrn.com/abstract=891202>

Foreign Direct Investment and the Domestic Capital Stock

Mihir A. Desai
Harvard University and NBER

C. Fritz Foley
Harvard University

James R. Hines Jr.
University of Michigan and NBER

January 2005

The authors thank the Division of Research at Harvard Business School for financial support.

Foreign Direct Investment and the Domestic Capital Stock

ABSTRACT

This paper evaluates evidence of the impact of outbound foreign direct investment (FDI) on domestic investment rates. OECD countries with high rates of outbound FDI in the 1980s and 1990s exhibited lower domestic investment than other countries, which suggests that FDI and domestic investment are substitutes. U.S. time series data tell a very different story, however: years in which American multinational firms have greater foreign capital expenditures coincide with greater domestic capital spending by the same firms. One dollar of additional foreign capital spending is associated with 3.5 dollars of additional domestic capital spending in the time series, implying that foreign and domestic capital are complements in production by multinational firms. This effect is consistent with cross sectional evidence that firms whose foreign operations expand simultaneously expand their domestic operations, and suggests that interpretation of the OECD cross sectional evidence may be confounded by omitted variables.

JEL Classifications: F230, F210.

Mihir A. Desai
Harvard Business School
Morgan 363
Soldiers Field
Boston, MA 02163
mdesai@hbs.edu

C. Fritz Foley
Harvard Business School
Morgan 389
Soldiers Field
Boston, MA 02163
ffoley@hbs.edu

James R. Hines Jr.
Office of Tax Policy Research
Michigan Business School
701 Tappan Street
Ann Arbor, MI 48109-1234
jrhines@umich.edu

I. Introduction

Rising levels of foreign direct investment (FDI) concern growing numbers of policymakers and members of the American public. These concerns stem from the perception that foreign activities of American multinational corporations reduce employment and other economic activities within the United States. While investment flows within the United States go largely unnoticed, in an international setting the lexicon of “winners” and “losers” can be inescapable. Curiously, both capital exporting countries and capital importing countries have at times expressed concern over the consequences of international capital flows. Capital exporting countries worry that too much of their capital goes abroad while capital importing countries fear foreign control of domestic assets and the possible macroeconomic instability associated with rapid changes in foreign investment levels. The concerns of capital exporting countries, while diffuse, often are based on conceptions of outbound FDI as diverting economic activity. Unsurprisingly, growing overseas activities of multinational firms have become a source of economic insecurity for workers, managers, and tax collectors.¹

Concerns over the economic impact of rising FDI have limited analytic and empirical support. The paucity of analysis reflects the nascent nature of FDI theories, and the difficulty, until recently, of analyzing the internal dynamics of multinational firms whose activities span borders. Given the rapidly rising scope of multinational activity, the absence of a readily available framework with which to analyze FDI is increasingly costly.² While the ratio of outbound FDI to private nonresidential fixed investment in the United States averaged six percent through the 1960s and 1970s, this ratio has risen to fifteen percent by the 2000s. This dramatic increase in outbound FDI is matched by a similarly dramatic increase in FDI flows into the United States.

This paper evaluates evidence of the relationship between outbound FDI and levels of domestic capital formation. Earlier findings reported by Martin S. Feldstein (1995), using data from the 1970s and 1980s, indicate that outbound FDI reduces total domestic investment in the United States roughly dollar for dollar, whereas inbound FDI

¹ See, for example, Kenneth F. Scheve and Matthew J. Slaughter (2001).

² David L. Carr, James R. Markusen and Keith E. Maskus (2001), Gene Grossman and Elhanan Helpman (2002) and Pol Antràs (2003) represent a new, and promising, generation of theories of multinational firms.

contributes to total domestic investment by the same magnitude. Evidence in this paper from a much broader sample of countries for the 1980s and 1990s confirms that the aggregate patterns identified by Feldstein persist in this larger, and more recent, sample. However, an entirely different picture emerges when attention is confined to multinational firms. Higher levels of capital expenditures by their own foreign affiliates are associated with greater levels of domestic investment by American multinational firms, suggesting that foreign and domestic investment are complements rather than substitutes. This pattern is consistent with recent firm-level evidence reported by Mihir A. Desai, C. Fritz Foley and James R. Hines Jr. (2004a), which uses foreign economic growth as an instrument for foreign investment by multinational firms. Therefore, a growing body of evidence offers no support for the simple, and common, perception that foreign investment diverts resources from domestic investment. This evidence also raises several new questions for further research.

II. Foreign investment and multinational firms.

The common intuition that outbound FDI reduces domestic investment is a special case of a broader set of possible effects of FDI on domestic economic activity. Consider, for example, a multinational firm producing worldwide output with the function $Q(K, K^*, \theta)$, in which K is domestic capital, K^* is foreign capital, and θ is a vector including prices and other market conditions relevant to output. The first-order condition corresponding to profit-maximizing levels of domestic investment is:

$$(1) \quad \frac{\partial Q(K, K^*, \theta)}{\partial K} = \lambda,$$

in which λ is the firm's cost of capital.³ From equation (1) it is clear that foreign and domestic investment can be related either through the production process, if

$\frac{\partial^2 Q(K, K^*, \theta)}{\partial K \partial K^*}$ is nonzero, or through the cost of capital, if λ is somehow a function of K^* .

³ Equation (1) does not include tax effects on investment; for an analysis, see Desai, Foley, and Hines (2004b).

The common intuition of diversion corresponds to a setting in which firm resources are fixed, so that a dollar invested abroad corresponds to one less dollar that can be invested domestically. In the notation of equation (1), this corresponds to a $\lambda(K + K^*)$ function that exhibits a discrete upward jump at the point that investment resources are exhausted. However, multinationals finance investment projects on world markets and make extensive use of their internal capital markets. Desai, Foley, and Hines (2004c) presents evidence that affiliates borrow extensively from local sources and opportunistically structure their internal capital markets in response to varying costs of external finance and tax factors.. Additionally, Desai, Foley, and Kristin J. Forbes (2004) finds that parents provide affiliates with additional equity to finance investment in the wake of severe currency depreciations. If financial resources are not fixed, then the primary source of interaction between foreign and domestic investment comes from the production process. Existing theories offer alternative, and contradictory, intuitions for the likely relationship between home and foreign capital in the firm's derived demand function (i.e., the sign of $\frac{\partial Q^2}{\partial K \partial K^*}$).

So-called horizontal FDI is investment that replicates business activities in foreign countries in response to trade costs or other frictions. To the degree that domestic exports are substitutes for output produced by horizontal FDI, such FDI can be viewed as representing a diversion of domestic activity. Once horizontal investments have been made, complementarity between foreign investment and domestic investment may emerge as foreign operations make use of functions performed by headquarters.

Alternatively, foreign investments might be vertical in nature, whereby production processes are fragmented into different stages and optimized globally. Vertical investments might substitute foreign activity for domestic activity if firms are shifting the location of activities that have been performed domestically. However, once the production process has been split up, foreign and domestic activities are likely to complement one another. Vertical foreign investments can raise the demand for domestic capital by permitting greater exploitation of intangible assets produced by domestic activity or by increasing the profitability of domestic production that can be combined

with foreign output. A voluminous literature examines the relative ability of vertical or horizontal theories of FDI to explain investment and trade patterns and finds evidence of both types of activity.⁴ Since substitution and complementarity can be operative for different firms at different times, their relative importance remains a matter for empirical resolution.

In addition to these conceptual issues, substantial measurement issues arise when investigating foreign investment. The common intuition is that FDI consists of investment or capital expenditures by multinational firms abroad. In fact, the common measurement of FDI in balance of payment accounts reflects the flow of financing for that investment across borders. Specifically, FDI flows in balance of payment accounts equals the sum of equity flows from home to abroad, intercompany debt flows from parents to subsidiaries, and retained earnings reinvested in those subsidiaries.⁵ These methods of measuring foreign investment make FDI flows a better measure of the financing of overseas operations through the use of internal capital markets rather than the actual capital expenditures of foreign subsidiaries. As discussed below, the distinction between investment and financing may help resolve some of the apparently conflicting patterns that appear in the data.

III. Does outbound FDI stimulate or reduce domestic investment?

Table 1 presents regressions constructed to resemble those of Feldstein (1995). While Feldstein's analysis was restricted to a relatively small number of countries in the 1970s and 1980s, the regressions presented in Table 1 cover a broader sample of countries for the 1980s and 1990s. Observations represent decade-long average values for each of 20 (in the case of the 1980s) or 26 (for the 1990s) OECD countries. The dependent variable in the regressions reported in Table 1 is the ratio of national gross capital formation to GDP, which is equivalent to the variable that Feldstein uses, and it is regressed on measures of savings, outward FDI flows and inward FDI flows.⁶

⁴ See, for example, Richard E. Caves (1996) and Markusen (2002) for a survey of this literature.

⁵ See Alicia M. Quijano (1990) and OECD (1999).

⁶ Gross capital formation is the measure of investment employed, and this variable includes outlays on additions to fixed assets as well as net changes in inventories, and measures of gross savings are computed as GDP less final consumption expenditures. Aggregate national measures of gross capital formation as a share of GDP, and gross savings as a share of GDP, are drawn from the World Bank's *World Development*

Column one reports estimated coefficients from regressions for the 1980s sample. The 0.7801 coefficient on the gross saving/GDP variable is consistent with the finding of Feldstein and Charles Y. Horioka (1980) that national saving and investment rates exhibit close to a one-to-one correlation. The -1.3357 coefficient on Outward FDI Flow/GDP variable, while only marginally significant, is consistent with Feldstein's finding that FDI outflows reduce domestic capital formation almost dollar for dollar. Similarly, the 1.1869 coefficient on Inward FDI Flows/GDP, while insignificant, is consistent with the effect of FDI inflows estimated by Feldstein.

Column two reports estimated coefficients from regressions run on observations from 26 countries in the 1990s. The estimated 0.6255 coefficient on Gross Savings/GDP remains large and significant, though significantly different from unity. The -1.0767 coefficient on Outward FDI Flows/GDP is significant and again very similar to the equivalent coefficient estimated by Feldstein for the 1970s and 1980s, whereas the 0.3220 coefficient on Inward FDI Flow/GDP is statistically indistinguishable from zero. Pooling data for the 1980s and 1990s, as in the regression reported in column three, produces results that closely resemble those for the 1990s. The pattern that Feldstein identified in a smaller sample of countries in the 1970s and 1980s persists in a broader sample of countries in the 1980s and 1990s: higher outbound FDI is associated with lower domestic investment.

The cross-country evidence presented in Table 1 describes the determinants of aggregate investment patterns for entire countries; the analysis is not restricted to estimating investment demand by multinational firms. In order to obtain estimates of the effects of foreign investment on domestic investment by multinational firms, the analysis in Table 2 uses time series data on the domestic and foreign capital expenditures of U.S. multinationals, while controlling for domestic savings and the capital expenditures of the U.S. affiliates of multinationals based outside the United States.⁷

Indicators. Data on total outward and inward FDI flows come from the OECD's *International Direct Investment Statistics* database. These flows are scaled by GDP as measured in the World Bank data. All of these variables are averaged over the 1980-1989 and 1990-1999 period, yielding observations for individual countries by decade.

⁷ The annual *Survey of U.S. Direct Investment Abroad*, published by the Bureau of Economic Analysis, provides the U.S. capital expenditures of nonbank American multinationals as well as the foreign capital

The dependent variable in these regressions is the ratio of aggregate annual domestic capital expenditures of American multinational firms to U.S. GDP, so it differs from the dependent variable in the regressions in Table 1 by focusing on a particular type of capital formation by a particular class of investor. Both regressions include time trends. The independent variable of interest in the regression reported in the first column of Table 2 is the ratio of U.S. multinational firms' foreign capital expenditures to U.S. GDP. The estimated 3.5059 coefficient implies that an additional dollar of foreign capital expenditure is associated with 3.5 dollars of domestic capital expenditures by the same group of multinational firms, strongly suggesting a complementary relationship between foreign and domestic investment.

The regression reported in column two of Table 2 includes the domestic saving rate and U.S. capital expenditures by foreign-owned firms in the United States as additional control variables. The inclusion of these variables does little to affect the estimated complementary relationship between foreign and domestic capital spending by American multinational firms: the estimated 3.8796 coefficient implies that an additional dollar of foreign capital expenditures is associated with 3.9 dollars of domestic capital expenditures. The estimated -1.8550 coefficient implies that an additional dollar of capital spending by foreign-owned firms in the United States reduces domestic expenditures by U.S. multinational firms by 1.9 dollars, while the estimated 0.2565 coefficient implies that U.S. capital spending by American multinational firms increases by 26 cents for each additional dollar of domestic savings.⁸

IV. Reconciling the Evidence

Why are the implications of the time series evidence on investment by American multinational firms so contradictory to the implications of the cross-sectional evidence examined by Feldstein and updated to the 1980s and 1990s? There are a number of potential explanations for the distinct results. First, and most obviously, the regressions

expenditures of the majority owned nonbank affiliates of these firms. The annual *Survey of Foreign Direct Investment in the United States* provides the U.S. capital expenditures of nonbank multinational based in other countries, and the National Income and Product Accounts provide annual measures of U.S. gross savings and U.S. GDP.

⁸ The Durbin-Watson statistic for this specification is in the range that requires further exploration given uncertainty in the distribution of d . Estimating this specification using the Prais-Winstone or Cochrane-Orcutt procedures yield qualitatively similar results.

presented in Table 2 exclusively consider the United States, while Table 1 employs data from a large sample of OECD countries. It is possible that foreign and domestic investment are complements in the American economy, whereas they are substitutes in other OECD economies. Given the relatively limited available evidence of the behavior of non-U.S. based multinational firms, it is difficult to dismiss or accept this explanation.

Second, the two analyses also differ in their scope, as the cross-sectional evidence considers economy-wide investment while the time-series evidence considers only the activities of U.S. multinational firms. Higher levels of foreign investment might be associated with higher levels of domestic investment by parents but lower levels of investment by other firms in the source country. In short, higher foreign investment by multinational firms may represent the decision to internalize activities abroad that previously were undertaken on an arms-length basis domestically. While there is evidence on the growing tendency of multinational firms to internalize activity (as in Desai, Foley and Hines (2004d)), there has been little, if any, analysis of this channel of diversion of domestic activity by FDI.

A third, and much more likely, possibility is that either the cross sectional or time series equations (or both!) are seriously biased by the omission of important variables. For example, FDI flows at the aggregate level are defined to include financing flows while the multinational firm analysis restricts attention to capital expenditures. As a consequence, high FDI outflows might indicate that domestic investment opportunities are poor, and these poor opportunities could be the force behind lower domestic investment and the reallocation of funds to more profitable foreign opportunities. The analysis of the capital expenditures of foreign affiliates, which does not consider their associated financing, is less subject, but not immune, to this concern.

Desai, Foley and Hines (2004a) address the problem of omitted variables by applying instruments for changes in foreign investment in a panel of American multinational firms. The instrument is the growth rate of foreign economies in which a firm invests in the base period, which is a strong predictor of subsequent changes in foreign investment by American multinational firms. Thus, a firm investing in the United Kingdom in 1982 is more likely to exhibit rapid subsequent economic growth than is a

firm that invested in France in 1982, since the British economy subsequently grew much more rapidly than did the French economy. Using this instrument, Desai, Foley and Hines (2004a) find that rising foreign investment (at the firm level) is associated with growing domestic investment, which is indicative of complementarity. It is noteworthy that the estimated effect of foreign investment on domestic investment has a larger (positive) magnitude in the instrumental variables equation than does the corresponding estimated coefficient in the (uninstrumented) ordinary least squares equation, implying that, in firm-level U.S. data, omitted variables have the effect of making foreign and domestic investment look more like substitutes than they really are.

While it is difficult to find suitable instruments for aggregate cross sectional or time series estimation of the effects of FDI on domestic investment, the ability to restrict attention to the activities of multinational firms makes the U.S. time series evidence likely to be more reliable than the OECD cross section. The evidence from the time series of U.S. data implies that FDI encourages greater domestic investment. The firm-level panel estimates reported by Desai, Foley and Hines (2004a) are consistent with this finding, and they are reassuring in that they suggest that biases introduced by omitted variables have a tendency to mitigate against a finding of complementarity between foreign and domestic investment.

V. *Conclusion*

It has been natural to assume that foreign investment comes at the expense of domestic investment. New evidence from analyses of American multinational firms suggests instead that greater foreign investment is associated with higher levels of domestic investment. This estimated complementarity implies that firms combine home production with foreign production to generate final output at lower cost than would be possible with production in just one country, making each stage of the production process more profitable, and therefore, in equilibrium, more abundant. It is clear that the simple story, in which the world has a fixed stock of investment capital that can either go to one place or another, is due for rethinking. The growing prominence of multinational firms, their reliance on their internal product and capital markets, and this evidence on the

complementarity of their investment worldwide suggest the importance and possible contours of such a reconsideration.

References

- Antràs, Pol. “Firms, Contracts, and Trade Structure.” Quarterly Journal of Economics, November 2003, 118(4), pp. 1375-1418.
- Carr, David L., James R. Markusen, and Keith E. Maskus. “Estimating the Knowledge-Capital Model of the Multinational Enterprise.” American Economic Review, June 2001, 91(3), pp. 693-708.
- Caves, Richard E. Multinational enterprise and economic analysis, 2nd ed. Cambridge, UK: Cambridge University Press, 1996.
- Desai, Mihir A., C. Fritz Foley, and Kristin J. Forbes. “Financial Constraints and Growth: Multinational and Local Firm Responses to Currency Depreciations.” Mimeo, Harvard University, 2004.
- Desai, Mihir A., C. Fritz Foley, and James R. Hines Jr. “Foreign Investment and Domestic Economic Activity.” Mimeo, Harvard University, 2004a.
- Desai, Mihir A., C. Fritz Foley, and James R. Hines Jr. “Foreign Direct Investment in a World of Multiple Taxes.” Journal of Public Economics, December 2004b, 88(12), pp. 2727-2744.
- Desai, Mihir A., C. Fritz Foley, and James R. Hines Jr. “A Multinational Perspective on Capital Structure Choice and Internal Capital Markets.” Journal of Finance, December 2004c, 59(6), pp. 2451-2488.
- Desai, Mihir A., C. Fritz Foley, and James R. Hines Jr. “The Costs of Shared Ownership: Evidence from International Joint Ventures.” Journal of Financial Economics, August 2004d, 73(2), pp. 323-374.
- Feldstein, Martin S. “The Effects of Outbound Foreign Direct Investment on the Domestic Capital Stock,” in Martin Feldstein, James R. Hines Jr., and R. Glenn Hubbard, eds., The effects of taxation on multinational corporations. Chicago: University of Chicago Press, 1995, pp. 43-66.

- Feldstein, Martin S. and Charles Y. Horioka. "Domestic Savings and International Capital Flows: The 1980 W.A. Mackintosh Lecture at Queen's University." Economic Journal, June 1980, 90(358), pp. 314-329.
- Grossman, Gene M. and Helpman, Elhanan. "Integration versus Outsourcing in Industry Equilibrium." Quarterly Journal of Economics, February 2002, 117(1), pp. 85-120.
- Markusen, James R. Multinational firms and the theory of international trade. Cambridge: MIT Press, 2002.
- OECD benchmark definition of foreign direct investment. Paris: OECD, 1999.
- Quijano, Alicia M. "A Guide to BEA Statistics on Foreign Direct Investment in the United States." Survey of Current Business, February 1990, pp. 29-37.
- Scheve, Kenneth F., and Matthew J. Slaughter. Globalization and the perception of American workers. Washington, D.C.: Institute for International Economics, 2001.

Table 1 - Domestic Investment and FDI in the OECD

<i>Dependent Variable:</i>	Gross Capital Formation/GDP		
	(1)	(2)	(3)
Constant	0.0575 (0.0302)	0.0921 (0.0327)	0.0846 (0.0205)
Outbound FDI Flow/GDP	-1.3357 (0.7136)	-1.0767 (0.2349)	-1.1227 (0.2160)
Inbound FDI Flow/GDP	1.1869 (1.1465)	0.3220 (0.2402)	0.3009 (0.2084)
Gross Savings/GDP	0.7801 (0.1005)	0.6255 (0.1383)	0.6718 (0.0798)
Period?	1980s	1990s	1980s and 1990s
No. of Obs.	20	26	46
R-Squared	0.7226	0.6652	0.6885

Notes: The dependent variable is the average ratio of gross capital formation (investment in fixed assets and inventories) to GDP, for OECD countries over particular decades. Column 1 restricts attention to the 1980s, column 2 to the 1990s and column 3 covers both decades. Outbound FDI Flow/GDP is the decade average ratio of total FDI outflows to GDP and Inbound FDI Flow/GDP is the decade average ratio of total FDI inflows to GDP. Gross Savings/GDP measures the decade average ratio of GDP less total consumption to GDP. Heteroskedasticity-consistent standard errors appear in parentheses.

Table 2 - Domestic and Foreign Capital Expenditures of U.S. Multinationals

<i>Dependent Variable:</i>	Domestic Capital Expenditures of U.S. Multinationals/U.S. GDP	
	(1)	(2)
Constant	1.5082 (0.2957)	0.0402 (0.4203)
Foreign Capital Expenditures of U.S. Multinationals/U.S. GDP	3.5059 (0.6311)	3.8796 (0.6262)
U.S. Capital Expenditures of Foreign Multinationals/U.S. GDP		-1.8550 (0.5340)
U.S. Gross Savings Rate		0.2565 (0.0535)
Time trend?	Yes	Yes
No. of Obs.	21	21
R-Squared	0.6857	0.8624

Notes: The dependant variable is the domestic capital expenditures of U.S. multinational firms scaled by U.S. GDP. Foreign capital expenditures of U.S. multinationals firms measures the host country capital expenditures of majority-owned nonbank affiliates of U.S. multinationals. U.S. capital expenditures of foreign firms measures the capital expenditures of all nonbank U.S. affiliates of foreign multinationals. Both specifications include a time trend, and heteroskedasticity-consistent standard errors appear in parentheses.