

# FOREIGN DIRECT INVESTMENT IN MEXICO DURING THE 1990s: AN EMPIRICAL ASSESSMENT

**Miguel D. Ramirez**  
*Trinity College*

Foreign direct investment (FDI) under the auspices of transnational corporations (TNCs) has become one of the key elements in the process of economic and financial integration of the world economy. The acceleration in FDI flows worldwide during the 1990s can be appreciated by considering the following figures: Between 1985 and 1990 these flows averaged \$142 billion annually, while between 1990 and 1998 they averaged \$336 billion, or more than twice as much [ECLAC, 1998, Tables A.1-A.4, 179-81]; and [United Nations, 1999, Table 1.3, 20]. The rapid increase in FDI flows has also been accompanied by an increasing proportion of these flows being channeled to developing nations, including the countries of Latin America and the Caribbean. Historically, most FDI flows have been channeled to developed countries, but during the decade of the nineties the share of total FDI directed to developing countries, particularly Asia and Latin America, rose from 15 percent in 1990 to 26 percent in 1998. Latin America's share of these FDI flows rose from 32 percent in 1990 to 43 percent in 1998, mainly confined to Argentina, Brazil, Chile and Mexico [ibid.].

The surge in FDI flows to these countries, and Mexico in particular, can be traced to several economic and institutional factors. For example, the widespread implementation of privatization and debt conversion programs, the liberalization of the tradeable sector, and the (conditional) removal of restrictive FDI legislation concerning the repatriation of profits, prior authorization of investments, and sectoral restrictions such as local content and export requirements. In addition to these policies, the relatively successful implementation of macroeconomic stabilization measures has reassured both foreign and domestic investors of Latin America's commitment to market-based reforms. Only time will tell whether these economic measures are sustainable in the long run, particularly in the wake of the severe economic and financial fallout created by the 1997-98 Asian economic crisis, the Argentinian economic debacle, and the current U.S. economic slowdown. What is certain, however, is that FDI flows will continue to be crucial in modernizing Latin America's economy and providing new job opportunities.

This paper analyzes the recent evolution, rationale, and major economic and institutional determinants of FDI flows to Mexico. The selection of Mexico is based, in part, on its strategic economic and geopolitical relationship to the United States. It is

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**Miguel D. Ramirez:** Department of Economics, Trinity College, 300 Summit Street, Hartford, CT 06109. E-mail: Ramirez@mail.trincoll.edu.

also motivated by the Mexican government's abandonment of an inward-oriented strategy of economic development in favor of an open, market-oriented model—a process that eventually culminated in the passage of the NAFTA in 1993 by the U.S. Congress, and its gradual and difficult implementation during the economic crises years of 1994-96. Third, the interest in Mexico is related to the destination of FDI flows on a sectoral basis. FDI has flowed primarily to newly-created manufacturing firms in the *maquiladora* sector along the U.S.- Mexico border, while in other countries of the region FDI flows have been primarily channeled to traditional sectors such as mining and energy sectors. An assessment of the Mexican experience with FDI flows in recent years should provide valuable insights into the major determinants of FDI and their potential economic and institutional impact, particularly the capacity of FDI to transfer up-to-date technology and managerial know-how.

### CONCEPTUAL FRAMEWORK

Empirical studies of the determinants of FDI flows to Latin America and the Caribbean are more difficult to obtain given the paucity and inconsistency of the data and the greater economic and institutional/legal heterogeneity present in these countries. However, in recent years, a number of studies focusing on the determinants of FDI flows to developing countries have arisen as a result of the renewed surge in net flows to these countries beginning in the second half of the 1980s and the availability of reliable and methodologically consistent time series data for a number of countries, including the countries of Latin America in general, and Mexico in particular [Bloomstrom and Wolff, 1994; DeMello, 1997; ECLAC, 2000; United Nations, 1998].

Dunning [1981; 1988] has developed one of the most comprehensive explanations of why TNC firms undertake cross-border investments. He argues that FDI provides TNCs with three major advantages. First, the establishment of TNC subsidiaries gives the parent firms exclusive ownership rights over patents, trademarks, commercial secrets and production processes, thereby effectively denying access to both foreign and domestic competitors. Second, they generate locational advantages for TNC affiliates that arise from direct access to growing markets and lower unit labor costs, reduced transportation and communication costs, avoidance of tariffs and non-tariff barriers, and last but not least, direct access to raw materials and intermediate products that are indispensable for the production of certain goods. Finally, Dunning points to the advantages TNCs derive from internalizing certain operations because utilizing market mechanisms are relatively more burdensome and costly. For instance, many TNCs would rather establish a subsidiary abroad and assume directly the contractual and administrative costs associated with the research, development, production, and marketing of a given product or service, thereby avoiding the transaction costs associated with leasing licenses and securing patents to undertake production or hiring the services of advertising agencies to market and distribute their products.

Institutional differences also seem to play a very important role in either attracting or discouraging FDI flows to developing countries. For example, countries that have a greater degree of political and macroeconomic stability, well-defined and enforceable property rights with regard to the transfer of technology, liberal legislation

governing the remittance of profits and dividends, and limited or nonexistent local content or export requirements tend, on average, to attract greater flows of FDI. However, from the standpoint of the host country the very factors that act as an incentive for FDI flows in the short run may prove detrimental to long-term economic development if they lead to a net outflow of resources, few backward and forward linkages, and limited transfers of technology and managerial know-how [Loungani and Razin, 2001, 1-7; Yeager, 1999].

In addition, FDI flows are likely to be attracted to developing economies that pursue a credible outward-oriented, “market-friendly” strategy of economic development, such as Mexico has had since its accession to the GATT in 1986. Government policy can also enhance the attractiveness of FDI flows by ensuring the adequate provision of economic and social infrastructure in the form of paved roads, ports, airfields, relatively cheap energy supplies, and a well-educated and disciplined work force. FDI flows are likely to be encouraged by government policies that lead to the establishment of a legal-institutional framework that is conducive to business activity—namely, one that significantly reduces the transactions costs associated with negotiating contracts, improves information about the quality of goods and services, and ensures that the parties to a formal agreement honor their commitments [North, 1990].

Finally, changes in a country’s exchange rate policy play a key role in altering its relative attractiveness to net FDI inflows. Not surprisingly, economists are not entirely of one mind when it comes to the optimal exchange rate strategy to pursue. For example, some investigators argue that a policy that keeps the real exchange rate undervalued relative to that of its key investment partners is, *ceteris paribus*, likely to enhance FDI flows because it artificially reduces the unit costs of the country’s factors of production and thus enables investors to make a significantly larger investment in terms of the domestic currency.<sup>1</sup> Therefore, after a reasonable lag, the amount of FDI should increase with a devaluation of the domestic currency [ECLAC, 1998].

Other researchers contend that a policy that leads to a real appreciation of the domestic currency is likely to encourage FDI inflows because it enhances the foreign currency (dollar) value of the remittances of profits and dividends back to the parent company [De Mello, 1997]. After all, it is the real rate of return on their initial (dollar) investment that matters to the parent company. In light of the conflicting views in the literature on the impact of the exchange rate on FDI flows, it is best, from a policy standpoint, to pursue a credible strategy that maintains the country’s real exchange rate in line with that of its key trading and investment partners.

### **FDI FLOWS TO MEXICO DURING THE 1990s**

The debt crisis of the early 1980s resulted in an absolute decrease in net FDI inflows to Latin America and the Caribbean during the first half of the decade, after which they began to increase steadily during the second half and posted a dramatic upward surge during the decade of the 1990s. In constant dollars, FDI flows to the countries of Latin American rose from \$8.4 billion in 1990 to \$76.7 billion in 1998, or more than a ninefold increase [ECLAC, 2000]. The strength of these flows is revealed

by the fact that despite the serious economic downturn in Mexico in 1995, and the associated “Tequila effect” which reduced FDI inflows relative to 1994, they staged a remarkable recovery during the following two years, easily surpassing the pre-crisis levels. In absolute terms, the major recipients of FDI flows have been concentrated in a few major countries of the region; in order of importance of the cumulative level of inflows during the 1990-98 period, they are Mexico, Brazil, Argentina, Chile and Venezuela. The major supplier of FDI flows to Latin America during the decade of the nineties (and historically) has been the United States, followed, in order of importance, by Great Britain, Japan, Germany, and France [INEGI, 1998, 504-505]

In relative terms, the major countries of Latin America, including Mexico, have exhibited a consistently strong record of attracting FDI inflows during the decade of the 1990s, never falling below 1.5 percent of their countries’ respective GDPs, and beginning in 1994, FDI inflows have averaged in excess of 3 percent of GDP for Mexico. From an economic standpoint, the importance of these inflows is more fully appreciated by focusing on their evolution relative to these countries’ gross fixed capital formation [ECLAC 2000, 106-111]. Table 1A shows that throughout the decade of the 1990s, and particularly after 1993, FDI flows now represent more than 15 percent of their countries’ gross fixed capital formation (including Mexico).

Critics of FDI, however, contend that these flows are a net drain on a country’s scarce resources because they generate substantial reverse flows in the form of remittances of profits and dividends to the parent companies [Cypher and Dietz, 1997; Stallings, 1990]. One way of measuring the net contribution of FDI to private capital formation is to deduct from these inflows the repatriation of profits and dividends to the parent companies. Table 1B reveals that during the decade of the nineties, remittances of profits and dividends by Latin America and the Caribbean to the developed countries more than tripled between 1990 and 1998, from \$7.0 to \$21.5 billion. Not surprisingly, the lion’s share was accounted for by Argentina, Brazil, Chile, Colombia, and Mexico.

Mexico’s profits and dividend remittances almost doubled between 1990 and 1998 from \$2.3 to \$4.8 billion. Relative to the inflows of FDI from 1990 to 1998, Mexico’s remittances of profits and dividends averaged 46 percent. If we subtract profits and dividends from FDI flows and express the net figure as a proportion of fixed capital formation, it is evident from Table 1B that the net contribution of FDI inflows to gross fixed capital formation in Mexico, although increasing in recent years, is far less than that advertised in Table 1A. It is also likely that the net contribution of FDI would be further reduced if we could accurately measure the amount of capital that leaves the region as a result of the widespread practice of intra-firm transfer pricing to avoid taxes and restrictions on the repatriation of profits [Plasschaert, 1994].

Economic theory suggests that rather than focus on the flows of FDI to the countries of Latin America, it is theoretically more appropriate to focus on the accumulated stock of FDI, because it is the latter that ultimately determines the marginal productivity of private capital (and labor). The stock of FDI in Latin America (1990 dollars) rose from \$175.6 billion in 1990 to \$343.8 billion in 1998. This represents almost a doubling in the stock of FDI of these countries, an increase that is far greater than that of the entire “lost decade” of the 1980s. Mexico’s stock of FDI rose from

**TABLE 1A**  
**Latin America: FDI Flows**  
**as a Percentage of Gross Fixed Capital Formation, 1990-97**

Country	1990	1991	1992	1993	1994	1995	1996	1997
<b>Argentina</b>	9.28	8.94	10.90	5.81	5.45	8.66	8.05	12.4
<b>Brazil</b>	1.13	1.23	2.46	1.41	2.83	3.85	8.72	11.9
<b>Chile</b>	8.34	7.21	7.50	7.22	14.56	12.11	25.71	27.9
<b>Colombia</b>	7.46	6.94	9.66	9.13	12.44	15.19	22.89	32.8
<b>Ecuador</b>	5.69	6.21	6.34	16.18	16.70	13.70	12.57	18.5
<b>Mexico</b>	5.61	8.72	7.12	7.14	16.44	16.56	15.73	16.3
<b>Peru</b>	0.11	0.09	1.59	6.84	22.75	12.23	22.42	11.1
<b>Venezuela</b>	6.57	19.64	4.97	3.10	8.46	10.17	20.03	31.2
<b>Annual Total<sup>a</sup></b>	<b>3.94</b>	<b>5.52</b>	<b>5.80</b>	<b>4.79</b>	<b>8.93</b>	<b>8.89</b>	<b>12.76</b>	<b>16.1</b>

Source: ECLAC [1998, 38] and United Nations [1999].

a. Total also includes Bolivia, Paraguay and Uruguay.

**TABLE 1B**  
**Chile and Mexico: FDI Flows**  
**Adjusted for the Remittance of Profits and Dividends**  
**as a Percentage of Gross Fixed Capital Formation, 1990-98**

Country	1990	1991	1992	1993	1994	1995	1996	1997	1998
<b>Chile<sup>b</sup></b>	4.75	-1.66	-2.10	0.75	6.01	10.89	16.71	17.4	17.8
<b>Mexico</b>	0.73	4.19	3.35	3.07	11.18	7.95	8.02	10.8	7.2

Source: ECLAC [1996-97, Table VIII. 4, 126] and ECLAC [2001].

b. A negative value indicates that profits and dividend payments exceeded FDI inflows for that year, thereby diverting resources away from fixed capital formation.

\$37.1 billion 1990 and accelerated after 1993 (following the passage of NAFTA) reaching an impressive level of \$81.5 billion by year-end 1998 [United Nations, 1998, Table B.3, 374-75; ECLAC, 2000, 9-10].

The sectoral destination of FDI flows to Mexico during the decade of the nineties is shown in Table 2. FDI flows have been primarily channeled to “greenfield” investments in the manufacturing sector, particularly in branches with a strong participation by TNC’s and with investments oriented towards exports such as those of the *maquiladora* industry. Table 2 below shows that during the 1990s, in anticipation of the passage of NAFTA, FDI flows surged into industrial sectors producing automobiles (for example, Ford Escorts) and auto parts (engines), machinery and computers, chemicals, and basic petrochemicals. The table also reveals that FDI flows fell by 25.1 percent in 1995 due to the severe economic contraction, but rose in 1996 and accelerated in 1997 and 1998, with over 60 percent channeled to the export-oriented manufacturing sector. This evolution in FDI flows is consistent with Dunning’s locational advantage hypothesis alluded to in the previous section, particularly now that NAFTA

**TABLE 2**  
**Sectorial Distribution of FDI Flows in Mexico, 1980-1998**  
**(Millions of dollars)**

Year	Total	Industry <sup>a</sup>	Services	Commerce	Mining	Agriculture
1980	1 622.6	1 285.7	131.3	118.0	86.7	0.9
1985	1 729.0	1 165.8	453.3	109.5	18.0	0.4
1986	2 424.2	1 918.9	323.1	151.2	30.8	0.2
1987	3 877.2	2 400.5	1 433.9	21.2	48.8	15.2
1988	3 157.1	1 020.0	1 877.4	246.8	24.9	12.0
1989	2 499.7	982.3	1 102.3	386.3	9.5	19.3
1990	3 722.4	1 192.9	2 203.1	171.4	93.9	61.1
1991	3 565.0	963.6	2 138.0	387.5	31.0	44.9
1992	3 599.6	1 100.8	1 700.0	750.9	8.6	39.3
1993	4 900.7	2 320.5	1 730.7	759.9	55.1	34.5
1994	10 158.8	5 878.9	2 929.5	1 239.6	102.9	7.9
1995	7 613.3	4 294.0	2 307.9	923.5	79.0	8.9
1996	9 186.1	5 236.1	2 939.6	826.7	91.8	45.9
1997	12 831.0	7 826.9	3 207.8	1 549.7	108.4	138.3
1998	11 311.0	6 809.2	2 827.8	1 357.3	203.6	113.1

Source: Instituto Nacional de Estadística, Geografía e Informática [1998, Table 17.23, 500] and Economic Commission for Latin America and the Caribbean Report [2000, 106-116].

a. Includes the maquiladora sector.

has “locked in” many of the neoliberal reforms initiated by both the De la Madrid (1982-88) and Salinas (1988-94) administrations.

Mexico has also attracted substantial inflows of FDI into apparel, banking and financial services, electronics and computers, telecommunications and the tourism industry. Many of these sectors have a substantial TNC presence and are characterized—like the automobile sector—by considerable intra-industry specialization and subcontracting of local parts and components, which is likely to further enhance FDI’s contribution to the transfer of technology and managerial knowhow [Casar, 1993; Moctezuma and Mungaray, 1997].

It should also be noted that most of the sectors in which TNC affiliates operate, particularly manufacturing, have in recent years developed a strong outward orientation. For example, the export propensity—defined as the ratio of exports to sales in percent—of the largest 100 TNC manufacturing affiliates operating in the Mexican market rose from 48.6 percent in 1994 to 71.4 percent in 1996, compared to 10.3 and 20.6 percent, respectively, for Mexican domestic manufacturing firms. The export orientation of Mexico’s largest firms (both domestic and foreign) in all sectors, and particularly in manufacturing, is significantly higher than their counterparts in Brazil, the region’s other industrial power [UN, 1998, 257]. This is partly explained by the proximity to the U.S. market, Mexico’s relatively low unit labor costs, and the investment and trade opportunities offered by NAFTA.

However, where proponents of the “new” outward-oriented strategy see boundless opportunities, critics see a number of serious challenges. First, they contend that many of the TNC-dominated industries have yet to establish significant forward and backward linkages with the domestic market, and that they are owned and led by foreign firms with little if any concern for national welfare. Second, they argue that the inherent dynamism of these industries is generated by the U.S export market, which renders the Mexican economy structurally dependent and vulnerable to the U.S. business cycle—a structural dependence that has been “locked in” by the passage of NAFTA. Third, they maintain that the capital-intensive technology utilized by these TNC subsidiaries limits their employment creation. Finally, they point out that the large tax concessions and unlimited profit remittances granted to these firms represents a major diversion of scarce resources away from more socially desirable projects and/or the non-tradable sector [Cypher and Dietz, 1997; Barkin, 1990].

### INSTITUTIONAL REFORMS AND FDI LEGISLATION

The large inflow of foreign capital in the 1990s has been stimulated by important changes in the region’s legal-institutional environment associated with the implementation of liberalization, privatization, and deregulation programs. In general, there has been a major liberalization in the restrictions governing the remittances of capital and profits, as well as the introduction of new laws that grant TNCs essentially the same benefits and responsibilities as domestic firms (namely, national treatment). For example, most countries have no restrictions on the repatriation of profits and dividends, corporate taxes have been reduced, and the need for prior authorization has been either eliminated entirely or restricted to a few “priority” sectors such as oil in Mexico [Figueroa, 1998; Ramirez, 1998].

The impetus for change in the Mexican government’s attitude and policy toward FDI can be traced to the country’s pressing need for funds following the credit squeeze generated by the onset and aftermath of the August 1982 debt crisis. Major changes in the legal framework governing FDI were first introduced by the Miguel De La Madrid administration (1982-1988), and further intensified by the neoliberal administration of Carlos Salinas de Gortari (1988-1994). For example, under the De la Madrid administration several sectors that had been off-limits to foreign investors, such as petrochemicals, mining, banking, and telecommunications, were opened on a selective basis and, in some instances, foreign investors were allowed a majority shareholding position. FDI regulations were further liberalized under the Salinas de Gortari administration during 1989 when the government allowed 100 percent foreign participation with no prior approval for investments valued under \$100 million [ECLAC, 1998; Lustig, 1992].

The imminent vote on NAFTA in late 1993 was also instrumental in the enactment in March of that year of the Mexican Investment Promotion and Foreign Investment Regulation Act which further liberalized the entry of foreign investors into “strategic” sectors. For example, according to ECLAC [2000], the legislation now in force permits foreign investors to participate in most economic sectors. It reports that “...of the 704 [sectors] listed in the Mexican Classification, 606 are fully open to foreign

capital, a share of up to 49 percent is permitted in 35 others, prior authorization from the National Foreign Investment Commission (CNIE) is required in 37, and FDI participation is not allowed in only 16 cases" [ibid., 103]. The aforementioned act also gave the Mexican government additional discretionary powers to determine in which sectors or projects foreign investors would be allowed to control majority interests. The passage of NAFTA in November of that year "locked in" the more liberal provisions governing the rights of foreign investors.

Mexico also introduced a limited and selective external debt conversion program in 1986 that channeled funds into high priority sectors in the tradable sector, particularly the *maquiladora* sector. The implicit subsidy to foreign investors was substantial in view of the fact that Mexican debt in the secondary market was selling at an average of 45 cents on the dollar of face value, while they received, on average, 82 cents on the dollar of face value from the Mexican government. About one-fourth of all FDI flows into Mexico from 1986 to 1990 were directly attributable to the debt conversion program and many of these investments were directed to enterprises in the high priority tradable sector. In 1990 the program was scaled back owing to its obvious inflationary potential and limited to investments in economic infrastructure projects such as the construction of roads, highways, bridges, sea ports and airport fields [ECLAC, 1998]. However, as opposed to the earlier program, it was opened to participation by domestic and foreign investors alike.

Mexico's privatization program, expanded and intensified during the Salinas de Gortari *sexenio*, has also played an important role in attracting FDI flows into sectors such as financial services, mining, and non-basic petrochemicals. In this connection, the International Finance Corporation (IFC), reports that between 1988 and 1994 revenues from Mexico's privatization program amounted to \$27.2 billion, with FDI accounting for close to 10 percent of the total proceeds.<sup>2</sup> The 1994-95 peso crisis initially reduced FDI flows from privatization, but in subsequent years it has acted as a catalyst in further opening key sectors of the Mexican economy to foreign investors.

## EMPIRICAL ANALYSIS

Following the lead of Agosin [1995], Ros [1994], and Zhang [2001], this study estimated a basic foreign investment function that includes arguments such as real GDP, the real exchange rate, and dummy variables to explain the variation in FDI flows to Mexico from 1956 to 1996.<sup>3</sup> Mexico's potential market size is proxied by the lagged value of real GDP because foreign investors make their investment decisions based on expectations generated, in part, by what the level of real GDP was in the preceding year. The sign associated with this variable is expected to be positive. The real exchange rate is included in the model as a proxy for labor and material costs given that a real devaluation of the peso reduces the real (dollar) cost of these inputs to foreign investors, thus enhancing profitability in sectors such as the *maquila* that rely on heavy use of these inputs.<sup>4</sup> It is also included because, as argued above, a considerable proportion of FDI flows to Mexico are concentrated in foreign affiliates, which have a strong export orientation, such as autos, electronic parts, and apparel. A *ceteris paribus* depreciation of the real exchange rate (a rise in *REX*) should in-



crease the profitability of these sectors and induce FDI flows to them. This variable is introduced with a lag because the decision to invest in new plants, machinery, and equipment in a foreign country takes time due to recognition, implementation, and institutional-legal delays. Dummy variables  $D1$  and  $D2$  included to capture, respectively, the relaxation of restrictions on profit remittances and entry into strategic sectors during the Salinas *sexenio* and the debt conversion program of the late 1980s. Both are expected to exert a positive effect on FDI flows to Mexico. The last dummy variable,  $D3$ , is included to capture periods of political turmoil such as the Tlatelolco student massacre of 1968, the emergence of major rural guerrilla groups in 1972, the expropriation of large tracts of fertile land in the northern state of Sonora belonging to powerful business groups in 1976, the political uncertainty following the disputed presidential elections of 1988, and the assassinations of important political leaders in 1994 such as the Institutional Revolutionary Party's (PRI's) presidential candidate, Luis Donaldo Colosio.<sup>5</sup> The variable is also assigned a value of 1 for periods of economic crises such as Portillo's ill-fated decision to nationalize the banking system and the onset of the debt crisis in 1982-83, as well as the sharp economic contraction of 1995. The uncertainty created by these events is likely to create a balance-of-payments crisis which may induce government officials to adopt a more nationalistic stance and impose restrictions on foreign investors in terms of the sectoral destination of FDI flows, as well as the repatriation of profits and dividends. This variable was expected to have a negative sign.

The results of the basic regression model are reported as equations (1)-(3) in Table 3.  $FDI$  is the flow of foreign direct investment in billions of 1970 pesos;  $GDP$  is real gross domestic product in 1970 pesos;  $REX$  is the real exchange rate (1970 pesos per dollar of 1970), where an increase represents a real depreciation of the domestic currency.  $D1$ ,  $D2$  and  $D3$  are, respectively, dummy variables for the surge in foreign capital inflows during the consolidation of market-oriented reforms under the Salinas administration (1991-94), the external debt to equity conversion program (1986-89), and economic crises and political instability years (1967-68, 1972, 1976, 1982-3, 1988, and 1994-95). The "L" operator denotes the natural logarithm, while the  $t$ -ratios are in parenthesis and "a" denotes statistical significance at the 10 percent level and "b" at the 5 percent level or less. The data used in the regression analysis were obtained from official government sources such as various issues of *La Economía Mexicana en Cifras*, the *Instituto Nacional de Estadística, Geografía e Informática* (INEGI), and the *World Investment Report 1998*.

The estimates in equation (1) suggest that the lagged level of real GDP has a positive and statistically significant effect on FDI flows, while a 10 percent depreciation of the real exchange rate during the current year stimulates FDI flows in the next year by 3.7 percent, and in the subsequent one by 3.5 percent, *ceteris paribus*.<sup>6</sup> (At this juncture, it is important to note that the nature of the lag for both variables was determined via the Akaike-Schwarz criteria, as well as through fitting a second-degree, 3-lag Almon polynomial with no constraints.)<sup>7</sup> From an institutional standpoint, the results suggest that both the debt conversion program and the liberalization of foreign investment rules from 1991 to 1994 had a positive and statistically significant effect on FDI flows to Mexico. The dummy variable for political and eco-

**TABLE 3**  
**Estimates of Determinants of FDI Flows to Mexico, 1956-96**

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$$(1) LFDI_t = -13.88 + 1.55 LGDP_{t-1} + 0.37 LREX_{t-1} + 0.35 LREX_{t-2} + 0.34 D1 + 0.46 D2 - 0.30 D3$$

(-1.64)<sup>b</sup>      (2.62)<sup>a</sup>      (1.70)<sup>b</sup>      (2.24)<sup>a</sup>      (2.11)<sup>a</sup>      (2.36)<sup>a</sup>      (-3.28)<sup>a</sup>

Adj. R<sup>2</sup> = .93, S.E. = 0.26, F-Stat. = 66.31<sup>a</sup>, D.W. = 1.82, Akaike criterion = 0.40, Schwarz criterion = 0.82.

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$$(1) LFDI_t = -14.62 + 1.61 LGDP_{t-1} + 6.18 D1 \times LGDP_{t-1} + 0.33 LREX_{t-1} + 0.34 LREX_{t-2} + 0.50 D2 - 0.26 D3$$

(-1.66)<sup>b</sup>      (2.62)<sup>a</sup>      (2.24)<sup>a</sup>      (1.70)<sup>b</sup>      (2.40)<sup>a</sup>      (2.91)<sup>a</sup>      (-3.57)<sup>a</sup>

Adj. R<sup>2</sup> = .94, S.E. = 0.26, F-Stat. = 65.70<sup>a</sup>, D.W. = 1.80, Akaike criterion = 0.41, Schwarz criterion = 0.83.

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$$(3) \quad LFDI_t = -9.83 + 1.36 LGDP_{t-1} + 0.25 LREX_{t-2}$$

(-1.75)<sup>b</sup>      (3.21)<sup>a</sup>      (2.11)<sup>a</sup>

Adj. R<sup>2</sup> = .84, S.E. = 0.41, F-Stat. = 68.11<sup>a</sup>, D.W. = 1.94, Akaike criterion = 1.13, Schwarz criterion = 1.30.

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a. Significant at the 1 percent level.

b. Significant at the 5 percent level.

conomic instability had the expected negative impact on FDI flows and it was highly significant.

The model was also estimated with dummy variable *D1* multiplied by the level of real GDP. By estimating this variable interactively with real GDP one can assess whether the consolidation of market-oriented reforms had a positive and significant effect on the capacity of market size to affect real FDI flows. (Similar results were obtained with dummy variable *D2*.) The results with *D1* are reported in equation (2). In general the results are consistent with those of equation (1), and the interactive term suggests that the effect of market size on FDI flows almost quadrupled during the Salinas de Gortari neoliberal reforms. Table 3 also reports results for the basic regression without the dummy variables to determine whether the GDP and real exchange rate variables maintain their signs and significance. As can be seen by equation (3), the variables retain their signs and significance, and the overall model has a high degree of explanatory power. Finally, the reported Durbin-Watson values (after correcting for first-order serial correlation) suggests that the null hypothesis of no (positive) autocorrelation cannot be rejected at the 5 percent level.

### **Cointegration Analysis**

This study also performed unit root tests on the variables in question given that it is well known that macro time series data tend to exhibit a deterministic and/or stochastic trend that renders them non-stationary; that is, the variables have means, variances, and covariances that are not time invariant. According to Engle and Granger [1987] the direct application of ordinary least-squares or generalized least-squares to non-stationary data produces regressions that are mis-specified or spurious in nature. Table 4 below presents the results of running an Augmented Dickey-Fuller test (one lag) for the variables in both level and differenced form under the assumption of

**TABLE 4**  
**Mexico: Unit Root Tests for Stationarity, Sample Period 1956-96.**

Variables	Levels	First Difference	5% Critical Value <sup>a</sup>	1% Critical Value
lnFDI	-0.66	-6.29 <sup>b</sup>	-2.94	-3.59
lnGDP	-1.66	-3.29 <sup>c</sup>	-2.94	-3.59
lnREX	-2.80	-7.23 <sup>b</sup>	-2.94	-3.59

a. Mackinnon critical values for rejection of null hypothesis of a unit root.

b. Significant at the 1 percent level.

c. Significant at the 5 percent level.

a stochastic trend.<sup>8</sup> It can be seen that the variables in level form are non-stationary. In case of first differences, however, the null hypothesis of non-stationarity (unit root) can be rejected for the relevant variables at least at the 5 percent level.

In view of these findings, the results displayed in equations (1)-(3) above are suspect. It is therefore necessary to determine whether there is at least one linear combination of these non-stationary variables (in level form) that is  $I(0)$ . In words, does a stable and non-spurious (cointegrated) relationship exist among the relevant variables over the period in question? The Johansen and Juselius [1990] method was used to determine whether a stable long-run relationship exists among the relevant variables (*LFDI*, *LGDP* and *LREX*). Application of the likelihood ratio (L.R.) test showed that the null hypothesis of no cointegrating relationship can be rejected at least at the 1 percent level (L.R. stat. = 41.47 > Critical value = 35.65), thereby suggesting that at least one linear combination of these non-stationary variables (in level form) is stationary. Similar results were obtained with the inclusion of the dummy variables (available upon request).<sup>9</sup>

The information provided by the likelihood-ratio test was also used to generate a set of error-correction models that capture both the short- and long-run behavior of the FDI relationship estimated above. Error-correction models enable researchers to estimate the speed of adjustment (coefficient of the lagged residual term) back to the long-run stable relationship among the variables. To conserve space, the results of one of the error-correction models estimated in this study is given below.

$$\begin{aligned}
 (4) \quad \Delta LFDI_t = & -0.65 + 1.13\Delta LGDP_{t-1} + 0.28\Delta LREX_{t-2} - 0.61EC_{t-1} + 0.38D1 \\
 & (-0.68) \quad (2.01)^a \quad (2.15)^a \quad (-5.07)^a \quad (3.18)^a \\
 & + 0.48D2 - 0.35D3 \\
 & (3.39)^a \quad (-5.28)^a
 \end{aligned}$$

Adj.  $R^2 = .74$ , S.E. = 0.23, F-Stat. = 12.21\*\*, D.W. = 1.85, Akaike criterion = 0.14, Schwarz criterion = 0.50. (a. significant at the 1 percent level.)

Where  $\Delta$  denotes the difference operator and  $EC_{t-1}$  represents the lagged residual from the cointegrating equation. The short-term estimates reported in equation (4)

are consistent with the results reported in Table 3 and they suggest that a one-year percentage change in real GDP has a positive effect on FDI flows and a two-year percentage change in the exchange rate also has a positive effect. From an institutional standpoint, the results suggest that both the debt conversion program (*D2*) and the liberalization of foreign investment rules from 1991 to 1994 (*D1*) had a positive and statistically significant effect on FDI flows to Mexico, while economic and political turmoil (*D3*) had a negative impact. The relative fit and efficiency of the error-correction model is quite good and, as the theory predicts, the lagged residual term is negative and statistically significant, suggesting that a deviation from long-run FDI flows to Mexico is corrected by about 61 percent in the next year on average. Finally, stability tests were conducted to determine whether the null hypothesis of no structural break could be rejected for key periods in Mexico's history. The Chow breakpoint tests suggested (at the five percent level) that the null hypothesis could not be rejected for the economic crises years 1976 (*p*-value: 0.124), 1982 (*p*-value: 0.166) and 1987 (*p*-value:0.575).

## CONCLUSION

This paper has analyzed the recent evolution, rationale, and impact of FDI flows in a major country of Latin America, Mexico. It assessed the major determinants of FDI flows to this country, as well as the economic and institutional-legal channels through which FDI flows have affected key economic variables and sectors of the Mexican economy. The evidence presented suggested that during the 1990s Mexico has done an effective job of attracting FDI flows to operations in the manufacturing sector where the international trade links are strong and the positive spillover effects associated with the transfer of technology and learning-by-doing are considered to be high. Mexico's auto and engine assembly (*maquiladora*) industry is a case in point. The major car manufacturers have made substantial investments in new plants, machinery, and equipment, as well as managerial techniques that have generated a rise in average labor productivity and an increasing volume of exports of autos and engine parts to the North American market. Many of these newly-established state-of-the-art auto and engine plants have also engaged in substantial subcontracting for parts and repairs from local suppliers. Thus, there is the potential for "learning from doing" as domestic suppliers gain experience in meeting the design and quality standards of the TNCs.

The paper also presented evidence that suggested that major institutional-legal changes such as the (conditional) relaxation or elimination of restrictions on profit and capital remittances, the elimination of prior authorization of investments, and the opening of formerly "priority" sectors to foreign investors, has had the combined effect of vigorously stimulating FDI flows from 1986 to 1999. Mexico's adoption of a debt conversion mechanism has attracted FDI flows into high priority sectors. It has proven to be highly effective given that foreign investors participating in the program must direct their investments to projects that significantly increase production capacity, incorporate new technologies in the export sector, and improve the country's infrastructure.

The econometric results presented in the last section of the paper supported the analysis undertaken in the previous sections. The estimates suggest that market size (proxied by real GDP), the real exchange rate, and institutional variables—captured via the inclusion of dummy variables—had the anticipated signs and were statistically important in explaining the variation of FDI flows to Mexico from 1956 to 1996. In addition, the Johansen cointegration test indicated that there is a stable relationship among the relevant variables which keeps them in proportion to one another over the long run. Finally, the error-correction model reported in equation (2) suggests that deviations from the long-run FDI relationship are corrected in subsequent periods.

The evidence also suggested that the Mexican government envisions that the positive effects associated with FDI in the form of capital financing and “intangibles” such as the transfer of technology and managerial knowhow will offset the short- and long-term costs associated with generous subsidies, extravagant tax concessions, and pressures on the balance of payments through profit and dividend remittances. Whether this comes to pass in the Mexican case remains to be seen, particularly in light of recent evidence that shows that TNCs’ remittances of profits and dividends from the country have grown substantially in recent years.

Finally, the results suggest that FDI flows will be attracted to countries that implement complementary and credible macro policies that ensure sustainable rates of economic growth in a low inflationary environment. In this connection, it is very important for Mexican policy makers to avoid extensive overvaluation of the real exchange rate because not only may it discourage FDI flows into the “innovative” tradeable sector, but it is likely to undermine the long-term stability of the real exchange rate, thereby discouraging FDI flows.

## NOTES

I would like to thank two anonymous reviewers and the editor of the *Journal* for helpful comments on earlier versions of this paper.

1. The surge of FDI into the *maquiladora* sector in Mexico following the 1994 peso devaluation provides support for this assessment of the impact of changes in the exchange rate on FDI flows [ECLAC, 1997, 256-57].
2. For further details see Bouton and Sumlinski [1996, 6-8].
3. Agosin [1995, 121-22] presents estimates for a regression model that tries to explain the variation in FDI flows to Chile during the 1975-93 period. He finds that both the level of real GDP in constant dollars and the real depreciation of the exchange rate have a positive and statistically significant effect on FDI flows. He also includes a dummy variable to capture the adoption of the debt conversion program (Chapter XIX), and finds that it also has a positive and statistically significant impact on FDI flows (coefficient = 0.04, t-ratio= 4.79).
4. An anonymous referee suggested that instead of *REX*, I use a more direct measure of labor costs such as unitary labor costs. Although this would be a preferable measure to use, data on Mexican unit labor costs for the period under review (going as far back as the fifties) is not available in a consistent and reliable form.
5. For further information on the political economy of Mexico in the postwar period, see Maxfield [1990, Chapters 3-5] and Ramirez [1997, Chapter 4].

6. Although the GDP variable is lagged in equation (1), it is possible that FDI flows may affect GDP. To test for this possibility I ran a pairwise "Granger Causality" test with one and two lags. The results for both specifications indicated that the null hypothesis that *GDP* does not "Granger cause" *FDI* could be rejected at the 5 percent level ( $p$ -value: 0.048), while the hypothesis that *FDI* does not "Granger cause" *GDP* could not be rejected ( $p$ -value: 0.123). Of course, this test says nothing about "causation" *per se*; it only provides information about whether changes in one variable precede changes in another. The evidence suggests that changes in *GDP* precede changes in *FDI*.
7. As one reviewer suggested, the length of the lags is likely to change as the legal-institutional environment for conducting business in Mexico improves. In this scenario, the flow of *FDI* to Mexico is likely to become more responsive to any future changes in *GDP* and/or the real exchange rate, *ceteris paribus*.
8. Unit root tests under the assumption of a deterministic trend also indicated that in level form the variables were non-stationary. Thus, the common practice of de-trending the data would not render them stationary (results are available upon written request).
9. I also performed an augmented (one lag) Dickey-Fuller (D-F) test on the residuals of the foreign investment function given in equation (1) to determine if they were stationary. (The length of the lag was determined via the Akaike-Schwarz criterion.) The results (available upon request) indicated that the absolute value of the D-F stat. (5.023) was greater than the absolute value of the critical Mackinnon value at the 1 percent level (3.61), thereby rejecting the presence of a non-stationary process (a so-called unit root). This admittedly somewhat dated test for stationarity is consistent with the more robust L.R. ratio test reported in the paper.

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