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Tax Sensitivity of Foreign Direct Investment

An Empirical Assessment

Anwar Shah
and
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Developing countries with heavy foreign direct investment need not worry about providing special tax incentives for foreign investment. But they must be sure that their tax system is competitive with the home tax regime of a marginal investor who has access to foreign tax credits against domestic tax liabilities.

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The tax sensitivity of foreign direct investment (FDI) has important policy implications for developing countries.

If FDI is not responsive to taxation, it may be an appropriate target for taxation by the host country, which can raise revenue without sacrificing any economic benefits from FDI.

Shah and Slemrod examine this question for Mexico by modeling the tax regimes in Mexico and the home country of a marginal investor, the credit status of U.S. multinationals, country risk factors, and regulatory and trade regimes in Mexico.

They conclude that the FDI in Mexico is sensitive to the Mexican and U.S. tax regimes, to the multinationals' credit status, to country credit ratings, and to the regulatory environment.

So Mexico's current policy of dismantling regulations and having a tax regime competitive with that in the United States is expected to improve FDI in Mexico.

Mexico must aim for tax rates similar to those in the United States to eliminate any tax-induced disincentives for investment and to ward off any possible transfer of revenues from Mexico to the U.S. treasury through U.S. foreign tax credit provisions.

A potential investor might find Mexico's new 2 percent assets tax, because of its partial noncreditability against U.S. tax liabilities, a cause for concern. An alternative minimum tax on an adjusted base that includes tax preferences as part of taxable income could achieve the same purpose but would probably be fully creditable against U.S tax liabilities.

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AN EMPIRICAL ASSESSMENT

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Summary

Tax sensitivity of foreign direct investment (FDI) has important policy implications. If FDI is not responsive to taxation, then it may be an appropriate target for taxation by the host country, which can raise revenue without sacrificing any economic benefits FDI produces. For some countries where the degree of FDI penetration is large, this can represent a significant fraction of total tax revenues. If, on the other hand, the volume of FDI responds negatively to taxation, then the host country must trade off the revenue gains of increased taxation against the economic costs of discouraging FDI.

The relevance of host and home country tax regimes for FDI transfers and reinvestments are the subject of considerable theoretical controversy and debate. According to the "old" view, both tax regimes matter - the home country tax system is relevant even if a subsidiary finances its investments by reinvested earnings or by raising local debt. This is because its financing and investment decisions affect home tax liability on dividends distributions. An alternative view (the so-called "new" view suggested by Hartman (1985)) argues that in the case of FDI financed by local debt or reinvested earnings, the home country tax rate is irrelevant. The reasoning is that any taxes due upon repatriation to the home country reduce equally the opportunity cost of investment (a repatriated dividend) and the after-tax return to investment. Thus it is irrelevant for the incentive to invest. Even under the new view, however, the home country tax rate would be relevant for home country multinationals that are contemplating a transfer of funds to a foreign subsidiary.

These questions have not yet been examined empirically for any developing country. The empirical literature on this subject primarily focuses on FDI in the USA and concludes that tax effects on FDI are quite strong. With one recent exception, none of these studies captures the home country regime in reaching these conclusions. Furthermore, in the literature, the disincentive to investment caused by the tax system is generally implicitly measured by an average tax rate, computed as total taxes paid divided by a measure of profits. However, the incentive to undertake new investment depends upon the effective marginal tax rate, which can deviate substantially from an average tax rate concept.

An analysis of FDI in Mexico poses some unique problems but also offers some unique analytical advantages. Unique problems arise from the historical policy emphasis in Mexico on "regulation" (as opposed to promotion) of FDI. Unique advantages arise from the fact that the USA is a major contributor (assumed to be marginal investor) and therefore it is possible to model the home country tax regime in examining tax effects. Having data from both Mexico and the USA make it possible to develop time series on marginal and average effective tax rates for use in this analysis.

This paper examines the effects of taxation on FDI in Mexico. The empirical model used for this purposes distinguishes FDI financed by transfers and retained earnings and incorporates host and home country tax and non-tax factors including host country risk factors and credit status of multinationals.

The paper concludes that empirical evidence on tax sensitivity of FDI in Mexico is quite strong. It suggests that FDI transfers and reinvested earnings respond negatively to the Mexican effective tax rate and to regulations. It is further dampened by the excess credit status of

multinationals. It is encouraged by a favorable economic and political climate in Mexico, as indicated by the country credit rating of The Institutional Investor and by tariffs.

In view of the sensitivity of FDI to tax regime in Mexico, Mexico must aim for tax rates closer to but not lower than the U.S. rates to eliminate any tax induced disincentives for investment as well as to ward off against any possible transfer of revenue from Mexico to the U.S. Treasury through the operation of U.S. foreign tax credit provisions. Mexico has already implemented tax reforms which make the tax regime there competitive with the USA and Canada. Furthermore, effective taxation of reinvestments in Mexico is lower than that of repatriations providing incentives for retained earnings The new 2-percent assets tax, nevertheless, because of its partial non-creditability against U.S. tax liability, may be a cause for concern by a potential investor. This tax could be replaced by an alternative minimum tax on an adjusted base that would include tax preferences as part of taxable income. Such a tax could achieve the same purpose as the 2-percent assets tax but would likely be fully creditable against U.S. tax liabilities.

With the tax changes introduced in 1989, the Mexican tax system does not provide any special disincentives for foreign investment. In view of this, perhaps public policy attention needs now to be focussed on accelerating the process of deregulation of FDI already initiated in Mexico.

An important implication of the conclusions reached here for other developing countries, especially for those where the degree of FDI penetration is large, is that they need not worry about providing special tax incentives for foreign investment but must insure that their tax system is competitive with the home tax regime of a marginal investor having access to foreign tax credits against domestic tax liabilities.

TAX SENSITIVITY OF FOREIGN DIRECT INVESTMENT
AN EMPIRICAL ASSESSMENT

Anwar Shah and Joel Slemrod *

1. Introduction

The 1980s have seen a remarkable growth in foreign direct investment (FDI). Along with this growth has come a renewed interest in its effect on economic performance (of both the host and home country) and on what is appropriate government policy toward FDI. Not surprisingly, a critical input to this debate is the responsiveness of FDI to attempts to tax the income that it produces. If FDI is not responsive to taxation, then it may be an appropriate target of taxation by the host country, which can raise revenue without sacrificing any of the economic benefits that FDI produces. For some countries where the degree of FDI penetration is large, the revenue raised from taxing FDI can represent a significant fraction of total tax revenues. For example in Trinidad and Tobago, Nigeria, Peru, Indonesia, Ecuador, and Egypt, tax payments by U.S. corporations alone as a share of host country revenues exceed 10% (Alworth, 1988, p. 33). If, however, the volume of FDI responds negatively to taxation, then the host country must trade off the revenue gains (if any) of increased taxation against the economic costs of discouraging FDI.

Most of the recent empirical literature on the tax sensitivity of FDI has focused on investment to and from the United States. Undoubtedly

this is due to the ready availability of data regarding these flows. In this paper we apply and extend the standard methodology to a study of the effect of taxation on FDI in Mexico. We conclude that FDI in Mexico is sensitive to the tax regime in Mexico and of the investing countries. In addition to taxation, the regulatory framework and overall economic and political climate in the country exercise important influences on FDI transfers and reinvestments in Mexico.

To arrive at these conclusions, the paper proceeds as follows. Section 2 reviews the recent empirical literature on FDI in the U.S., and Section 3 draws out the important differences between Mexico and the U.S. that are relevant for an empirical study. Sector 4 describes the tax regime for foreign investment in Mexico. Based on these insights, Section 5 presents an empirical framework. Section 6 outlines the data issues. Section 7 reviews the empirical results, and Section 8 offers some concluding comments.

2. Review of the Existing Empirical Literature

The recent empirical literature on the effects of taxation on inward foreign direct investment has focused exclusively on FDI in the United States. Interest in this topic has been stimulated of late by the extraordinary increase in the late 1980s of FDI into the U.S. Slemrod (1989) discusses to what extent that increase may be related to the tax changes in the Tax Reform Act of 1986. Because of the literature's focus on FDI into the U.S., below we first review this literature and subsequently we discuss how an empirical treatment of FDI into Mexico should be altered.

Empirical study of the effect of taxation on the time series of FDI in the U.S. was pioneered by Hartman (1984). Using annual data from 1965 to 1979, he estimated the response of FDI, separately for investment financed by retained earnings and transfers from abroad, to three variables: the after-tax rate of return realized by foreign investors in the U.S., the overall after-tax rate of return on capital in the U.S., and the tax rate on U.S. capital owned by foreigners relative to the tax rate on U.S. capital owned by U.S. investors. The first two terms are meant to proxy for the prospective return to new FDI, the first term being more appropriate for firms considering expansion of current operations and the second more applicable to the acquisition of existing assets which are not expected to earn extraordinary returns based on production of differentiated products or possession of superior technology. The relative tax term is designed to capture the possibility that tax changes which apply only to U.S. investors will, by affecting the valuation of assets, alter the foreign investor's cost and therefore the return to acquiring the asset.[1]

Hartman does not attempt to measure either an effective withholding tax rate or the foreign income tax rate applied to the aggregate of foreign direct investment. He defends their absence by noting the likelihood that the average values of these tax rates are relatively constant over time. Furthermore, no attempt is made to measure the alternative rate of return available abroad to foreign investors.

Hartman's regression results reveal a positive association of both after-tax rate of return variables with the ratio to U.S. GNP of FDI financed by retained earnings, and a negative association of the FDI-GNP ratio with the relative tax rate on foreigners compared to domestic

residents. The model does not explain transfers from abroad as well as retained earnings, although coefficients of all three variables have the expected sign and are significantly different from zero. Hartman concludes from this research that the effect of taxes on FDI, both that implied by reinvestment of earnings and that accomplished by explicit transfer of funds, is quite strong.

Boskin and Gale (1986) re-estimate Hartman's equation using the updated tax rate and rate of return series from Feldstein and Jun (1986). Although the estimated elasticities of FDI to the rates of return are somewhat lower, none of the point estimates changes by more than one standard deviation. They also extend the sample forward to 1984, and in some cases backward to 1956, and experiment with a variety of alternative explanatory variables and functional forms. They conclude that although the results are somewhat sensitive to sample period and specification, the qualitative conclusions of Hartman are fairly robust.

Young (1988) uses revised data on investment, GNP and rates of return earned by foreigners to estimate similar equations. These changes increase the estimated elasticities with respect to the rate of return realized by foreigners and the relative rate of return. However, the equations for new transfers of funds estimated using the years 1956-84 yield very poor results, suggesting to Young that the simple Hartman model is inadequate for studying foreign direct investment through new funds when applied to the expanded sample period. Relaxing Hartman's assumption of a unitary income elasticity and including the lagged dependent variable as a right-hand side variable does not substantially alter the conclusions for retained earnings (although the estimated responsiveness is significantly lower), but the tax responsiveness of transfer of new funds still is not supported.

Newlon (1987) reexamines the results of Hartman as well as Boskin and Gale. During his attempt at replication, he discovered that the series measuring the rate of return on foreign direc' investment, used in all earlier papers, had been miscalculated from the original Bureau of Economic Analysis data for the years 1965 to 1973. Using the corrected series the equation explaining retained earnings does not fit as well, although the equation explaining transfers fits better. In explaining retained earnings, the estimated co-efficients on the return to FDI and the tax ratio are slightly larger in absolute value and remain statistically significant, although the estimated coefficient on the net return in the U.S. is lower and is no longer statistically significant. For transfers of funds, the estimated coefficient on the return to FDI is much larger and becomes significant, although the estimated coefficient on the net return in the U.S. becomes smaller and insignificant. When the sample period is extended to range from 1956 to 1984, Newlon's results also differ from those of Hartman and those of Boskin and Gale. In particular, the equation explaining transfer of funds fits poorly, and no estimated coefficient is significant.[2]

It is notable that none of these studies has deviated very far from the approach taken in Hartman's 1984 paper. Although Young (1988) refers to Feldstein's (1982) dictum that, in *' ? absence of a perfectly specified model, many alternative models should be investigated, the empirical research has been extremely one-tracked. This is a sufficient reason to explore alternative methodologies. Furthermore, there are several problems with the standard approach which bear further study.

In the previous literature, the disincentive to investment caused by the tax system is implicitly measured by an average tax rate, computed

as total taxes paid divided by a measure of profits. However, the incentive to undertake new investment depends on the effective marginal tax rate which, as is well known, can deviate substantially from an average tax rate concept.

None of the existing studies attempts to estimate the effect of the home country's tax system on FDI in the U.S. Of course, collecting the appropriate data is difficult and perhaps, as Hartman argued, these tax rates have not in fact varied much. The observed stability, though, applies to statutory tax rates and not necessarily to the more appropriate effective marginal tax rates. There is also a theoretical reason to focus attention on the host country tax rate. Hartman (1985) has argued that only the host country's tax system matters for investment coming from subsidiaries' earnings, even when the home country taxes its residents on the basis of worldwide income. This is because the home country's tax equally reduces the parent's return to an investment and the opportunity cost of making an investment (remitting a dividend to the parent).[3] Thus, for any subsidiary whose desired investment exceeds earnings, the tax due upon repatriation of earnings does matter. This situation would likely occur for newly formed subsidiaries. In any event, it is worthwhile to investigate empirically the impact of both the home country's rate of taxation and its system of taxing foreign-source income.

The interpretation of the estimated coefficient on the rate of return to FDI variable is also problematic, as stressed by Newlon. This rate of return is defined as the after-tax income from direct investment divided by the stock of direct investment. When the home country has a foreign tax credit with deferral, it is often optimal for the subsidiary to finance investment by first using retained earnings, and only when these

earnings are exhausted to ∟se funds transferred from the parent firm. This hierarchy of financing implies that whenever a subsidiary's investment exceeds its retained earnings, its retained earnings will exactly equal its income. Thus for these firms we would expect a direct association between the calculated rate of return (in which after-tax income is the numerator) on FDI and retained earnings, regardless of whether the average rate of return in fact influences decisions concerning new FDI. As Newlon notes, if subsidiaries were following a fixed dividend pay out rule (e.g., it pays out a fixed fraction of income), a direct association between income and retained earnings would also be observed. This argument may also apply to subsidiaries of firms residing in countries that employ territorial systems of taxation, thus rendering problematic any observed empirical association between FDI out of retained earnings and realized rate of return.

Slemrod (in Razin and Slemrod, forthcoming) attempts to remedy some of the empirical problems discussed above. He extends and updates a Hartman-style model of aggregate FDI in the U.S., in part replacing a measure of the average rate of tax by a measure of the marginal effective tax rate on new investment. This analysis is generally supportive of a negative impact of U.S. effective rates of taxation on total FDI and new transfers of funds, but not on retained earnings.

3. Unique Problems and Advantages of Studying FDI in Mexico

An analysis of FDI to Mexico poses some unique problems but offers some unique analytical advantages. Here we review each in turn.

3.1 Unique Problems

Historically, policy emphasis in Mexico has been on the "regulation" of foreign investment rather than encouragement or promotion of such investment. Foreign investment was viewed as a vehicle for political and economic domination of Mexico and therefore suspect. The period from 1948 to 1982 witnessed a trend towards a more restrictive policy regime towards foreign investment. First, certain important industries such as telecommunications, electric power, timber, and film distribution were nationalized. Second, foreign investment in most industries was restricted to minority participation subject to prior authorization from the Government of Mexico. The regulatory environment worked to discourage foreign participation and as a result the net FDI flows averaged less than one percent of GDP during 1950 to 1985. A dramatic reversal of these past policies has been taking place in recent years. This began with the initiation of a debt to equity conversion scheme (the scheme was later suspended in 1987 and reinstated again in 1990) and the exemption of small to medium levels of investment from the prior authorization for majority participation in 1986. In 1987, majority FDI participation in specified sectors was permitted on a case by case basis. On May 19, 1989 President Carlos Salinas De Gortari announced a major shift in Mexican policy towards foreign investment. He stated:

> "We are a mature country with the judicial, intellectual and
> economic capacity to assimilate the largest flow of foreign
> investment. On behalf of all Mexicans, we will institute new
> regulations to encourage the types of foreign investment that
> support our economic policy objectives without compromising our
> sovereignty and freedom of action". (Press Release, Monterey,
> N.L.).

This presidential pronouncement was followed by major changes in the foreign investment regulations. The new regulations establish that majority investment in non-restricted sectors meeting all of the following six criteria would be eligible to receive automatic approval:

1. that the investment is less than 250 billion pesos (about 100 million U.S. dollars);

2. that the capital originates from outside Mexico;

3. that the project be located outside the country's three major industrial cities (Mexico City, Monterrey and Guadalajara);

4. that the foreign exchange cost is spread evenly over a period of three years;

5. that the investment provides permanent jobs and training; and

6. that the project uses "adequate" technologies that satisfy existing environmental regulations.

The regulations further permit limited access to the Mexican stock market through special trust funds. Temporary access to some sectors normally reserved for Mexicans only will be allowed under 20-year trusts for investment in Mexican companies with high export potential or in financial distress. 30-year trust funds will provide access to otherwise restricted geographical zones such as coastal and border areas. New regulations stipulate automatic approval of an application on which the National Foreign Investment Commission fails to reach a decision within 45 days of the initial submission.

It is clear from the above discussion that whatever the demand for FDI in Mexico, in most of the post-war years the supply of available opportunities for FDI has been limited by regulations. Thus it will be important to control for this in the analysis. If demand was always limited by these regulations in a binding way, there would be no

interesting story to tell about taxation. However, we believe that these limitations were not always binding, so that tax influences on demand did play a role in the volume of FDI into Mexico.

The instability of the Mexican economy also poses analytical problems. The high inflation rates (114% in 1987) and nominal interest rates (92% in 1987) have dramatic consequences for the calculations of the effective tax rate on new investment. The standard assumptions used in their calculation, that current values for inflation, interest rates, tax rates, and tax depreciation rates will persist in the future, are unlikely to be accurate, but reasonable alternative assumptions about expectations are not obvious. This problem suggests that some measure of the average rate of taxation (taxes paid divided by a measure of economic income) may be a more accurate measure of the tax system's disincentives than an analytically constructed marginal tax rate.

3.2 Unique Advantages

Historically a majority of FDI in Mexico originates in the United States. This fact offers two analytical advantages. First, because the U.S. independently compiles country-by-country data on outward FDI, it is possible to check the Mexican data on inward FDI from the U.S. against the U.S. data on outward FDI to Mexico. Second, it facilitates the investigation of the effect of the investing country's tax system on FDI.

4.   Taxation of Foreign Investment Income in Mexico

Mexico taxes non-residents under the territorial rule and therefore only income originating from Mexican sources is taxed. Mexico is

a member of the Latin America Integration Association which aims to provide preferential treatment to member countries in matters of trade and taxation. Mexico has not yet concluded any comprehensive treaty on avoidance of double taxation or tax sparing with any other country. It has concluded agreements with the USA, Canada and Netherlands on the avoidance of double taxation of income from international shipping and/or air transport and with France on prevention and investigation of customs fraud.

In Mexico, until 1989, dividends of a foreign subsidiary were exempt from the corporate tax base but taxed upon distribution to a parent. All income of a branch was taxed upon accrual; thus from a Mexican tax standpoint, establishing a subsidiary rather than a branch office was a tax preferred alternative. (Home country tax rules also generally favor the subsidiary form, because tax liability is deferred until earnings are repatriated). As a result of various tax changes introduced in 1989, the differential treatment by Mexico of subsidiary income over branch income was eliminated. Major features of the taxation of foreign investment income announced in 1989 are summarized in the following paragraphs.

Taxation of Corporate Income: The corporate income tax base is now completely indexed. Taxable profits (defined as gross receipts minus costs, business expenses, dividends corresponding to previous periods of earnings and net losses carried forward from other periods) are subject to tax at a rate of 35%. Full expensing of investment is permitted in all regions except major metropolitan areas (permitted rate is 60% in the first year and remaining 40% subject to capital consumption allowances in excepted cases) and in all sectors except the automobiles. Note that major metropolitan areas in Mexico account for nearly two-third of total investment.

Assets Tax: An assets tax at a rate of 2% of the average value of total assets of business enterprises and creditable against their income tax liability in Mexico, is levied effective in 1989.

Dividend Income: Starting in 1989, dividends will no longer be deductible by the corporation distributing them nor includable in the gross income of the recipient. The withholding tax on dividend distributions varies with the source (whether or not paid from accumulated earnings already taxed ("the net tax profit account") or paid from untaxed other sources) and the tax regime faced by the recipient as follows:

Recipient	Dividends Paid From	
	the "net tax profit account"	Other Sources
Individuals or non-profit organizations, resident or non-resident in Mexico	10%	40%
Resident Corporations	None	35%
Foreign Corporations:		
1. home tax rate on foreign dividend income at 30% or more	None	35%
2. home tax rate on foreign dividend income at less then 30%	10%	40%

Interest Income and Royalties: The withholding tax rate on interest income and payments for technical assistance, know-how, transfer of technology fees including royalties for patents when licensed in connection with the rendering of technical assistance paid to non-residents will be 35% and 21%, respectively, beginning in 1991. Payments for the use of other royalties such as for the licensing of trade marks or trade names, or

patents without the rendering of technical assistance will be taxed at 40%.

Goods in Bonded Warehouses: These goods are subject to a 3% tax either on the value on which import duties is assessed or declared value whichever is greater.

Profit Sharing: All businesses in Mexico are obliged to share 10% of their profits with employees.

Social Security and Payroll Taxes: Employers are obliged to contribute to social security coverage for workers (11% of workers' weekly wages), children's nurseries (1% of wages) and an occupational risk fund (from 5 to 167% of wages with 167% being applicable in certain high risk resource industries). In addition, employers contribute 5% of wages to the National Housing Fund and 1% of wages in support of education.

Value-Added Tax (VAT): The general 15% rate of the VAT is applicable to all transactions rendered in the border and free zones.

Investment Incentives: Effective 1991 immediate full expensing of investment will be available to all investors regardless of the resident status. Incentives for priority industries and special regions are available to Mexican residents only. The "inbond-assembly" industries established in border areas may be completely owned and operated by foreigners provided Mexicans are hired to process the imported raw materials using imported equipment and the processed goods are exported back to the country of origin.

Table 1 provides a comparative perspective on taxation of business income in Mexico and the major source countries for foreign investment. It shows that the Mexican tax system is fully competitive with the tax regime in home countries of foreign investors. Mexico has also moved some distance towards adoption of a full cash flow taxation in a future year. The table

Table 1

Taxation of Business Income: A Comparative Perspective

	Mexico (1991)	U.S.A. (1990)	Canada (1990)
Corporate Income Tax Rate: General	$35+\frac{100}{90}\times35=38.9$	$34+6=40$	$28+15=43$

Withholding Taxes: Rates
  Interest
  Dividends
  Technology Transfer fees
  Royalties
	
	35
	35/0
	21
	40
		
		30
		30
		30
		30
			
			28
			25
			25
			25

Indexation of deductions	Full	No	No
Loss carry forward	5	15	7
Loss carry backward	0	3	3
Minimum/Alternative Minimum Tax	2% Assets tax	20% on taxable income inclusive of tax preferences	0.175% on capital in excess of $10 million creditable against 3% surtax on corporate profits

Capital Gains Taxation
  Coverage
  Indexation
  Rate
	
	Full
	Full
	35
		
		Full
		No
		34
			
			2/3rd
			No
			28

Dividends deduction	No	Yes	Yes
Full Expensing of Investment	Yes	No	No
Investment Tax Credits	Regional & Priority Sectors	Energy Investment, Rehabilitation of real estate, targetted job credit.	Regional & R & D

Source: Ugarte (1988); Price Waterhouse (1988, 1989); Mancera Hermanos (1989); International Bureau of Fiscal Documentation (1988) and Gil-Díaz (1989).

shows that possibly the only cause of concern for a foreign investor may be the 2% assets tax which would not be creditable against U.S. or Canadian tax liability.

5. Some Theory and the Empirical Model

5.1 Some Theory

The modern literature has, for the most part, concluded that the demand for FDI is primarily an issue of industrial organization. Dunning (1985, p. 6-7) has argued that FDI by firms of country A in country B is more likely if A's firms (i) possess ownership-specific advantages relative to B's firms in sourcing markets, (ii) find it profitable to use these advantages themselves rather than lease them to B's firms, and (iii) find it profitable to utilize their ownership-specific advantages in B rather than A. A large body of empirical literature has been addressed to testing this theory of international production, usually referred to as the "eclectic" theory. Much of this research has been cross-sectional, relating the extent of foreign investment in a given sector to characteristics of that sector that represent ownership-specific and location specific comparative advantages. Several examples of this type of analysis are contained in Dunning (1985).

Studies of the effects of taxation on FDI have generally taken the perspective that whatever its benefits to firms are, they must be balanced against the tax consequences of carrying out FDI. We may hypothesize that the tax systems of both Mexico and the firm's home country can affect the incentives concerning FDI as well as how to finance a given pattern of FDI.[4]

Mexico, as do all countries of the world, asserts the right to tax the income originating within its borders, including the income generated by multinationals. The effective tax rate on this income depends in a complicated way on the statutory tax rate on corporate income, the extent of tax credits granted, and the definition of the tax base, including the system of depreciation and how gross income and deductions are allocated between Mexican-source and foreign-source.

There are two approaches to measuring the effective tax rate on new investment. In the analytical approach pioneered by Hall and Jorgenson, one calculates the level of pre-tax return required for a stylized investment to yield a given return after tax. The wedge between the pre-tax rate of return and the after-tax rate is a measure of the tax-related disincentive to invest. This procedure requires details on the tax code, rate of inflation, economic depreciation rates, proportion of debt and equity finance, and costs of debt and equity finance. Thus the effective tax rate on equi ' transfers and retained earnings on FDI in Mexico would be different.

The alternative approach is to calculate the ratio of taxes paid in a given year by a measure of income that is independent of the definition of taxable income. This approach may capture some of the features of the tax law which are left out of the analytical approach, and also may more accurately capture some features which are present in the analytical models but are inadequately represented by the stylized assumptions that must be made to calculate marginal effective tax rates. As we argued above, because of the extreme volatility of the inflation rate, from 2 to 132% on annual basis, in the Mexican case an average tax rate may be more appropriate.

The country of residence of the multinational may also assert the right to tax the income that is generated in Mexico. This is not, however, true of all countries. Some countries, notably France and Netherlands, operate a "territorial" system for active (i.e., non-portfolio) income earned abroad. Under a territorial system, the home country levies no tax of its own on the foreign-source income. Under the "worldwide" system of taxation, used by the United States, Canada, United Kingdom, and Japan among other countries, the multinational's home country asserts the right to tax its income regardless of where it is generated. In order to avoid two tiers of taxation, these countries offer their multinationals a limited credit against domestic tax liability for certain taxes paid to foreign governments. The credit is generally limited to what tax liability the foreign-source income would incur if home country tax rules were applied. Finally, in most cases the tax liability (and credit) attendant to subsidiaries' foreign-source is deferred until dividends are repatriated to the parent company. Foreign-source income of branch operations is not, however, deferred but instead is taxable upon accrual.

Let τ_m be the effective rate of tax on new investment imposed by the Mexican tax system. For a multinational from a country using the territorial system, τ_m is also the total tax burden imposed. For a multinational from a country with a worldwide system of taxation, there is another level of taxation to consider, that of the home country. The "old" view of this extra level of taxation is given by $\max(\alpha(t_u - \tau_m), 0)$ where t_u is the tax rate of the home country and α is a value between zero and one that reflects the benefits of being able to defer the tax liability on subsidiaries' foreign-source income until the earnings are repatriated. In the cases where earnings are never repatriated (α is equal to zero), or

when the firm is in an excess credit position ($r_m > t_u$), the home country tax
is irrelevant. An opposite extreme case occurs when α is equal to one,
implying that the host country tax liability of the multinational can be
fully offset by the home country tax credits. Note that t_u is generally
closer to a statutory rate concept than an effective tax rate on
investment, since the home country tax base for foreign-source income
generally does not take account of such things as accelerated depreciation
and investment tax credits that affect the taxable income due to domestic
operations. Note that $\alpha \cdot (t_u - r_m)$ can be negative if t_u is less than r_m. In
this case tax paid to the host country generates foreign tax credits that
may be used to offset the tax that could otherwise be due on repatriations
from low-tax country whose effective tax rate is less than t_u.

The "new" view of the total tax burden on FDI, due to Hartman
(1984), holds that if investment is financed by retained earnings of the
foreign subsidiary, then the home country tax rate is irrelevant, so that
the total tax burden remains at r_m. The reasoning is that any taxes due
upon repatriation to the home country reduce equally the opportunity cost
of investment (a repatriated dividend) and the after-tax return to
investment. Thus it is irrelevant for the incentive to invest. Even under
the new view, however, the home country tax rate would be relevant for home
country multinationals that are contemplating a transfer of funds to a
foreign subsidiary. It is difficult to reconcile, though, the simultaneous
occurrence of transfers of funds and remittance of dividends from
subsidiaries, since these activities incur an avoidable tax liability (see
Hines and Hubbard, forthcoming).

Thus under the "new" view, the total tax burden on FDI financed by
retained earnings is r_m but is $r_m + \alpha \cdot (t_u - r_m)$ for investment financed by

transfer of funds. The old view did not distinguish debt and equity financing, using the latter expression for both cases.

The value of α will depend on the excess credit or limit position of the potential investor. If the multinational is in an excess credit position, so that the average rate of tax paid to foreign governments exceeds t_u, then at the margin there is no extra tax due to the home country government upon repatriation. If the multinational is in an excess limit position, where the average rate of foreign taxes paid is less than t_u, then the repatriation tax may be binding at the margin. Note that this depends on the average rate of tax paid to all foreign governments, not just Mexico. Thus even if r_m is less than t_u, if the overall foreign tax rate exceeds t_u, then the Mexican tax rate is the marginal rate (α is close to zero).

A recent paper by Scholes and Wolfson (1989) has suggested that the ownership of a given stock of domestic capital will depend on the relative tax rate paid by alternative owners. This implies that, in the contest for ownership of Mexican capital, foreign owners will be more likely to be successful the lower is the ratio $[r_m + \alpha \cdot (t_u - r_m)]/r_m$. (This of course only applies if the home country operates a worldwide system of taxation). The surprising implication of this analysis is that, as long as α is greater than zero and t_u exceeds r_m, an increase in r_m will increase foreign ownership of Mexican capital. The idea is that while an increase in r_m applies fully to potential Mexican owners (or owners from countries with a territorial tax system), its effect on foreign owners is partly offset by credits taken against domestic tax liability. Thus it reduces the relative tax burden on foreign owners from countries with worldwide tax systems. Of course, to the extent that r_m reduces the incentive to

undertake investment in Mexico, both domestically and foreign-owned investment will decline. The overall impact on FDI thus depends on the relative strength of the Scholes-Wolfson ownership effect and the volume effect. Furthermore, the ownership effect applies only to investment from countries with a worldwide tax system and only to the extent that the multinationals are in an excess limitation position, so that additional taxes paid to the Mexican government do in fact generate additional foreign tax credits.

5.2 The Empirical Model

The foregoing discussion suggests that a general empirical model of the impact of taxation on FDI in Mexico have the following form:

(1) $FDI_s = f_s (r_m; L(t_u - r_m), X)$

where X is a vector of non-tax factors that affect FDI and L is an index of the credit status of the investing countries. The presumption is that the greater the extent of excess credit status, the lower the effect of the home country's tax rate. The subscript s on FDI suggests that the impact of taxes may depend on the source of financing.

In order to see the implications of the competing theories of FDI, we specify (1) as follows:

(2a) $FDI_T = a_o + a_1 r_m + a_2 (t_u - r_m) + a_3 \cdot L \cdot (t_u - r_m) + a_4 X + u_T$

(2b) $FDI_R = b_o + b_1 r_m + b_2 (t_u - r_m) + b_3 \cdot L \cdot (t_u - r_m) + b_4 X + u_R$

where a subscript T denotes FDI financed by transfers of funds and a subscript R denotes FDI financed by retained earnings.

6. **The Data**

Aggregate data on stocks and flows of FDI and other relevant variables for the period 1965-1985 have been assembled from a variety of sources. Details of these sources are given in an appendix. A few key variables utilized in the study are described in the following paragraphs.

Foreign Direct Investment: Data on FDI flows is derived from the Banco de Mexico's published and unpublished sources for various years. Substantial details on the financial flows of firms with foreign capital are available from these sources, including transfers and reinvested earnings. A breakdown of FDI by economic sector and the country of origin is also available. Alternate but less complete sources of FDI data include the U.S. Commerce Department (U.S. investments only) and the Director General of Foreign Investment (new approvals only). Figure 1 shows FDI from 1965 to 1987. It indicates that from 1965 to 1977, FDI showed a slow but steadily rising trend. The beginning of the oil boom in the late seventies led to dramatic increases in FDI reaching 1981 peak of U.S. $2.0 billion. Later, the end of the oil boom in 1981 coincided with a sharp curtailment of FDI. This trend was reversed again in 1984 and accelerated with the initiation of debt/equity conversion schemes and the exemption of small/medium FDI from government control and approval process. The debt/equity conversion scheme was subsequently suspended in 1987 and a process to relax foreign investment regulations was initiated the same year and for the first time, majority foreign participation in key sectors was permitted on a case by case basis. This decontrol process was further strengthened by the new foreign investment regulations unveiled in 1989.

Figure 1

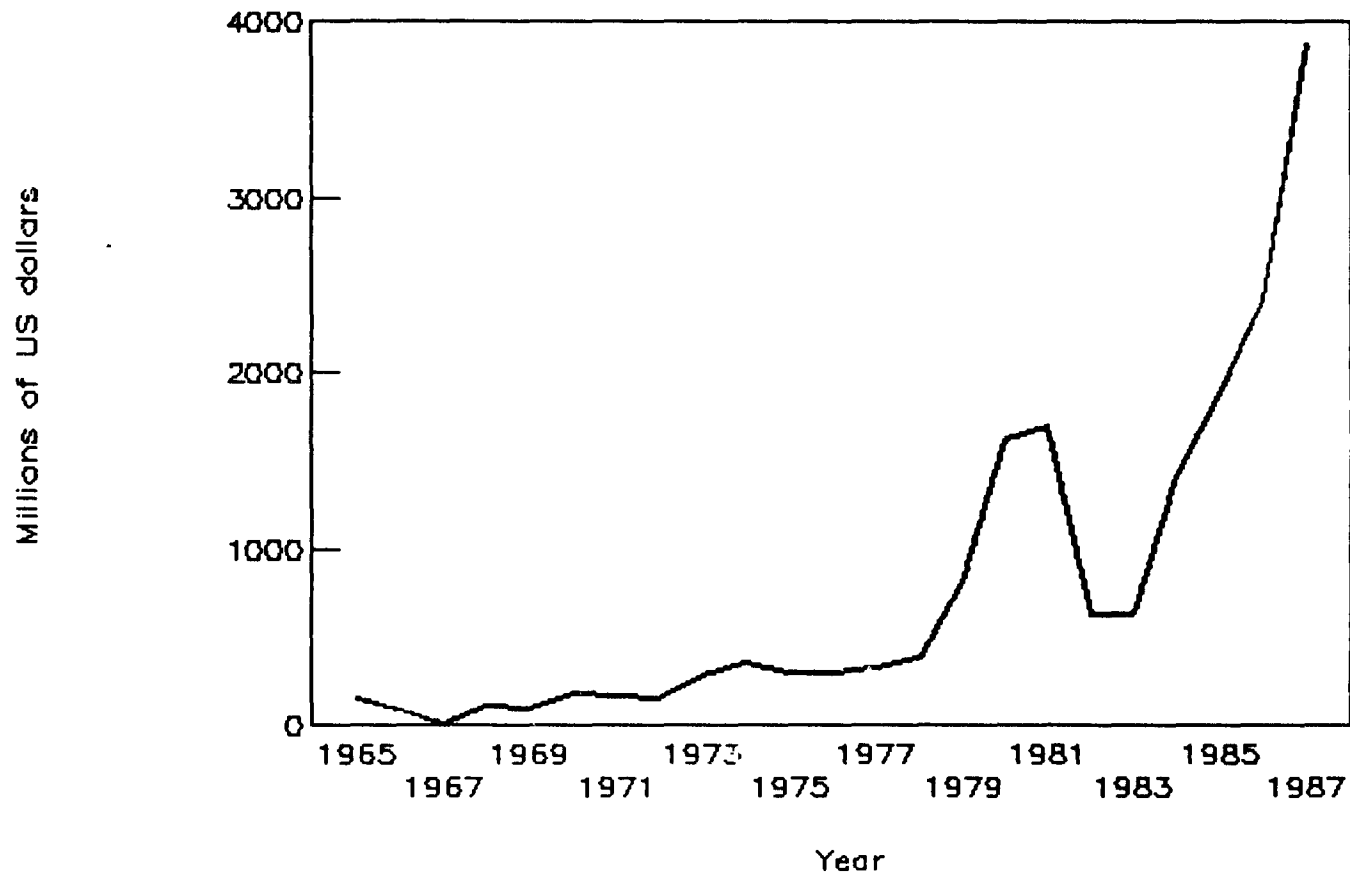# Foreign Direct Investment in Mexico

1965—1987

Figure 2 provides details on net transfers to Mexico during the period 1965 to 1987. These transfers show a fairly flat trend during 1965 to 1977, alternating boom and bust cycles from 1978 to 1982 and a sharply rising trend since 1983. Figure 3 graphs retained earnings by multinationals in Mexico during the period 1965 to 1987. These reinvestments show a slightly rising trend from 1967 to 1975, declining trend during 1975 to 1977 and major alternating boom and bust cycles in the next decade coinciding with cycles in general economic activity.

Effective Tax Rates: Four alternate measures of the tax disincentive to new investment in Mexico, three marginal (one each for aggregate investment, transfers and retained earnings) and the fourth an average measure, are developed in this paper. First, historical series on the marginal effective tax rate on new aggregate investment in Mexico (r_m) is developed using the standard Auerbach-Hill-Jorgenson methodology (see Appendix A). A comparable series for the U.S. is obtained from Auerbach-Hines (1988). Then we develop marginal effective tax rate for transfers by calculating weighted average cost of capital by taking into account such factors as Mexican and U.S. corporate tax rate, U.S. personal tax rate, U.S. interest rate, U.S. and Mexican inflation rate, and the rate of Mexican pesos depreciation against the dollar (see Auerbach, 1990). A third marginal effective tax rate calculation was done for retained earnings. Finally, an average effective tax rate (T) measure based on corporate tax liability per dollar of value added is calculated for both Mexico (T_m) and the USA (T_u). The choice of this particular formulation of the average effective tax rate was based primarily on the completeness of data series for this measure. Several alternate measures of average effective tax rates are also available. These include average effective
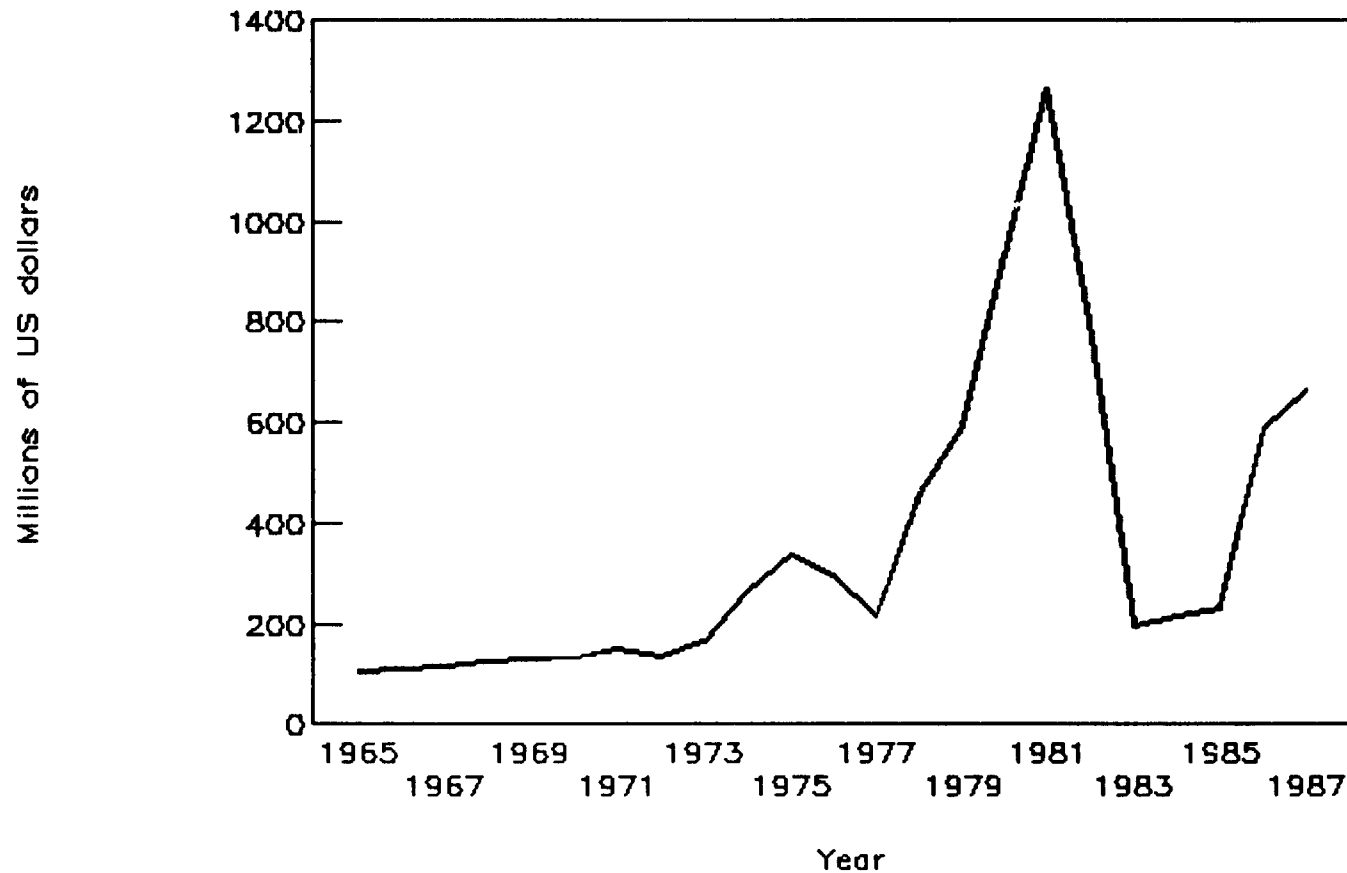
Figure 2

Transfer of Funds to Mexico

1965–1987
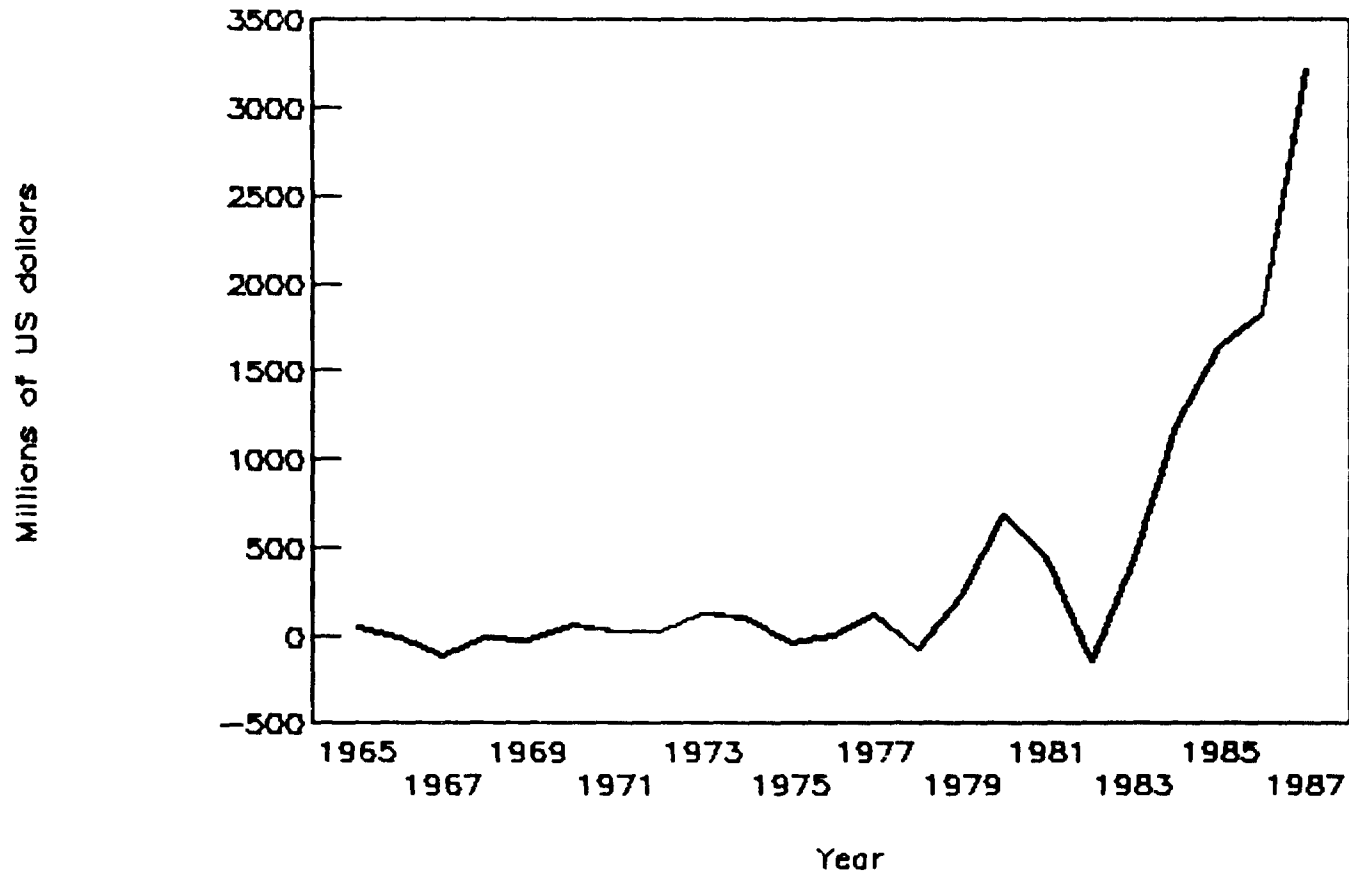
Retained Earnings by Multinationals in Mexico, 1965–1987

rate on gross profits, revenues and assets. While complete data series for these variables are available for the U.S., for Mexico observations are missing for all years beyond 1981. For this reason, these series were not used in further analyses. The marginal effective tax rate measure is conceptually attractive but as discussed in Section 3.1, a highly inflationary environment with financing constraints clouds the usefulness of such a measure. Therefore, the paper also explores the average effective tax rate as an alternate measure of the tax system's disincentive.

Index of Credit Status of Investing Multinationals (L): This index is calculated as the ratio of foreign tax credit claimed to foreign tax credits available to U.S. multinationals. Because U.S. investment has accounted for about two-third of Mexican FDI in this period studied, it is a reasonable indicator of the excess credit status of investing countries generally. The closer this index is to zero, the more likely is the typical U.S. multinational to be in an excess credit position. At the extreme where this value is one, all available foreign tax credits are immediately claimed, implying that the multinationals are in an excess limitation (deficit of credit) position. A major limitation of this measure is that data were available only for five years; values for the remaining years were interpolated. Longer time series data is available on an alternate but conceptually less satisfactory measure i.e., the credit status of U.S. multinationals investing worldwide (L_W). This alternate measure include all U.S. multinationals, whether investing in Mexico or not. Because of the presence of some firms with no Mexican investment in this sample, use of this latter measure in the analyses of reinvested earnings would be subject to caveats.

Country Credit Rating (CRM): The Business International Corporation (BIC) and the Institutional Investor (II) publish annual credit ratings of various countries based on a composite index of political, commercial and monetary factors (see Appendix A for details). To develop a consistent time series data on the credit rating of Mexico, the BIC index for 1965 to 1979 was spliced with the II index for 1979-1987. This index is a useful measure of the country risk factors.

Index of Regulations (REGU): Black market exchange rate premia is used as an index of regulation in Mexico. Exchange rate premia in Mexico correlates well to past history of regulation and therefore serves as a reasonable proxy of regulatory environment. This is however, not a fully satisfactory measure of regulations as it may simply be capturing effects of import restrictions.

Effective Tariff Rate (MDM): Data on import duties and the value of imports from various Mexican government publications are used to calculate these historical series.

7. Empirical Estimation and Results

A wide array of variables to empirically implement models specified in Equations 2a and 2b is available. Choices include alternate measures of tax disincentives such as marginal (r), average (T) or statutory (t) tax rates, two alternate measures of excess credit status of multinationals and a host of non-tax factors including quantitative restrictions, unemployment rates in the host and home countries, exchange rate and price movements etc.

Mexican data show a great deal of variability during the period 1977 to 1987 due to oil boom and bust cycles. To examine differential

behavior during this as opposed to earlier period in the sample, intercept dummy with a value of one for the oil boom-bust period and zero otherwise was used in various regressions. This variable was found insignificant and therefore dropped from further analysis. Note that the economic environment associated with oil boom and bust cycles is well captured by credit ratings and therefore it is possible to isolate tax effects from the effects associated with a general deterioration and/or amelioration of economic activity. Furthermore, marginal effective tax rate incorporates rate of return to FDI and therefore captures variability of profits over time. The foremost dilemma in model estimation was presented by the choices available for the tax rate variable. Theory did not provide much guidance in this respect and therefore final variable selection was primarily done on the basis of model selection tests described below. It should be noted that in various formulations of the models, marginal effective tax variable showed a great deal of consistency as a determinant of transfers and retained earnings. Estimated coefficients of average tax rate and statutory tax rates variables, on the other hand, showed a great deal of sensitivity to model specification. This instability of coefficients was partly attributable to a degree of collinearity among a subset of variables. An unexplained part of this instability is that the coefficient estimates for regressions on retained earnings showed a greater degree of instability than for those for transfers. Thus the conclusions reached in the following sections merely represent our best judgements based on available data. It is conceivable that a better set of data may or may not support some of the conclusions reached here.

As a first step the Lagrange multiplier test is used here to screen regressors to be included in model specification. Subsequently,

several alternate models are formulated and model selection tests are conducted to select "the best" model.[5] These tests take the form of residual sum of squares multiplied by a penalty factor. The penalty factor varies directly with the number of estimated parameters. An increase in model complexity would reduce residuals sum of squares (RSS) while raising the penalty. A better performing model thus would have lower values on most of these tests than an alternate model. Two better performing regressions based on these criteria are presented in Tables 2 and 3.[6]

Table 2 presents estimation results for FDI transfers from 1965-1987. FDI transfers to Mexico show a great deal of sensitivity to Mexican marginal effective tax rate (τ_m) and Mexico's credit ratings (CRM). The estimated coefficient of τ_m suggests that a one percent increase in the marginal effective tax rate on investment in Mexico induced a 6.2 percent decrease in FDI transfers to Mexico (at mean values of variables). As the elasticity of marginal effective tax rate with respect to Mexican statutory tax rate is only 0.2, this translates into FDI elasticity of -1.24 only with respect to the changes in Mexican statutory tax rates. Each percentage point increase in the credit rating also induced a 2.5 percentage increase in FDI transfers at mean values. The tax differential variable and the composite variable on credit status of multinationals had signs consistent with a priori expectations, but were not significant. The estimated coefficient of the tax differential variable suggests that Mexican tax differentials over the U.S. statutory rates did not matter much for FDI transfers to Mexico. Furthermore, the excess credit position of the multinationals had a small and insignificant effect on FDI transfers to Mexico. Empirical results further suggest that the regulatory environment in Mexico discourages foreign investment and protective trade barriers had

Table 2

Regression Explaining FDI Transfers to Mexico
(Equation 2A)
Period: 1965-1987
Dependent Variable: FDIT

Independent Variable	Coefficient	t-statistic
r_m	-6766.7	-2.4
$t_u - r_m$	-3994.5	-0.8
$L(t_u - r_m)$	-3012.1	-0.6
CRM	34.6	3.8
REGU	-394.6	-1.6
MDM	2507.9	1.1
CONSTANT	2341.1	1.7

$\bar{R}^2 = 0.89$

Log of the Likelihood function = -157.7

Model Selection Tests

Log AIC: 11.5
Log SC: 11.8
FPE: 99110
HQ: 105980
SHIBATA: 85033
GCV: 109230
RICE: 135080

a positive effect on FDI. Overall, the specified equation fitted the data well, explaining 89% of the variation in FDI.

Equation 2b (see Table 3) indicates that reinvested earnings are quite sensitive to the Mexican marginal effective tax rate, Mexican-U.S. tax differentials, the credit position of the multinationals, Mexico's credit ratings and regulations. Protective trade barriers, on the other hand, did not play any significant role in reinvestment decisions of multinationals. Reinvested earnings showed negative but elastic responses to changes in Mexican marginal effective tax rate (elasticity at mean values of -2.8 with respect to marginal effective tax rate but only -0.56 with respect to the Mexican statutory tax rate) and Mexican-U.S. tax differences (elasticity at mean values of -7.5). A change in the credit status of multinationals toward excess credit influenced positively their decisions to reinvest rather than repatriate earnings. This influence is estimated to be quite strong (elasticity at mean values of 4.3).

Overall, the results confirm the "old" view regarding the tax sensitivity of FDI and suggest that both the host and home tax regimes matter for FDI in Mexico. In addition to taxation, the regulatory framework and overall economic and political climate in the country were the dominant influences on FDI transfers and reinvestments in Mexico.

8. Policy Implications

Our analysis suggests that FDI in Mexico shows a great deal of sensitivity to tax regime in Mexico. Thus Mexico must aim for tax rates closer to but not lower than the U.S. rates to eliminate any tax induced disincentives for investment as well as to ward off against any possible

Table 3

Reinvested Profits Equation (2B)
Period: 1965-1987
Dependent Variables: FDIR

Independent Variable	Coefficient	t-statistic
τ_m	-2593.7	-2.9
$t_u - T_m$	-6687.5	-2.7
$L \cdot (t_u - T_m)$	5166.0	2.5
CRM	17.1	3.0
REGU	-340.0	-1.9
MDM	-1573.9	-0.9
CONSTANT	3415.6	5.1

$\bar{R}^2 = 0.69$

Log of the Likelihood function = -146.9

Model Selection Tests

Log AIC: 10.5
Log SC: 10.9
FPE: 38702
HQ: 41384
SHIBATA: 33206
GCV: 42653
RICE: 52750

transfer of revenue from Mexico to the U.S. Treasury through the operation of U.S. foreign tax credit provisions. Mexico has already implemented tax reforms which make the tax regime there competitive with the USA and Canada. Furthermore, effective taxation of reinvestments in Mexico is lower than that of repatriations providing incentives for retained earnings. The new 2% assets tax, nevertheless, because of its partial non-deductibility against U.S. tax liability may be a cause for concern by a potential investor. This tax could be replaced by an alternative minimum tax with an adjusted base that would include tax preferences as part of taxable income. Such a tax could achieve the same functions as the 2% assets tax but would be fully creditable against U.S. tax liabilities.

Since with the tax changes introduced in 1989, the Mexican tax system does not provide any special disincentives for foreign investment, perhaps public policy attention needs to be focussed on accelerating the process of deregulation of FDI already initiated in Mexico.

An important implication of the conclusions reached here for other developing countries where the degree of FDI penetration is large, is that they need not worry about providing special tax incentives for foreign investment but must insure that their tax system is competitive with the home tax regime of a marginal investor having access to foreign tax credits against domestic tax liabilities.

NOTES

1/ Hartman argues that the variable measuring the rate of return to domestic capital, because it is based on replacement costs, will not capture these valuation effects.

2/ Newlon also estimates variants of Hartman's original model with several additional variables, including a quadratic time trend, dummy variables for the years when data revisions were made, and with a definition of the return to direct investment that includes the fees and royalties that accrue to the parent from its foreign subsidiary. Most of these changes do not alter the qualitative results reported earlier.

3/ If, however, the home country's tax system is expected to change, then there is an incentive to time repatriations appropriately.

4/ On credibility of Tax regime for FDI, see Bond and Samuelson (1989).

5/ Formulae for model selection tests as reported below:

Akaike Information Criterion (AIC): $RSS/(N-k)$

Schwarz Criterion (SC): $(RSS/N) \, N^{k/N}$

Akaike Finite Prediction Error (FPE): $(RSS/N) \, (N+k)/(N-k)$

Hannan and Quinn Criterion (HQ): $(RSS/N) \, (\ln N)^{2k/N}$

Shibata Criterion (SHIBATA): $(RSS/N) \, (N+2k)/N$

Craven and Wabba Generalized Cross Validation method (GCV): $(RSS/N)[1-(k/N)]^{-2}$

Rice Criterion: $(RSS/N)[1-(2k/N)]^{-1}$

Symbols: RSS = Residual sum of squares
  N = Number of observations
  k = number of estimated parameters

See Ramanathan (1986) and Judge et al. 1985, pp. 242-263 and pp. 854-891.

6/ Please note that only regressions incorporating aggregate marginal effective tax rate are presented here as this formulation allows us to test the two alternative views on tax sensitivity of FDI in a simple and transparent manner. Results from regressions incorporating marginal effective tax rate on transfers and retained earnings are close to this simple formulation.

The Data

Various Series on Foreign Direct Investment:

These data are obtained from Banco de Mexico, Subdireccion de Investigacion Economica.

Index of Excess Credit Status (L):

These data are obtained from the U.S. Commerce Department. The index is calculated as follows:

$$L = \frac{A}{B + C - D + E}$$

Where   A = Foreign Tax Credit Claimed
B = Foreign Taxes paid or accrued
C = Foreign Taxes deemed paid
D = Deductions for certain foreign taxes.
E = Taxes carried over.

Marginal Effective Tax Rates:
The following formulation developed by Auerbach (1990) is used in the calculation of marginal effective tax rates.

$$\tau = \frac{[(r + \delta)(1 - \Gamma)/(1 - t) - \delta] - s}{(r + \delta)(1 - \Gamma)/(1 - t) - \delta}$$

where τ = effective corporate tax rate
r = weighted average cost of capital
δ = capital depreciation rate (assumed value)
Γ = present value of investment credits and depreciation deductions (based on a sample of 23 firms reported in Schwartzman (1987))
t = corporate tax rate (Mexico)
s = rate of return to supplier of funds (calculated based on data from IMF: International Finance Statistics, various issues).

Marginal effective tax rate for transfers (τ_t)
utilizes the following expression for the weighted average cost of capital (r).

$$r = b \left[\frac{i_u (1 - t_u^P) - (\pi_u - \pi_m - XRRC)}{1 - t_{max}} \right] + (1 - b) \left[\frac{\mu}{1 - \phi} \right] \left[\frac{1 - t_{min}}{1 - t_u} \right]$$

where   b = fraction financed by debt

μ = real discount rate for equity

t_m = Mexico corporate tax rate

t_u^p = U.S. personal tax rate

i_u = U.S. nominal interest rate

π_u = U.S. inflation rate

π_m = Mexico inflation rate

XRRC = rate of Mexican pesos depreciation against the dollar

t_{max} = higher of U.S. personal income tax rate and the Mexican withholding tax on interest payments

t_{min} = smaller of Mexican and U.S. corporate tax rates

ϕ = effective tax rate on real equity return

For retained earnings: $r = \dfrac{\mu}{1 - \phi}$ is utilized in the effective tax rate formula.

Regulations (REGU): Exchange rate premia is used as a proxy for regulation. It is defined as:

$$REGU = \frac{XRM - XRN}{XRN}$$

where   XRM = Market Exchange rate

XRN = Official Exchange Rate

Unemployment rates: U.S. data is from the Economic Report of the President to the Congress (various issues), whereas the Mexican data is from INEGI unpublished statistics on unemployment rate in Mexico city.

Country Credit Ratings: Country credit ratings is a composite index of the following factors:

Political factors:

      Political stability
      Nationalization Problems
      Restrict Capital Movements
      Desire Foreign Investment
      Limits: Foreign Equity
      Limits: Foreign Expansion
      Government Interventions
      Internal Disorders
      Red Tape: Delays
      Cultural Interaction.

Commercial Factors:

      GDP Market Size History
      Real GDP Growth History
      Real GDP Growth Forecast
      Income Per Capita
      Trade Restrictions
      Capital Availability
      Labor Availability
      Corporate tax level
      Infrastructure quality

Monetary Ratings

      Inflation History
      Inflation Forecast
      Devaluations last 10 years
      Percent Devaluation
      Currency Forecast
      Balance of Payment Forecast
      External Debt Forecast
      Import Coverage History
      Import Coverage Forecast
      Convertability Forecast

Table A1

Basic Statistics on Selected Variables

Variable Name	Mean	Standard Deviation	Minimum	Maximum
FDIT	422.37	817.51	-143.50	3215.20
FDIR	355.91	309.17	105.00	1265.00
CRM	30.39	10.63	18.00	64.00
t_m	0.42	0.01	0.35	0.42
T_m	0.07	0.01	0.04	0.10
r_m	0.39	0.15	0.25	0.72
t_u	0.47	0.04	0.34	0.53
T_u	0.07	0.03	0.01	0.10
r_u	0.32	0.14	0.09	0.51
MDM	0.13	0.05	0.07	0.23
REGU	0.53	0.96	-0.93	1.61

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