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Foreign Direct Investment in Mexico

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1. Introduction

Mexico provides an interesting case study of the effects of inward foreign direct investment because, like many other developing countries, it has gone from a highly protectionist regime focussed on import-substituting industrialisation (ISI) to an open regime which actively attracts foreign investment. Following the onset of industrialisation a decade earlier, Mexico officially endorsed ISI policies during the 1940s as the government raised import tariffs, introduced import licenses, and imposed export controls in an attempt to encourage its domestic industry. These policies proved successful in developing a manufacturing base centred on Mexico City[1].

Since the announcement of the North American Free Trade Agreement (NAFTA), considerable attention has been levied on the effects that the dismantling of trade and investment barriers would have on the US and Mexican economies (and the Canadian economy to a lesser extent). However, this belies the fact that Mexico effectively made the transition from a closed economy to an open economy during the 1980s after it announced in 1985 that it intended to join the General Agreement on Tariffs and Trade (GATT)[2]. Hanson even suggests that given the geographical proximity of Mexico and the US, trade liberalisation by Mexico in 1985 constituted the beginning of integration, with NAFTA merely finalising the process a decade later (Hanson, 1998).

The proximity of the world's most powerful nation is another reason why the Mexican economy provides such an interesting case study. Over the last two decades the US has consistently been the source of over half of Mexico's inward FDI (see Diagram 1). The attraction of FDI is that it is supposedly "a composite bundle of capital, technology, and know-how" (Balasubramanyam et al., 1996, p.6) that can be harnessed by the host economy to help narrow the 'ideas gap' (Romer, 1993) and

[1] Between 1930 and 1970 the share of manufacturing in Mexican GDP grew from 12.9% to 23.3%, and Mexico City's share of manufacturing employment grew from 19.0% to 47.3% (Hanson, 1998).
[2] In 1995 import licenses covered 92.2% of national production, the average tariff was 23.5%, and 85.0% of non-petroleum exports were covered by export controls. By 1987 export controls had been abolished, import licenses covered only 25.5% of national production, and the average tariff was down to 11.8% (Hanson, 1997).

hence increase domestic productivity. The degree to which FDI embodies technology and know-how will evidently vary from one investment to another. Given that the technological sophistication of the source country is likely to be one important determinant, the fact that the majority of Mexico's FDI comes from the US suggests that Mexico may be in an excellent position to benefit from FDI (and is therefore an ideal candidate in which to test for possible FDI spillovers).

This paper is organised as follows. Section 2 looks at the volume and structure of Mexican inward FDI. The determinants of this FDI are discussed in section 3. Section 4 reviews the extant literature on FDI spillovers. The results of a simple time series analysis of the growth effects of FDI in Mexico are presented in section 5 and section 6 concludes and offers some policy proposals.

2. Volume and Structure

Mexico has long been a large recipient of foreign direct investment (FDI). During the 1980s it accounted for approximately 10% of all FDI flows to developing countries and roughly a quarter of all flows to Latin American (Love & Lage-Hidalgo, 2000). Though many Mexicans once lamented that they were "so far from heaven and so close to the Unites States" (Blomstom & Kokko, 1997, p.21), Mexico's proximity to the world's largest economy is perhaps its greatest advantage. Figure 1 illustrates the primacy of the US in Mexican inward FDI.

Figure 1. FDI Participation in Mexico, 1976 – 1994 (%)

Period	US	Germany	Japan	UK	Switzerland	Spain	France
76-94	62.28	7.33	7.27	3.9	5.11	2.83	3.09
76-80	68.72	11.56	14.77	-3.76	8.96	4.16	-0.54
81-85	62.97	8.7	6.25	3.29	4.1	3.39	3.58
86-90	58.13	5.24	3.66	8.97	3.68	2.1	5.03
91-94	58.55	2.92	3.67	7.87	3.35	1.36	4.58

Source: Love & Lage-Hidalgo (2000)

Despite a modest decline in FDI participation in Mexico by the US between 1976 and 1994, the US remains by far the largest single investor. One of the principal advantages of this for Mexico is that the US economy is at the technological frontier and it may be expected that US FDI may be managerially and technologically well

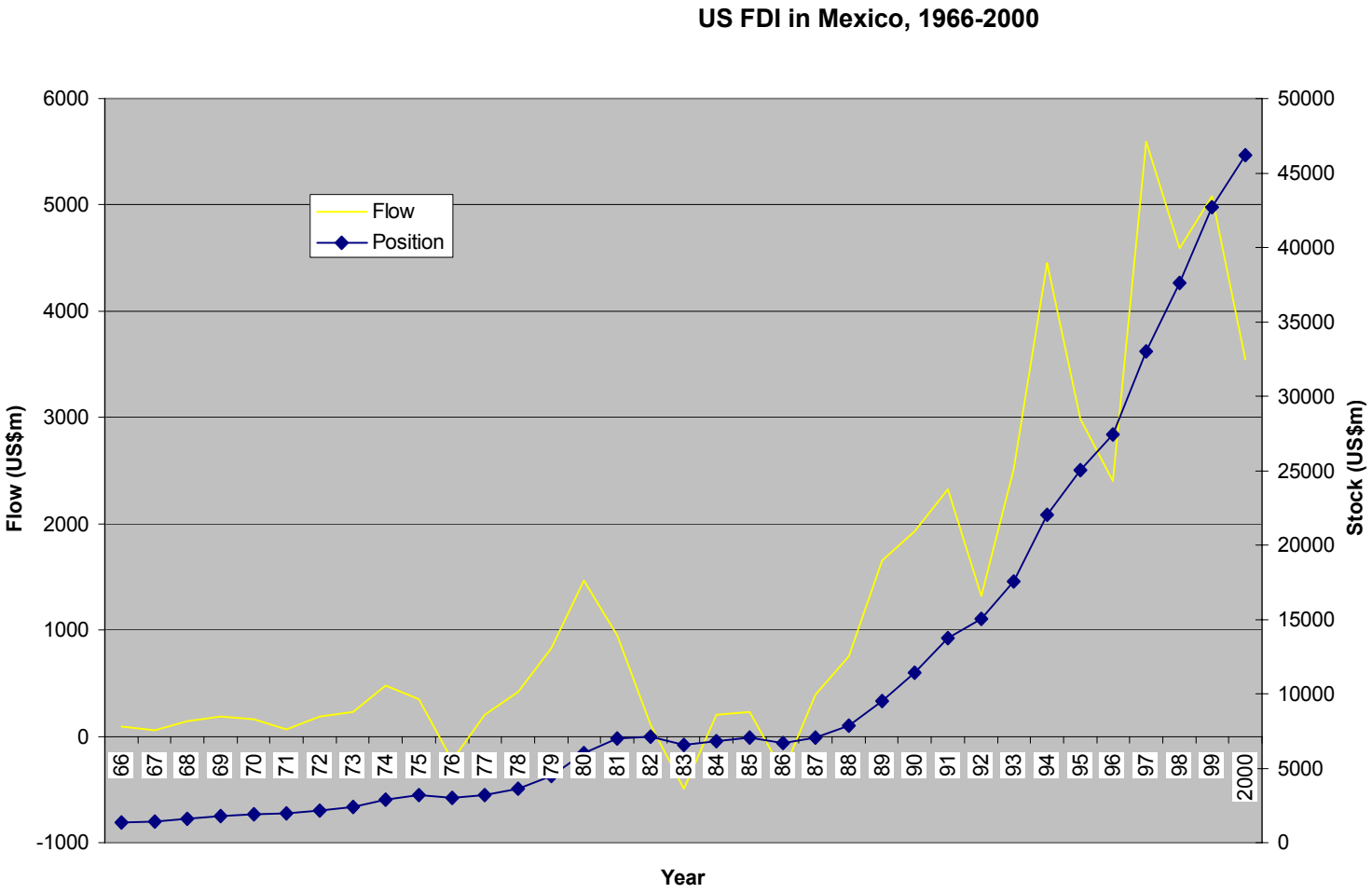
endowed. The principal advantage for researchers is that the US collects the most comprehensive data on the activities of its multinationals abroad, and hence provides detailed information pertaining to roughly 60% of all FDI inflows into Mexico. Few other, if any, countries offer this wealth of data.

Figure 2 shows the stock and flows of FDI from the US to Mexico for the years 1966 to 2000. As flows in any individual year are heavily influenced by individual undertakings, they show a marked volatility in comparison with the stock data. For this reason, it is preferable to analyse the FDI trend by consideration of the stock as opposed to the flow. Whilst the figure shows a gradual increase in FDI stock from the outset, there appears to be a dramatic increase in FDI during the nineties[3]. In fact, Graham & Wada (2000) report that there is a trend break in 1989.

It is interesting that the timing of this trend break precedes the implementation of NAFTA by some five years. During the negotiations of NAFTA there was considerable concern expressed in the US and Canada that the abundant supply of cheap labour in Mexico would lead to sizeable negative effects on domestic wages and employment. What these concerns overlooked, however, was that trade and investment liberalisation in Mexico had begun in earnest ten years earlier; with corresponding adjustments in trade and investment volumes already having taken place[4]. Graham & Wada (2000) report that the earliest indications that NAFTA was in the 'pipeline' were from 'leaked' reports from the Mexican Government in the spring of 1990, and so "the trend break cannot be attributed to NAFTA nor even to expectations that it would occur" (p.781).

Recognising that FDI typically involves long lead times between the decision of firms to invest and the actual investment taking place, Graham & Wada (2000) further discount the re-election of the incumbent Institutional Revolutionary Party (PRI) in 1988 and significant liberalisation of the Law on Foreign Investment (LFI) in 1989 as explanations of the trend break.

[3] Note that the apparent drop in stock in 1982 is due to a recalibration of the data by the US Department of Commerce and not an actual withdrawal of foreign investors (Graham & Wada, 2000).
[4] Furthermore, despite the primacy of US activity in the Mexican economy, the relative size of Mexico somewhat precludes dramatic effects on the US and Canada.


US FDI in Mexico, 1966-2000
Flow
Position
Flow (US$m)
Stock (US$m)
Year
6000
5000
4000
3000
2000
1000
0
-1000
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
66
67
68
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70
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98
99
2000

The true catalyst for the trend break would seem to be the dramatic policy reorientation that Mexico was forced into in the mid-1980s due to its sovereign debt crisis. In 1995 Mexico announced its intention to join the General Agreement on Tariffs and Trade (GATT), began a series of bilateral negotiations to liberalise trade and investment with the US, and instituted unilateral policy reform. It is these significant changes in Mexico's policy environment that seem to have generated a marked increase of FDI from the US. Despite fears pertaining to the consequences of NAFTA, the major structural changes to the Mexican economy and their associated effects on trade and investment occurred some years prior. The main impact of NAFTA may actually have been to 'lock in' Mexico's policy liberalisation and to validate it on the international stage. An increase in the proportion of FDI originating from 'outside' countries after 1994 would certainly seem to validate this conclusion.

In a study of the impact of regional integration on FDI, Blomstom & Kokko (1997) suggest that the effect of NAFTA is likely to characterise Mexico in area 1 of figure 3.

Figure 3. Factors Determining the Impact of Economic Integration

	Locational Advantages (positive to negative →)	
Environmental Change (strong to weak ↓)	1	2
	3	4

Source: Globerman & Schwindt (1996)

This area is reserved for those countries upon which the regional integration agreement (RIA) has a strong policy impact *and* whom have positive locational advantages (such as low unit labour costs, sizeable domestic market etc.). It is expected that the potential for positive impacts from the formation of an RIA will be greatest for countries described by this scenario. Undoubtedly, low labour costs and proximity to US market endow Mexico with strong locational advantages. However, our preceding discussion suggests that the environmental impact of NAFTA may not have been as strong as originally thought (or *feared*, in some cases), indicating that

Mexico may be better described by area 3[5]. In this region the impact of the RIA on inward FDI is still expected to be positive, but not as strong as that in area 1.

Let us now turn towards the sectoral distribution of total world FDI in Mexico. Figure 4 shows the breakdown for the last decade according to the Instituto Nacional de Estadistica. While the service sector received the slight majority of inward FDI in the early nineties, by the close of the century the industrial sector was by far the greatest recipient. The wholesale and retail trade sector has also enjoyed rapidly accelerating FDI during the decade, firmly establishing itself as the third most important sector. Extraction and Agriculture receive comparatively little FDI.

Figure 4. Sectoral Composition of Mexican FDI (US$m)

Period	Total	Industrial	Services	Trade	Extractive	Agriculture
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	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	10 564.0	6 114.6	3 093.2	1 250.5	95.1	10.6
1995	8 201.8	4 738.3	2 367.4	1 005.9	79.1	11.1
1996	7 662.3	4 682.1	2 144.8	719.9	83.8	31.7
1997	11 812.7	7 233.0	2 584.9	1 853.7	130.2	10.9
1998	7 612.0	4 899.7	1 774.3	866.9	42.4	28.7
1999	11 964.5	8 661.9	2 176.2	926.3	122.9	77.2
2000	12 451.6	7 632.6	2 886.4	1 689.1	161.7	81.8

Source: Instituto Nacional de Estadistica

In order to gain a more detailed insight into the industrial location of Mexican FDI it is once again necessary to examine data maintained by the US Department of Commerce. As before, this has the disadvantage that it accounts only for US FDI, but the advantage that the data is considerably more comprehensive and accurate than that available elsewhere[6]. Figure 5 shows a detailed decomposition of US FDI flows into 2-digit SIC Mexican manufacturing industries. It is evident that the three most

[5] Figure 3 may more satisfactorily be depicted as a continuum in both environmental change and locational advantages, in which case we would argue that Mexico may be more properly located in the West of the diagram (as opposed to the North-West as suggested by Blomstrom & Kokko, 1997).

[6] Concerning accuracy, it is interesting to note that the Instituto Nacional de Estadistica reports US inward FDI for 1999 as US$ 6635m, whereas the US Department of Commerce reports only US$ 5084m. This discrepancy is likely due to the fact that the Instituto records planned or announced FDI, but the Department of Commerce only records FDI that has actually taken place. This example serves to emphasise the importance of verifying investment data when and where possible, and offers an indication of the potential data problems that plague empirical studies.

important industries are Transport Equipment (SIC 37), Food (SIC 20), and Chemicals and Allied Products (SIC 28). Unfortunately, a number of the investment figures have been suppressed (D) to ensure that it is not possible to identify the activities of any individual firm. However, by subtracting the available data from the total for all manufacturing industries we can be certain that none of the suppressed figures are 'hiding' significant FDI flows.

Figure 5. US FDI Flows in Mexican Manufacturing Industries, 1982-2000

Year	Total	Food	Chemicals	Primary Metals	Industrial	Electronics	Transport	Other
1982	203	18	93	37	-3	37	-74	96
1983	-427	-58	-21	-42	-141	-56	-59	-51
1984	129	122	131	32	-279	85	48	-10
1985	200	33	55	6	-52	-18	87	89
1986	-351	-45	-52	-29	-111	-2	-83	-29
1987	264	-91	120	26	-79	48	5	236
1988	670	69	190	32	21	27	163	168
1989	1159	281	289	39	60	D	250	D
1990	1323	393	173	49	53	D	257	D
1991	1325	281	262	19	-9	-43	619	196
1992	720	28	152	D	D	-92	404	268
1993	1023	952	410	D	D	-95	-628	304
1994	2530	674	314	D	D	158	1028	281
1995	1785	360	289	D	D	-69	687	D
1996	1665	692	599	52	D	7	-211	D
1997	2499	1007	577	D	D	-14	144	D
1998	2472	713	107	D	D	D	1300	495
1999	2468	-23	729	80	D	D	774	656
2000	1710	507	483	D	D	D	726	D

Source: US Department of Commerce

Finally, it is important to note that a significant proportion of FDI into Mexico has been in in-bond foreign assembly plants (maquiladoras) based overwhelmingly along the 3,326 km US-Mexico border[7]. Although the maquiladora program has proved popular with foreign investors since its introduction in the 1960s, relaxation of restrictions in the early 1980s saw maquiladora employment increase from 150,867 in 1983 to 460,293 in 1990 as the share of maquiladora workers in national

[7] Maquiladoras are subject to tax only on the value added of their activities. They import most of their intermediate imports from abroad and export virtually all of their output (until 1988 they were required by law to export 100% of their output). The vast majority of maquiladoras produce electronic equipment, clothing, plastics, furniture, electrical appliances, or auto parts.

manufacturing employment grew from 4.9% to 19% (Feenstra & Hanson, 1997). Today there are some one million workers in nearly 4000 thousand maquiladoras.

Gerber (2001) reports that maquila investment has accounted on average for 27% of US FDI into Mexico for the period 1994 to 2000[8]. Furthermore, five cities located on the US-Mexico border share 50% of the firms and 51% of the workers in US origin maquilas. Feenstra & Hanson (1997) find that in the regions where FDI was most concentrated, growth in maquiladora investment can account for over half of the increase in the share of skilled labour in total wages that occurred during the late 1980s[9]. Given this, the authors claim that the "FDI boom…has resulted in a region-specific shock to labor demand" (p.374).

Hanson (1996, 1998) draws similar conclusions investigating the spatial impact of FDI and Mexican-US integration. He argues that the massive US inward FDI concentrated in maquiladoras near the Mexican-US border has essentially created vertical production networks spanning the border. This has contributed to a significant contraction in employment in the Mexico City manufacturing belt, a rapid expansion of manufacturing employment in Northern Mexico, and an increase in wage inequality.

Interestingly, these studies also suggest that the impact of the NAFTA on the US has been understated. Hanson (1996) examines data for US-Mexico border-city pairs (e.g. San Diego – Tijuana), concluding that export manufacturing in *maquiladoras* encourages increases in employment in US border cities.

Early evidence therefore seems to indicate that despite the benefits inward FDI can bring in terms of capital and productivity spillovers, it may also lead to rising inequality and regional deindustrialisation. The potential costs of such problems are

[8] In addition, US investment in maquiladoras was 87% of total world FDI in maquiladoras and around 80% of maquila output is shipped to the US.
[9] US investment in *maquiladoras* is aimed at outsourcing low-skilled production tasks to take advantage of the lower unit labour costs in Mexico. However, these tasks which are viewed as low skilled to US firms are in fact relatively high skilled in terms of the skills and training of the Mexican workforce. In this manner, US FDI in Mexico can cause an increase in the relative demand for (relatively) skilled labour in both countries simultaneously.

well known and it is obvious that the spatial aspects of FDI and integration warrant further investigation.

In this section we have argued that Mexico's sweeping liberalisation and policy reform in the mid-eighties was the catalyst to a dramatic acceleration in inward FDI (with the implementation of NAFTA nearly a decade later serving to consolidate and validate these reforms). Given this, what factors explain the attraction of the Mexican economy to foreign investors, and what determines the industrial and geographical location of FDI in Mexico? These are the questions that we turn to next.

3. Determinants

The decision process prior to undertaking foreign investment will undoubtedly vary from one firm to another. However, there are many considerations (such as availability of factor inputs, domestic demand conditions, property rights protection etc.) that will be common to all firms. One theory that neatly encapsulates these diverse factors is the eclectic paradigm developed by Dunning (1988). This argues that FDI will be the appropriate mode of foreign market entry when multinationals find it most advantageous to exploit ownership and location advantages through internalisation rather than through exporting or licensing.

There are numerous recent empirical studies which seek to test the determinants of FDI[10]. Most of the issues under investigation can be categorised as location advantages, but there are also studies which seek to asses the impact of ownership advantages and strategic considerations on FDI. Despite the wealth of such studies, the number that specifically address Mexican FDI is unfortunately rather small. Two authors who seem intent on single-handedly remedying this are Love & Lage-Hidalgo (1999a, 1999b, 2000). In one paper they test the ownership advantages of US multinational as determinants of FDI flows into Mexico (1999a), while in other papers (1999b, 2000) they consider a derivative of the model employed by Buckley & Casson (1991) which takes the principal determinants of FDI to be the scale of

[10] For example, Lehmann (1999) investigates the role of country risk, Traxler & Woitech (2000) consider labour market regimes, Schoeman et al. (2000) analyse fiscal policy, List & Co (2000) study environmental policy, Sung & Lapan (2000) assess exchange rate volatility.

demand in the host economy and relative factor costs in the capital exporting and importing countries.

In order to investigate the significance of ownership advantages the authors conduct an empirical analysis of sectoral data from the majority-owned foreign affiliates (MOFAs) of US MNEs[11]. The dependent variable is FDI flows, whilst the independent variables (which all apply specifically to the US MOFAs in Mexico) are R&D expenditures, capital expenditures, net tangible assets, employee compensation, and total Mexican sales. Their analysis reveals that all of the explanatory variables (with the exception of R&D expenditure) are positively related to FDI flows. They conclude that "direct investment into US MNEs' affiliates in Mexico is driven by benefits derived from embedded human knowledge and from technical knowledge embodied in plant and machinery" (p.70).

To test their alternative model the authors employ data on US FDI flows to Mexico for the period 1967 to 1994. In this instance the independent variables are Mexican income per capita (as a proxy for the scale of domestic demand), the difference between US and Mexican hourly real wages, and an estimate of the difference between the cost of capital between the US and Mexico[12]. The model was able to explain two-thirds of the variation in FDI flows and strongly supported the belief that real wage differentials were an important locational determinant. Cost of capital differentials, on the other hand, were found to have a weak positive effect on FDI. The authors' suggested explanation for the unexpected sign on capital cost is that when the cost of capital increases in the home nation it encourages MNEs to raise capital from the host country which ultimately leads to increases in FDI. Mexican income per capita was also found to have a strong positive influence on FDI, which is interpreted as indicating that the domestic Mexican market is attractive to FDI in its own right (and not simply because it offers a plentiful supply of 'cheap labour').

[11] MOFAs are those subsidiaries in which the US parent has a stake of 50% or more. As data for these firms is considerably more comprehensive than that for all affiliates (and given that the US Department of Commerce benchmark studies indicate that MOFAs typically represent approximately two thirds of overall US investment in Mexico) the authors opted to focus on these affiliates only.

[12] The lagged stock of US FDI in Mexico is included as a fourth explanatory variable because "in any given period, actual and desired foreign capital stocks are unlikely to be equal as a result of adjustment costs and operating lags [so] flows of foreign direct investment will therefore be a lagged function of the difference between actual and desired capital stocks in previous periods." (p.209/10)

One notable shortcoming of these studies (which is readily acknowledged by the authors) is their use of wage differentials instead of the more appropriate unit labour costs (ULCs) that take into account labour productivity as well as labour compensation. Fortunately, the recent provision of ULC measures for Mexico by the Key Indicators of the Labour Market (KILM) database enables this to be remedied.

Figure 6. FDI Flows and Unit Labour Costs in Mexico (1982-1996)

	Coeff.	Std.Err.	t-ratio	P-value
Const	-49470.7	29950.4	-1.65	0.11
ULCj	-11729.2	5966.19	-1.96	0.06
POPj	0.00021	0.00013	1.57	0.12
POPi	0.00019	0.00018	1.05	0.30
GDPj	6.63E-08	3.37E-08	1.96	0.06
GDPi	-4.65E-09	3.80E-09	-1.22	0.23

dependent var. = FDI flows; obs. = 30; Adj. $R^2 = 0.61$

Figure 6 shows the regression results from an OLS regression with US FDI flows to Mexico and Canada for the period 1982 to 1996 as the dependent variable[13]. The independent variables include the GDP and population (POPi) of the US (intended to capture the 'push' effects on FDI) and the GDP and populations (POPj) of Mexico and Canada (capturing the 'pull' effects of domestic market demand). ULCj is the unit labour cost in US$ in Mexico and Canada[14]. As the table shows, only the coefficients on GDPj (host income) and ULCj are statistically significant (at 6%). The sign on both of these variables are as expected and indicate that, *ceterus paribus*, a larger host economy and lower unit labour costs encourage inward FDI. While this analysis is very crude and suffers from a very limited number of observations (a problem common to most studies on this topic), it appears to confirm the findings of other authors that labour costs and domestic demand are important determinants of the location of US FDI in Mexico.

In order to attempt a more comprehensive analysis of the determinants of Mexican inward FDI we constructed a data set of FDI flows disaggregated by two-digit SIC

[13] Unfortunately, the availability of ULC data restricted our analysis to the years 1982-1996.
[14] While it is common practice in the literature to use a log-linear specification, a number of observations with negative FDI flows (indicating net disinvestment in that particular year) precluded this possibility.

manufacturing industries. US flow data for the years 1987 to 2000 was taken from the Bureau of Economic Analysis (BEA) for the Food, Chemicals, Primary Metals, Industrial Machinery, Electronics and Transport industries. As disaggregated ULC data are not available for Mexico, we employed data on hourly compensation available from the US Bureau of Foreign Labour Statistics.

In addition to the compensation variable we included the GDP of the domestic US industry (INDiY), and the GDP growth rates of the US (y_i) and Mexican (y_j) economies as explanatory variables[15]. We therefore estimated the following equation:

$$\ln FDI = \alpha + \beta_1 {COMP_j}/{COMPi} + \beta_2 \ln IND_i Y + \beta_3 y_i + \beta_4 y_j \qquad [1]$$

where i indicates the investing economy (in this case the US) and j represents the recipient (Mexico).

Unfortunately, due to data suppression by the BEA (to protect the identity of individual firms) and missing values for compensation in some years our potential panel size of 68 observations was reduced to 31. Given this, it is somewhat unsurprising that we failed to achieve conclusive results, whether using an REM or FEM model. The sole statistically significant coefficient was β_2, whose value ranged from 1.24 to 1.59 (significant at the 5% level) depending on the model specification and sample used[16] (full results are available on request). This implies that, *ceterus paribus*, a given increase in the size of a manufacturing industry in the US will lead to a greater increase in FDI flows to Mexico[17]. Obviously though, the lack of data has prevented us from carry out a very sophisticated or comprehensive study and this conclusion should be taken with the caution that it deserves.

[15] INDiY and y_i are intended to capture the 'push' effects on FDI and y_j the 'pull' effect. This is similar to the standard 'gravity model' which has proved very empirically successful at accounting for a whole range of factor flows.

[16] In order to increase the number of observations available we also experimented with the inclusion of data for US FDI into Canada. However, this failed to meaningfully alter the results and β_2 remained the only significant coefficient.

[17] Note that our regression specification assumes that all FDI in a given Mexican industry comes from US firms in the same industry. However, this may not be too unrealistic as the two-digit level.

The simple empirical work we have undertaken, while not particularly inspiring, seems to offer some evidence to support the intuition that unit labour costs and growth of the US manufacturing industries have been important in stimulating inflows of FDI to Mexico. An analysis of the attraction of factors such as tax breaks, special economic zones and agglomeration economies is beyond the scope of this review paper but would make a valuable contribution to the literature if a sufficient dataset could be obtained.

4. Spillover Channels

The literature identifies four main channels through which spillovers from FDI are thought to occur – imitation; competition effects; human capital acquisition; export spillovers. We briefly consider each in turn.

4.1 Imitation

The most convincing explanations in the theoretical literature on why multinationals invest abroad as opposed to licensing or exporting tend to assume that the firm has some sort of ownership advantage (such as patented technology) that it must internalise through direct investment to overcome market imperfections (such as poor intellectual property rights in the host country). As Krugman & Helpman (1994) observe, the multinational will surely be disadvantaged in terms of local knowledge and so must have some proprietary advantage to counteract this. Either by imitation or demonstration, dispersion of this proprietary knowledge (whether it be technology, a product or process innovation, or simply managerial or organisation expertise) is believed to be one of the primary channels through which domestic firms can improve their productivity.

Immediately, it is obvious that a number of factors will be crucial in determining how successful domestic firms will be in gaining from this type of spillover. For instance, the level of technology or knowledge embodied in FDI can be expected to vary with the type of investment (e.g. initial capital or reinvested earnings), industry of investment (e.g. electronics or agriculture), and source country (e.g. US or Brazil). Furthermore, the host nation's ability to benefit from any spillovers likely depends on

its technological sophistication, levels of human capital, cultural and social capital, and financial institutions and markets (factors which Abramovitz [1986] might refer to as determining a country's 'absorptive capacity'). Indeed, there is quite a debate in the literature as to whether the size of the 'technology gap' (that is, the difference in technological sophistication between the source and host countries) exerts a positive or negative influence on spillovers[18]. The argument that it is positive rests on the belief that the more 'backward' the host nation the greater the scope for it to make gains on the leading countries and hence the faster domestic productivity growth will be. However, if the gap is large it may prove too great for domestic firms to 'jump' and ultimately they may gain very little from FDI (and may actually be harmed by it if they are forced out of the market).

In a cross-section industry level study of Mexico for 1970, Kokko (1994) investigates the role of the 'technology gap'. He finds that "factors related to technology alone do not seem to inhibit spillovers, but that large productivity gaps and large foreign market shares together appear to make up significant obstacles" (p.290). This finding may be of particular concern to Mexico because US investment in maquiladoras in Northern Mexico exhibits aspects of enclave behaviour.

4.2 Competition

A number of authors emphasise the role of competition effects in generating spillovers from FDI (Wang & Blomstrom, 1992; Glass & Saggi, 2001). Entry by a foreign firm will initially increase competition in the domestic industry which should force domestic firms to adopt new technologies or reduce X-inefficiency even if there are no gains in terms of imitation as discussed above[19]. This spillover mechanism is analogous to the standard gains associated with increased armslength trade and is often cited as potentially one of the most important benefits from FDI[20]. Of course, if foreign entry forces out some domestic firms that are unable to compete and hence

[18] See Findlay (1978) and Wang & Blomstrom (1992).
[19] Although entry by a similar sized domestic firm would also increase competitive pressure, the fact that foreign affiliates are generally more efficient that domestic firms (Blomstrom & Wolff, 1994) leads us to expect that FDI will lead to greater and more beneficial competitive pressure than the equivalent domestic investment.
[20] For example, the Cecchini Report on the benefits of completing the European Single Market identified competition effects as the primary source of gain (Gorg & Greenaway, 2002).

ultimately leads to an increase in concentration and imperfection in the market, competition effects from FDI may actually harm the host economy.

4.3 Acquisition of Human Capital

Human capital has long been held to be a vital determinant of economic growth and has recently been incorporated into endogenous growth models to permit countries to enjoy increasing returns. Given this, the prospect that FDI is linked with training and on-the-job learning for domestic workers is particularly encouraging. Fosfuri, Motta, & Ronde note that "the fact that MNEs undertake substantial efforts in the education of local workers has been documented in many instances (e.g. ILO, 1981; Lindsey, 1986), and empirical research seems to indicate that MNEs offer more training to technical workers and managers than do local firms (Chen, 1983; Gerschenberg, 1987)" (p.206).

The possibility of spillovers is magnified when affiliate employees move to domestic firms or set up their own enterprises. Katz (1987) observes that managers of domestic firms in Latin America often started their careers and were trained in foreign affiliates. Aitken, Harrison, & Lipsey (1996) investigate the possibility of human capital spillovers in Mexico, Venezuela, and the US by estimating the effect of foreign ownership on wages. They find for all three countries that FDI is associated with higher wages, but in Mexico and Venezuela higher wages were only found for foreign firms. This implies that FDI does improve the human capital of domestic workers employed by foreign affiliates, but there is no evidence of human capital spillovers to workers of domestic firms.

4.4 Export Spillovers

There is a rich history of research on the export-led growth hypothesis. More recently, a number of papers have considered the prospect that involvement in exporting increases a firm's productivity[21]. Given that exports also secure foreign currency for the exporting nation, the prospect that FDI may enhance the ability of

[21] See Bernard & Jensen (1999), Bernard & Wagner (1997), and Girma, Greenaway & Kneller (2002).

domestic firms to export has received significant attention. Multinationals have an obvious advantage over domestic firms when it comes to knowledge and experience of exporting. It is not difficult to imagine that some of this expertise may spillover from foreign affiliates to domestic firms, especially if the affiliate is itself engaged in export activity. Furthermore, if the affiliate is producing for export then it may encourage the formation of export infrastructure (such as transport, warehousing etc) that can be utilised by domestic firms.

Aitken, Hanson, & Harrison (1997) employ cross-section firm level data for 1986 and 1989 to study the link between FDI and export spillovers in Mexico. They find that the probability that a domestic plant will export is positively correlated with proximity to multinational affiliates, but unrelated to general exporting activity. They conclude that "foreign-owned enterprises are a natural conduit for information about foreign markets and technology, and a natural channel through which domestic firms can distribute their goods. To the extent that foreign investors directly or indirectly provide information and distribution services, their activities enhance the export prospects of local firms" (p.25).

4.5. Empirical Studies on Productivity Spillovers

As previously mentioned, Mexico has proved a popular area of study, although the most recent empirical studies have focussed on other developing countries from Latin America and East Asia. Whilst overall evidence from empirical studies on FDI spillovers is mixed, there is a general consensus amongst the Mexican studies that FDI does lead to beneficial spillovers for domestic firms.

The earliest study of spillovers in Mexico was by Blomstrom & Persson (1983) who related the technical efficiency of Mexican manufacturing industries in 1970 to capital intensity, labour quality, scale of competition, degree of competition, and the presence of foreign affiliates. They found a positive relationship between technical efficiency and foreign presence, which they took as suggesting that 'spillover efficiency benefits' do occur from foreign plants to domestic plants. However, the study does not indicate through what channels these spillovers might take place.

Blomstrom (1986) attempts to remedy this failing by analysing the effects of FDI on the productive efficiency of the industrial structure in Mexico between 1970 and 1975. He does this by constructing an efficiency index, which is a measure of how far the average firm is from the industry frontier, and then running OLS regressions with a foreign share variable as one of the independent variables. In all regressions he finds a positive coefficient on the foreign share variable that he interprets as evidence that "MNCs have a positive independent influence on structure, so that industries dominated by foreign firms tend to be more efficient than others in the sense that the average firm is closer to the frontier" (p.105).

To then investigate the possible channels through which the foreign firms may be contributing to structural efficiency, Blomstrom relates different aspects of structural change between 1970 and 1975 to changes in foreign presence during this same period. He finds that foreign entry is uncorrelated with both changes in the technological frontier and labour productivity in the least efficient plants, but that it is positively related to productivity changes in the industry average. This is interpreted as evidence that spillovers occur not through the transfer of technology but rather through competitive pressure. It may also indicate that FDI encourages the dualistic nature of developing country markets (i.e. foreign firms enter and improve the 'modern' sector of an industry, whilst the 'traditional' sector is unaffected and falls further behind).

Blomstrom & Wolff (1994) investigate the influence of multinationals on productivity convergence between Mexico and the US between 1970 and 1975. They report that "there is strong evidence that the presence of multinational firms acts as a catalyst to the productivity growth in Mexico and that foreign direct investment speeds up the convergence process between Mexico and the United States" (p.275). Unfortunately, the study is unable to distinguish between the direct effect of FDI and possible indirect (spillover) effects and so it is possible that industry productivity in Mexico is improved simply by the entry of more productive MNE affiliates without any increase in domestic firm productivity.

It is important to note that the spillover studies discussed above all make use of cross-sectional industry-level data. Recently, Gorg & Strobl (2001) have argued that use of

cross section data may lead to biased results because of the problem of correctly identifying the causation between industry productivity and multinational affiliate entry. They recommend that panel data be used to circumvent this problem. Gorg & Greenaway (2002) conduct an exhaustive survey of papers on productivity spillovers (covering a variety of developed, developing, and transition economies) and note that only "two studies using appropriate data and estimation techniques…report positive evidence for aggregate spillovers" (p.7). The remaining sixteen find either negative or no statistically significant effects.

This would appear quite damning evidence for the positive spillovers found for Mexico. However, it must also be realised that none of the studies which found negative or no effects were done for Mexico. As discussed previously, spillovers from FDI are likely to vary with the host economy under consideration. In fact, Kokko (1994) finds that "the technology imports of MNC affiliates seem to be larger in countries and industries where the educational level of the local labor force is higher, where local competition is tougher, and where the host country imposes fewer formal requirements on the affiliates' operations" (p.280). This combined with the fact that the majority of Mexico's FDI comes from the US may be the actual explanation for why positive spillovers have been consistently found for Mexico, but no statistically significant effects were found for Morocco (Haddad & Harrison, 1993) or Uruguay (Kokko et al., 1996).

Many developing countries, including Mexico, actively compete to attract FDI in the belief that it can contribute not just to the quantity of capital, but also the *quality*. In some instances governments are so eager to attract foreign firms that they will even subsidise the investment[22]. Given this, it is disappointing that there is not more consensus among empirical research confirming the existence of beneficial FDI spillovers.

[22] For instance, Head (1998) claims that the state government of Alabama paid the equivalent of $150,000 per employee to entice Mercedes to locate its new plant in the state.

5. Does FDI Enhance Growth?

The majority of empirical studies investigating the host country effects of FDI focus on labour or output productivity in manufacturing as the variable requiring explanation. We take a different approach here and follow Balasubramanyam et. al. (1996) and Carkovic & Levine (2002) in examining directly the growth rate of gross domestic product (GDP) in a model derived from a production function with FDI as an additional input alongside labour and physical capital. As alluded previously, foreign investment is attractive to host countries specifically because it is believed to embody greater technology and human capital than domestic investment. Given this, it is appropriate that the stock of foreign investment and domestic investment should enter separately in the production function.

In the usual manner we can represent the production function as:

$$Y = g(L, K, F, t) \qquad [2]$$

where Y is real GDP, L is labour, K is domestic capital stock, F is foreign capital stock, and t is a time trend capturing technical progress.

Taking [2] to be linear in logs and differencing we arrive at the following expression for the growth rate of GDP:

$$y = \alpha + \beta_1 l + \beta_2 k + \beta_3 f \qquad [3]$$

where lower case letters denote growth rates and the beta coefficients therefore represent output elasticities.

With regard to measurement of the domestic and foreign capital stock we follow the precedent set by Balasubramanyam et. al. (1996) and take the shares of domestic

investment and foreign investment in GDP as adequate proxies for the growth rate of the domestic and foreign capital stocks respectively[23].

Having so far adhered closely to the model and procedure employed in Balasubramanyam et. al. (1996), we now depart in terms of the data to be analysed. Whereas Balasubramanyam et. al. (1996) employed cross-section data on 46 countries averaged over the period 1970 to 1985, we utilise time series data pertaining to growth and FDI in Mexico from 1970 to 1999. In all instances the data are taken from the World Bank's World Development Indicators 2001.

Figure 7 offers a selection of the most interesting results. Equation [7.1] is the regression specified above [3], estimated for the entire sample (details of the time trend are not reported). Of the independent variables, only the coefficient on I/Y (the proxy for the growth rate of the domestic capital stock) is statistically significant, with an output elasticity of 0.85% (significantly different from zero at the 1% level)[24]. This suggests that for Mexico for the period 1970 to 1999 FDI has not played a role in economic growth (the statistically insignificant coefficient on labour force growth indicates that labour also has been unimportant).

This finding is at odds with previous studies on Mexico cited earlier and also with Balasubramanyam et. al. (1996) who report a statically significant, positive effect of FDI on growth (albeit for a cross-section of 46 economies). Fortunately, the work of Balasubramanyam et. al. (1996) also hints at a convincing explanation for the finding of [3.1]. Bhagwati (1978) hypothesised that the volume and efficacy of inward FDI will be dependent on the trade regime pursued by the host nation. Further, he suggested that FDI would be far more beneficial under an export promoting (EP) strategy than under a strategy of import substitution (IS)[25,26]. By separating their

[23] In doing this Balasubramanyam et. al. (1996) where themselves following "the precedent set in numerous previous studies by approximating the rate of growth of the capital stock by the share of investment in GDP" (p. 98). See, for example, Mankiw, Romer, & Weil (1992).
[24] An alternative interpretation of the coefficient is that a one percent increase in the growth rate of the domestic capital stock will engender a 0.85% increase in output growth, *ceterus paribus*.
[25] The reasoning for this being that an EP strategy offers a distortion-free environment, whereas an IS strategy offers artificial and transitory incentives. So FDI will locate in an EP environment based purely on efficiency considerations, but tax and other such incentives in an IS environment may encourage FDI to locate in sub-optimal locations.

sample into EP and IS countries, Balasubramanyam et al. (1996) find evidence to suggest that this is indeed the case. As Mexico has undergone a dramatic reorientation of its trade policy during our sample period, we are motivated to explore the possibility that this is masking a positive effect of FDI in our overall sample.

Figure 7.

Eq. No.	Intercept	*FDI/Y*	*I/Y*	*l*	FDI/Y_{t-2}	*adj.* R^2	F	Years
7.1	-16.45* (1.95)	0.14 (0.14)	0.85*** (2.90)	1.01 (0.59)		0.20	3.46 (3, 26)	*70-99*
7.2	-6.27 (0.43)	7.83 (1.5)	0.25 (0.50)	0.21 (0.78)		0.25	2.63 (3, 12)	*70-85*
7.3	-7.51 (0.76)	-0.71 (0.63)	1.12*** (3.51)	-3.24 (1.18)		0.29	4.17 (3, 20)	*86-99*
7.4	-15.77** (2.50)		0.88*** (2.99)	0.66 (0.52)	-0.0017 (0.67)	0.22	3.66 (3, 26)	*70-99*
7.5	-20.74 (1.57)		0.83 (2.18)	2.33 (0.91)	-0.0016 (0.56)	0.13	1.72 (3, 12)	*70-85*
7.6	-32.02 (1.65)		0.60 (0.92)	6.05 (1.33)	3.45** (2.35)	0.33	3.18 (3, 10)	*86-99*

Dependent variable is the growth rate of real GDP. Estimation is by ordinary least squares OLS). The time trend is not reported. Figures in parentheses are absolute t-ratios. * indicates significance at the 10% level, ** at 5%, and *** at 1%.

Our initial procedure for classifying our sample into an IS period and an EP period was to perform the CUSUM and CUSUMSQ tests of structural stability. However, even for a range of equation specifications, neither of these tests indicated a structural break. Given our failure to identify a natural break, we chose to divide the sample according to the date given by Sachs & Warner (1995) for the liberalisation of Mexico (1986). Equation [7.2] for the years 1970 to 1985 is therefore chosen to represent Mexico under an IS regime, and Equation [7.3] for the years 1980 to 1999 under an EP regime.

Unfortunately, the variable FDI/Y performs no better in the separate sub-samples. None of the coefficients are statistically significant in [7.2] and only I/Y is significant in [7.3] (though we may interpret the larger coefficient on I/Y in [7.3] as an indication

[26] Bhagwati (1978) also hypothesised that the volume of FDI would be greater under an EP regime. Balasubramanyam & Salisu (1991) offer evidence supporting this contention.

that domestic investment provides a greater inducement to growth under an EP regime).

Another approach to investigating the possible impact of trade orientation was to include an interaction term between FDI/Y and a measure of openness as an additional explanatory variable[27]. If a liberal regime does indeed improve the efficacy of FDI then we should find a positive coefficient on the interaction term. However, the interaction term failed to enter significantly into any of the specifications tested and so the results are not reported here.

Finally, we experimented with varying lag lengths of both the foreign and domestic capital variables[28]. Given that there is often a substantial delay between the moment of FDI and the point at which the foreign operation is 'up-and-running' or at least operating at expected efficiency (especially for initial investments), it does not seem unreasonable to expect that output growth may lag behind growth of the foreign capital stock[29]. While all lagged variables of domestic capital performed poorly, a two-period lag of foreign investment proved to be statistically significant in the EP sample [7.6]. What is more, the coefficient was economically very significant, implying an output elasticity of FDI/Y of 3.45 for the period since liberalisation. This is far greater in magnitude than the coefficient achieved on I/Y under any of the specifications tried (both those reported and not reported), and suggests that (subject to a short lag) FDI has significantly contributed to output growth in Mexico since 1986.

Obviously the evidence supporting the beneficial growth effects of FDI in Mexico is not as strong as one might have liked. Without introducing lagged values of the variable, FDI/Y appears to exert no influence on growth. However, there is some evidence that, in the presence of an appropriate host environment (e.g. the

[27] The openness variable was defined as (imports+exports/GDP).
[28] Note, we also experimented with the inclusion of year dummies for 1982, 1983, 1984, 1994, and 1995 (to try and account for periods of crisis in Mexico during our sample period) and with a variable measuring export growth (acknowledging the vast literature on the export-led growth hypothesis). The inclusion of these did not change the results on our variables of interest (although the dummies 1982, 1983, and 1994 were negative and statistically significant and the export variable entered significantly and positively in some specifications). Results available on request.
[29] Anecdotal evidence in Hanson (2001) of investments by General Motors and Ford in Brazil would seem to support this assumption.

increasingly liberal regime found in Mexico post-1986), FDI is a vital contributor to economic growth. This is encouraging news for Mexico considering that it continues to attract increasing inflows of FDI and is consolidating its policies of liberalisation through the ongoing demands of NAFTA and negotiation of various bilateral treaties with countries such as the UK.

6. Policy Proposals

With many developing countries offering generous incentives to try and attract FDI, in the belief that it offers a great social return, it is of great concern that recent empirical studies seem to cast doubt on the finding of positive spillovers in early cross-section studies. Many of these favourable early studies focussed on Mexico and it now becomes vital that we investigate the cause of these empirical discrepancies. Though there is suggestion (Gorg & Stobl, 2001; Gorg & Greenaway, 2002) that cross-section approaches lead to biased results, there are currently no panel data studies for Mexico. Until this is the case it is difficult to take a firm position either way. What should help assuage our fears in the case of Mexico, however, is the fact that around 60% of Mexico's inward FDI comes from the world's most technologically advanced nation. Subject to some evidence that spillovers may be reduced if the technology gap is too large (Kokko, 1994, 1996), this suggests that the potential is there for Mexico to reap great benefits from FDI.

How can Mexico ensure that it maximises the potential spillovers from FDI? As Caves (1999) observes, no systematic theory has emerged in the development literature to address this issue. This is a major failing that deserves urgent attention. Lacking sound micro-management policies for how to maximise spillovers, we are left to recommend broader macro objectives based at improving a country's 'absorptive capacity'. These include such things as investment in human capital, physical and financial infrastructure development, and openness.

The beauty of 'investing' in 'absorptive capacity' is that it also attracts FDI. Indeed, in an ideal world there would be no competition for FDI (in terms of tax concessions etc.), rather multinationals would be left to choose investment locations based purely on efficiency and competitive advantage considerations. This would ensure the

maximum social return for investment in a global sense and would limit MNEs ability to privately capture the benefits of FDI. Despite this not being the case, and evidence that lower corporate tax rates do attract FDI (Hanson, 2001), we recommend that Mexico discontinue any attempts to 'artificially' attract FDI and instead focus on offering a favourable economic environment (e.g. high growth, educated labour force, good infrastructure etc.). By providing a 'distortion-free' environment Mexico would enjoy the greatest opportunity to benefit from FDI spillovers[30].

Furthermore, given its geographical proximity to the US, Mexico need not fear loss of FDI flows. The formation of NAFTA has legitimised the liberalisation policies adopted by Mexico in the mid-eighties and appears to be attracting considerable non-member FDI intent on penetrating the US market. As the domestic Mexican market continues to grow and becomes more 'Americanised' it will attract more FDI in its own right[31]. Hopefully, this will allow it to move away from maquiladora-type operations to activities which add more value and provide greater opportunity for spillovers[32].

Ending on a note of caution, recent research suggests that FDI may result in undesirable spatial effects and inequality.[33] The costs of these are well documented and this issue deserves serious consideration. Although the Mexican government has implemented policies to try and attract FDI and maquiladora investment into the southern regions, economic factors (including transport costs and agglomeration economies) dictate that foreign investment will continue to be concentrated primarily along the US-Mexico border and near Mexico City. Future integration among the Southern Hemisphere economies may serve to revitalise the south of Mexico, but the effects of any such RIA are hard to predict with much certainty.

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[30] Furthermore, there is evidence (Love & Lage-Hidalgo, 1999a) that Mexico and Canada do not compete for US investment (i.e. increased US investment in Canada will not lead to decreased investment in Mexico).

[31] Using Hofstede's four dimensions of national culture (power distance, uncertainty avoidance, individuality, and masculinity) Kogut & Singh (1998) estimate the 'cultural distance' between the US and Mexico as 3.13 (compared with 0.08 for the UK, 0.11 for Canada, 1.63 for India, and 3.60 for China).

[32] Despite a pervasive view in the popular press that maquiladoras are little more than 'sweatshops' employing young female labour (Feenstra & Hanson, 1997), Silver (2002) reports that each maquiladora job indirectly supports 3.5 more jobs at suppliers, transport companies and other service providers.

[33] Given that the top 20% of earners account for 55% of the income in Mexico (CIA World Factbook, 2001), inequality is already a serious issue that needs no exacerbation.

Foreign direct investment, particularly with reference to developing economies, is a subject that will continue to attract an enormous deal of attention, and rightly so. Issues concerning the scope of FDI to confer spillover benefits on the host nation and how these benefits can best be realised are still far from resolved. The potential spatial effects of FDI also warrant urgent attention. Regrettably, as is so often the case in economics, we are at the mercy of the available data.

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