

Pacheco-López, Penélope

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Foreign Direct Investment, Exports and Imports in Mexico

Penélope Pacheco-López

Department of Economics
University of Kent

Abstract

This paper analyses the liberalisation of foreign direct investment (FDI) in Mexico since the late-1980s, and its relationships with exports and imports. Such a process has eased the access of multinational corporations (MNCs) to the country, which has promoted exports. However, it has also resulted in a higher import content and the displacement of local firms, which has limited Mexico's economic development through the balance of payments constraint. The analysis is supported by the existence of linkages —bi-directional Granger causality— between exports, imports and FDI.

JEL Classification: F14, F21, F23, O1.

Keywords: Foreign Direct Investment-Liberalisation, Imports, Exports, NAFTA, Mexico.

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Correspondence address: Department of Economics, Keynes College, University of Kent, Canterbury, Kent, CT2 7NP. Tel: +44 (0) 1227 827679. Fax: +44 (0) 1227 827850. Email: P.Pacheco-Lopez@kent.ac.uk

Foreign Direct Investment, Exports and Imports in Mexico

1. Introduction

Since the mid-1980s, and particularly since the signing of the North American Free Trade Agreement (NAFTA) in 1994, there has been a large increase of foreign direct investment (FDI) into Mexico. The Mexican government has pursued an active policy of lowering entry barriers to investment from foreign multinational corporations (MNCs) in the hope that FDI will promote economic development through knowledge spillovers and a faster growth of exports. In 2001, Mexico was the largest FDI recipient in Latin America (UNCTAD, 2002), and it became the second largest trading developing country in the world (WTO, 2001) with nearly two-thirds of the country's exports coming from MNCs (UNCTAD, 2002).

The purpose of this paper is four-fold; firstly to examine the FDI liberalisation process in Mexico and to present a descriptive analysis of the performance of FDI; secondly to address some of the adverse consequences of FDI on the Mexican economy; thirdly to explore the causality relationships between FDI and exports and imports, and finally to conclude with a critical evaluation of the results from the perspective of Mexico's economic development. The effects of FDI can be far-reaching, with evidence that FDI impacts significantly on efficiency, employment, factor prices and trade.¹ In the case of Mexico, various studies have focused on the impact of FDI on labour productivity (Blomström and Persson, 1983; Blomström, 1988), wages (Feenstra and Hanson, 1997), and growth (Ramírez, 2000; Griffiths and Sapsford, 2003). However, despite the rapid growth of both FDI and trade, the effects of FDI on exports and imports have not been extensively explored. There is one recent paper on the causal link between FDI and

¹ See Markusen (1995) for a survey of the literature.

exports (Alguacil *et al.* 2002), but the causality linkage between FDI and imports has not been studied at all.

2. The Liberalisation and Performance of FDI

2.1 FDI liberalisation

Over time, the deregulation of the *Foreign Investment Law* (FIL) has gradually reduced the range of activities reserved for the State or Mexican citizens. In particular, the reforms of 1989 and 1993 attempted to make the FIL compatible with the proposal for NAFTA. Further amendments to the FIL in 1995, 1996, 1998, 1999 and 2000 accelerated the participation of FDI in Mexican economic activity.

From the evolution of the FIL, the most relevant issues must be pointed out. Mexico's first formal statute to regulate, systematise and codify the rules and legal principles on investment was the *Law to Promote Mexican Investment and to Regulate Foreign Investment* of 1973. In this *Law*, foreign investors were required to seek authorisation from the government; FDI was prohibited in services; financial restrictions included limits on the repatriation of capital; and, foreign firms were not allowed to access the national financial market. In 1989, the *Law* had a major relaxation, which was part of a set of market-orientated reforms designed to open the economy to greater foreign participation, specifically from the US. Additionally, "In October 1989, a new framework agreement was signed to start global conversations to facilitate trade and investment" (Aspe, 1993)² —*Entendimiento para Facilitar el Comercio y la Inversión*. Particularly, in the case of the car industry, under the pressure of MNCs, the domestic content rules were relaxed in 1989 by means of two decrees —*Decreto para el Fomento del Sector*

² Aspe was the Minister of Finance from 1988 to 1994. He mentions that in 1987 Mexico and the US signed a framework agreement to set up principles and procedures for resolving controversies on trade and investment.

Automotriz and *Decreto para el Fomento y Modernización de la Industria Manufacturera de Vehículos de Autotransporte*.

A new FIL was enacted in December 1993, which derogated the *Law to Promote Mexican Investment and to Regulate Foreign Investment* of 1989. The FIL of 1993 further reduced the number of activities in which foreign participation was forbidden or restricted. It divided restrictions on foreign investment into four categories: (i) activities that are reserved for the Mexican State and in which neither foreign nor Mexican private investment may participate (i.e. minting coins, printing of bank notes, electricity, oil); (ii) activities that are reserved exclusively for Mexican nationals and Mexican companies that exclude foreigners; (iii) activities in which foreign investment may participate up to a prescribed percentage (10 per cent, 25 per cent, 30 per cent or 49 per cent, depending on the activity); and (iv) activities in which foreign participation may exceed 49 per cent with prior approval from the Mexican Foreign Investment Commission —the official institution in charge of promoting foreign investment. Investment in any activity which does not fall within the above categories is not restricted (FIL: *Ley de Inversión Extranjera*, 1993).

The FIL of 1993 included the necessary adjustments to make it compatible with the NAFTA. NAFTA's investment provisions are meant to contribute to a less discriminatory investment environment among its members, but they also reflect the protectionist demands of several powerful industries.³ In essence, NAFTA guarantees favourable conditions for investors within the region “each Party shall accord to investors of another Party treatment no less favourable than that it accords ... to its own investors...” (Article 1102), but NAFTA provides preferences to the US and Canada for

³ See Gestrin and Rugman (1994) for a detailed analysis of NAFTA's investment provisions.

FDI in automobiles (Annex 300 A: Trade and Investment in the Automotive Sector)⁴ and apparel (Annex 300 B: Textile and Apparel Goods).

Let us consider the auto industry to show how the Mexican authorities have modified the regulations in order to facilitate US MNCs entry. The *maquila*⁵ programme, in combination with the Mexican national automobile policy, which had the main aim to adapt the automobile industry to a new strategy based on the liberalisation of the domestic market (Moreno-Brid, 1994), reduced costs in the assembly of labour-intensive auto-parts, which facilitated the implementation of export-oriented plants.⁶ Later, the Mexican government facilitated, by means of NAFTA, the establishment of new corporate strategies of US auto MNCs in Mexico. The Mexican authorities permitted the assembly of “export models” that incorporated higher levels of imported components—70 per cent as compared to 40 per cent for models sold in the national market (Mortimore, 2000). Hence, behind the huge increase of FDI in the Mexican automobile industry, there were the legal terms which hindered integration of this industry with local sectors.

Additionally, Mexico’s trade-investment policies are relatively constrained by the Agreement on Trade-Related Investment Measures (TRIMs), which is one of the

⁴ According to Mortimore (2000) the links between FDI and trade in automobile MNCs operating in Mexico became one of Mexico’s principal means of integration into the international economy.

⁵ The *maquila* programme consists of special tariff preferences; raw materials can be imported in-bond duty free, manufactured, and then re-exported while paying duty only on the value-added in Mexico.

⁶ For instance, in 1998 automobile exports relative to the production of the 4 biggest auto MNCs was 68 per cent (see Table 1).

Table 1
Structure and Export Propensities of the Mexican Automobile Industry, 1998 (Thousands of units and percentage)

Vehicle Assembler	Production	%	Exports	%	Exports/ Production (%)
Chrysler	360.6	25.3	301.1	31.0	83.5
Ford	213.7	15.0	174.8	18.0	81.8
General Motors	314.2	22.0	198.8	20.5	63.3
Volkswagen and Nissan	539.5	37.8	297.3	30.6	55.1
Total	1,427.6	100	972.0	100	68.1

Source: Mortimore (2000).

agreements of the 1986–94 Uruguay Round negotiations, signed at the Marrakesh ministerial meeting in April 1994, the results of which came into force in January 1995 (WTO, 1994a). This agreement is based on the assumption that certain investment measures restrict and distort trade. Therefore, it prohibits countries from using trade-related investment measures (e.g. local content requirements, trade balancing requirements, etc.), which are considered inconsistent with the provisions of GATT 1994 on national treatment (Article III) and those forbidding the use of quantitative restrictions (Article XI) (WTO, 1994b). The phasing-out period for developed countries was two years from 1 January 1995; developing countries had a transition period of five years; and the least developed countries had seven years.

Continuing with the liberalisation process of the FIL, it is relevant to mention that one of the most extensive amendments to the FIL was realised in January 1999, when the majority of financial services were liberalised. The government allowed 100 per cent participation of FDI in the financial sector, particularly in banks; and, railroad services and gas distribution were entirely deregulated.

In addition to the changes in the FIL, it is important to highlight that in 1994 the Mexican government changed the definition of FDI data, with the intention of making it consistent with that of the IMF and OECD. Before 1994, FDI included notified and authorised FDI to the National Foreign Investment Registry Office, which did not necessarily coincide with actual or realised investment (i.e. firms could have asked for authorisation of FDI without actually investing). Since 1994, FDI refers to realised new investment which includes: 1) amounts reported to the National Foreign Investment Registry Office; 2) provision of capital for new companies; 3) foreign investor trust-funds; 4) transfers of stock from nationals to foreigners, 5) imports of capital assets (fixed assets) by *maquila* firms; 6) ploughing back of profits by FDI firms; and, 7) the amounts involved in accounts between companies (debts and loans between parent companies).

Prior to 1994, FDI data were only available for the first three categories (INEGI and Secretaría de Economía).⁷

The modifications and amendments to the legal investment framework in Mexico were orientated towards trade and investment integration mainly between the US and Mexico (Blomström and Kokko, 1997). Therefore, the argument of Graham and Wada (2000) that the reforms of the FIL were not related to NAFTA is groundless.

Beyond the amendments to the FIL, and the preference to North American investment given by the NAFTA agreement, the Mexican government has subscribed to several bilateral foreign investment agreements, mainly with European or Latin American countries, in order to promote foreign investment and to diversify the origin of FDI. Mexico has bilateral investment treaties with Spain (1997), Switzerland (1998), Argentina (1998), the Netherlands (2000), Denmark (2000), France (2001), Finland (2001), and Portugal (2001); and has unfinished agreements with: Austria, Belgium and Luxemburg, Cuba, Germany, Greece, Italy, South Korea, Sweden, and Uruguay (Secretaría de Economía). In spite of these numerous agreements the main source of FDI inflows continues to be the US.

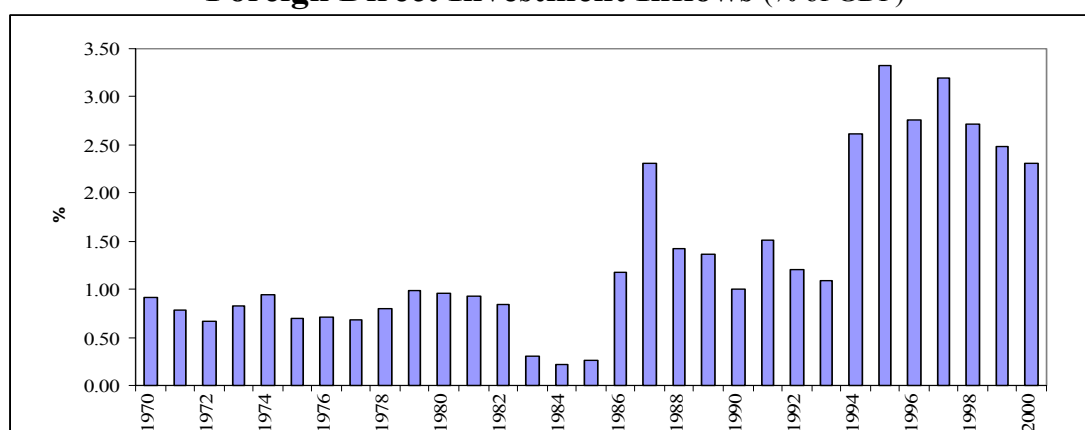
2.2 FDI performance

The main motive for foreign investors to locate operations in Mexico is to take advantage of Mexico's location in order to serve the whole North American market rather than to serve the domestic market by itself (Agosin and Prieto, 1993; Twomey, 1996; Graham and Wada, 2000; Sargent and Matthews, 2001). The cheap labour in Mexico is another determinant that attracts US FDI flows to the country (Cimoli and Correa, 2002; Love and Lage-Hidalgo, 2000). These factors explain why Mexico is among the world's largest recipients of FDI inflows and that, on average, more than 60 per cent of Mexico's FDI inflows come from the US.

⁷ In statistical work, it is important to take account of this change of definition of FDI in 1994.

The previous analysis of FDI liberalisation facilitates a better understanding of the FDI figures, especially those from the 1990s. Over recent decades, the performance of FDI in Mexico has changed markedly (see Graph 1). During the 1970s, FDI relative to GDP was more or less stable, averaging 0.80 per cent of GDP, but it has increased over time, especially during the 1990s. FDI inflows as a percentage of GDP rose from 0.94 per cent in 1980 to 1.1 per cent in 1993; and from 1994 to 2000 it rose, on average, 2.7 percentage points; however, the high post-1994 figures cannot all be attributed to NAFTA because of the change in the definition of FDI in 1994.⁸ This significant detail has not been identified by previous studies which have analysed FDI in Mexico and presented econometric results (e.g. Cuadros *et al.*, 2001; Alguacil *et al.*, 2002; Griffiths and Sapsford, 2003).

Graph 1
Foreign Direct Investment Inflows (% of GDP)

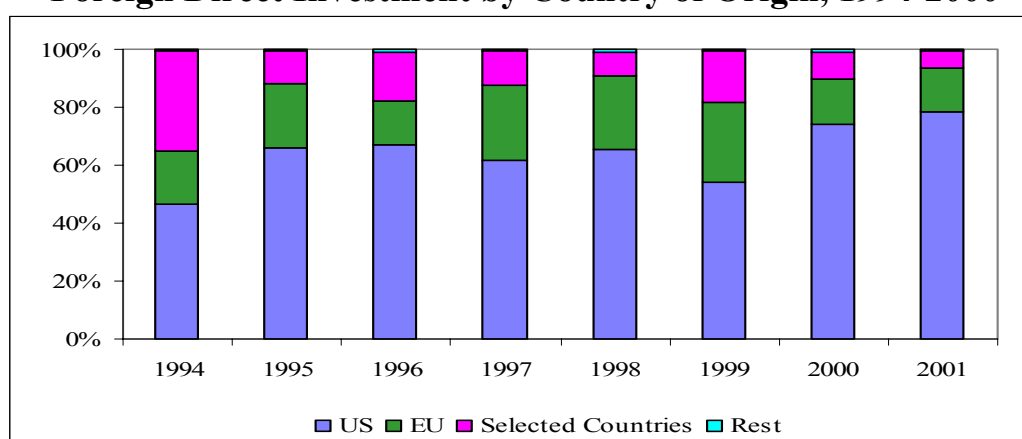


Note: There are three components in FDI: equity capital, reinvested earnings and intra-company loans.
Source: World Development Indicators (2002).

⁸ FDI inflows to Mexico were compared from five different data sources: two local (Secretaria de Economía and INEGI) and three international (UNCTAD, World Bank and IMF). The Mexican sources mention that due to the modification in the components included in the FDI definition, no comparison before and after 1994 is accurate.

The US has always been the main source of FDI in Mexico, followed by countries of the European Union (EU). Two main changes have taken place since NAFTA was initiated. First, the US share has increased from 46 per cent in 1994 to 78 per cent in 2001. Second, the share of some EU countries, such as the United Kingdom and Germany, has fallen; while the share of others, such as Spain and Holland, has increased during this period. The FDI participation of other countries (i.e. Japan, South Korea, Switzerland, etc.) has drastically decreased (see Graph 2). These tendencies show the interest of US firms in investing in Mexico, given the context provided by NAFTA, the geographical situation, low labour costs and less strict environmental regulations.

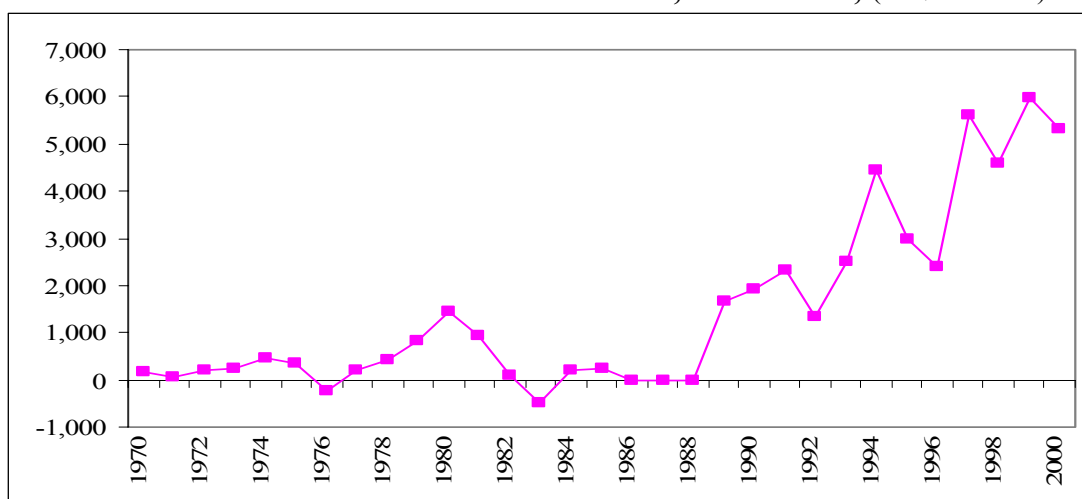
Graph 2
Foreign Direct Investment by Country of Origin, 1994-2000



Source: Secretaría de Economía, Mexico.

Graph 3 shows in particular the performance of US investment in Mexico from 1970 to 2000. Notice that US FDI in Mexico during the 1970s and 1980s had a steady performance, although with a few peaks; however, there is a clear rising trend post-1988, when presumably US investors responded quite strongly to the first round of reforms. Thus, the timing and changes in the US investment position suggest that the important stimulus to the upswing of US investment in Mexico must have been the comprehensive trade and financial liberalisation that commenced in the mid-1980s, which continued in the late-1980s and eventually culminated with the NAFTA.

Graph 3^a
US Direct Investment Flows to Mexico, 1970-2000, (US\$ millions)



Note: ^a Capital flows to Mexico are defined as equities, inter-company debt, and reinvested earnings. FDI with a negative sign suggests that at least one of the three components is negative and it is not compensated by the positive components.

Source: US Department of Commerce.

Looking at the sectoral destination of FDI flows into Mexico (see Table 2), it can be seen that they have been primarily channelled to the manufacturing sector (except in 2001). From 1994 to 2001 this sector accounted for 67.3 per cent of total FDI inflows.

Table 2
Foreign Direct Investment by Sectors, 1994-2000, (Millions of US\$)

Sectors	1994	1995	1996	1997	1998	1999	2000	2001	1994-2001	
									Value	Share (%)
Total	10,640	8,325	7,702	12,112	7,986	12,767	15,318	25,221	74,850	100.0
Agriculture	11	11	32	10	29	81	88	5	266	0.4
Extractive	98	79	84	130	42	127	181	33	775	1.0
Manufacturing	6,187	4,849	4,706	7,281	5,022	8,732	8,824	4,791	50,392	67.3
Electricity and Water	15	2	1	5	27	140	117	248	554	0.7
Construction	259	26	26	110	83	129	168	72	874	1.2
Commerce	1,251	1,008	725	1,899	937	1,156	2,165	1,533	10,675	14.3
Transport and Communication	719	876	428	686	374	256	2,458	2,864	3,745	5.0
Financial Services	941	1,066	1,214	1,087	708	714	4,586	13,571	23,889	31.9
Other Services	1,158	407	486	903	763	1,432	1,647	2,104	8,901	11.9

Source: Secretaría de Economía, Mexico.

Recently, the deregulation of services in transport and telecommunications has attracted huge FDI inflows. For instance, in 1999 this sector received only 256 millions of

US\$, and the following year it registered 2,458 millions of US\$.⁹ The financial services sector has also expanded significantly. In 2001, as a result of the liberalisation of the financial sector in 1999, Mexico received the largest foreign investment ever made resulting from the acquisition of *Banco Nacional de México* (BANAMEX was the biggest commercial bank in Mexico) by Citicorp. This investment represented more than 50 per cent of total FDI in 2001 (UNCTAD, 2002).¹⁰

Table 3 shows the average participation of FDI in the manufacturing sub-sectors from 1994 to 2001. The Machinery and Equipment sub-sector received the highest share of FDI—48 per cent (automobiles and auto-parts are included in this sub-sector);¹¹ followed by the Food Products, Beverages and Tobacco sub-sector with 19 per cent.¹² Table 3 also shows the number of firms in the manufacturing sub-sectors which received FDI and the percentage that it represents. The majority of the firms with FDI are in three sub-sectors: Machinery and Equipment (2,818 firms), Chemical Substances (1,169 firms), and Textiles and Leather Products (1,034 firms). In spite of the relatively large number of firms in the Textile and Leather Products sub-sector, accounting for 14.4 per cent of all the firms with FDI in the Manufacturing sector, it only accounts for 3.8 per cent of FDI inflows, reflecting the relatively small size of firms.

⁹Also, the increase of FDI includes major privatisations, such as TELMEX (*Teléfonos de México*).

¹⁰ Since 1994, the amendments to the FIL have attracted investments by a large number of financial groups including Citicorp (Citibank) of the US; Bank Bilbao-Vizcaya and Bank Santander of Spain; and, Bank of Montreal of Canada. In spite of new investments and their consequent benefits (i.e. modernisation of the banking sector), the availability of credit is still very limited due to the restrictive monetary policy, which is focused on controlling inflation.

¹¹ The automobile and automotive components sectors account for between one-third and one-half of intra-regional trade within NAFTA (UNCTAD, 2003).

Table 3
Participation of FDI in the Manufacturing Sub-Sectors, 1994-2001

Sector	FDI ^a (%)	Firms with FDI	
		Number	%
Food Products, Beverages and Tobacco	18.9	577	8.0
Textiles and Leather Products	3.8	1,034	14.4
Wood Products	0.4	214	3.0
Paper Products, Printing and Publishing	2.0	393	5.5
Chemical Substances	12.9	1,169	16.3
Non-Metallic Products	1.3	192	2.7
Basic Metals	5.1	157	2.2
Machinery and Equipment	47.9	2,818	39.3
Other Manufactures	7.8	625	8.7

Note: ^a Original data in US\$.

Source: Own calculations based on data from Secretaría de Economía, Mexico.

It is relevant to mention the contribution that FDI makes to Mexican exports. For instance, in 2000 the top 35 MNCs, most of them from the US, accounted for 30 per cent of total Mexican exports (UNCTAD, 2002). Further —and perhaps a more relevant result derived from FDI inflows— from 1995 to 2000 Mexico occupied top ranking positions in the ‘top 20 export winners list’, in terms of increased market share: it ranked second in medium-technology manufactures, third in low-technology manufactures, and sixth in high-technology manufactures (UNCTAD, 2002).

3. Backwardness associated with FDI

In general, the effects of FDI inflows might be expected to be positive for the Mexican economy because they have a direct impact on the productive sector. However, a more detailed analysis of the nature of the FDI inflows leads to a more cautious assessment. At least four caveats can be made. First, linkages between FDI and local industry are rather frail. It has been well documented that MNCs allocated in the manufacturing sector are poorly connected with domestic industry (Arestis and Paliginis, 1996; Dussel, 2000; Ruiz-Napoles, 2000; Mattár *et al.*, 2002; Mortimore, 2000;

¹² Mattár *et al.* (2002) mention that FDI has a strong presence in the Food, Beverages and Tobacco sub-sector, as a result of purchases of national enterprises and from added investment by MNCs already established in Mexico (i.e. PepsiCo, Nestlé and Coca-Cola).

UNCTAD, 2002). Mattár *et al.* (2002) argue that FDI has not led to an increase in fixed capital formation in the country as a whole; instead it has led to a division between an export-oriented sector linked to FDI on the one hand, and smaller indigenous firms focusing on domestic demand on the other. As reported by Mortimore (2000), FDI in Mexico has resulted in an export platform, possessing little contact with the domestic economy, truncating and limiting the domestic industrialisation process. Dussel (2000) argues that FDI has increased the *polarisation* of Mexico's economy, reflected in regional differences in economic performance of the economy. The northern states absorb FDI because export activities are located in that area, while the south of the country lags behind the performance of the rest of the country.

Secondly, domestic industry has been weakened by imported inputs and competition from FDI. Mattár *et al.* (2002) conclude that the high import content of Mexican exports has increased due to the displacement and close-down of local firms that produced for the domestic and foreign markets but were unable to compete with MNC entry.¹³ In relation to the high import content, the dominance of the *maquila* industry in export activities is a cause for concern. For instance, 54 per cent of manufacturing exports are produced in the *maquila* industry which uses only 2 per cent of local inputs. This type of exports hardly provides any net foreign exchange to finance other imports necessary for Mexico's technological progress and growth.

¹³ Cimoli and Correa (2002) describe very well what has been happening by saying that “[m]any production activities have been seriously disrupted by trade liberalisation and by the massive inflow of imports, ..., which have rapidly proceeded toward the de-verticalisation of their production organisation technologies, substituting domestically-produced intermediate inputs by cheaper (and sometimes better), imported ones, reorganising themselves more as assembly-type operations based on a much higher unit import content. ...The share of large firms —either local subsidiaries of [MNCs] or domestically-owned conglomerates—in GDP has significantly increased during the adjustment process, while countless [small and medium enterprises] have been forced to exit the market altogether.”

Third, the agreements concerning FDI have effectively removed the ability of the Mexican State to intervene and protect indigenous industry (Blecker, 1996; Arestis and Paliginis, 1996). Because of trade and financial liberalisation, embodied in NAFTA, Mexico is unable to apply strategic industrial and trade policies for a successful outward-oriented development strategy that would guarantee a balance between the growth of exports and imports without constraining output growth in the long-run. There is very strong evidence that Mexico's growth is balance of payments constrained (Moreno-Brid, 1998, 1999, 2001; Ocegueda, 2000), and that this constraint has deepened as a result of trade liberalisation (Pacheco-López and Thirlwall, 2004). Although NAFTA has worked as a catalyst for attracting FDI and fostering exports (Lustig, 1997), it has also generated serious difficulties for Mexico's economic development.

Fourth, it should also be remembered that FDI inflows associated with mergers, or any other sort of acquisitions of already existing assets, will only have a limited impact, if any, on the productive system or the trade sector (exports). This type of FDI would be a one-off foreign exchange contribution to the economy. For example, the acquisition of BANAMEX by Citicorp in 2001 accounted for 50 percent of FDI inflows during that year, but did not have a significant impact either on exports or output growth.

4. Causality relationships between FDI, Exports and Imports

Now we focus our attention on the causal relationship between FDI and exports, and FDI and imports, which could run in either direction. With regard to exports, initially, firms trade in the foreign market, and after learning more about the economic, social, political and ruling conditions of their trading partners they may establish a subsidiary in the host country (Liu *et al.*, 2001) or they may embark on joint ventures with local enterprises. This implies FDI inflows, and, after some period, MNCs may start to export (UNCTAD, 1996; Rob and Vettas, 2003). The role of MNCs in expanding exports in host

countries derives from the additional capital, new technology and better management and marketing strategies that they can bring with them (UNCTAD, 2002). Thus, there may be a bi-directional causal link: exports stimulate FDI and FDI promotes exports.

Likewise, there are two possible bi-directional links between FDI and imports. First, if imports are evidence that a market exists for a commodity, FDI might be attracted to the host country to produce that product locally. In other words, a rise in imports in the host country justifies investment and production by MNCs; thus, imports stimulate FDI inflows. Second, as soon as MNCs establish in the host country, they import certain types of supplies (basic components and intermediate goods produced by the headquarters) to satisfy the quality standards required by the international market; therefore, FDI inflows increase the demand for imports.

3.1 Methodology

We use the Granger causality methodology to test for the relationship between FDI inflows and exports, and FDI inflows and imports. In a bivariate framework, the variable x is said to cause the variable y in the Granger sense if the forecast for y improves when lagged variables for x are taken into account in the equation, *ceteris paribus* (Charemza and Deadman, 1997). In other words, the standard Granger causality procedure is based on past changes in one variable explaining actual changes in another variable.

Testing causality, in the Granger sense, involves using an F-test (or Wald test). The appropriate formulation of a Granger-type test of causality (which must be applied to stationary series) is:

$$X_t = \beta_0 + \beta_1 X_{t-1} + \dots + \beta_j X_{t-j} + \theta_1 FDI_{t-1} + \dots + \theta_j FDI_{t-j} + \mu_t \quad (1)$$

$$FDI_t = \delta_0 + \delta_1 FDI_{t-1} + \dots + \delta_j FDI_{t-j} + \gamma_1 X_{t-1} + \dots + \gamma_j X_{t-j} + \nu_t \quad (2)$$

$$M_t = \varphi_0 + \varphi_1 M_{t-1} + \dots + \varphi_j M_{t-j} + \alpha_1 FDI_{t-1} + \dots + \alpha_j FDI_{t-j} + \sigma_t \quad (3)$$

$$FDI_t = \psi_0 + \psi_1 FDI_{t-1} + \dots + \psi_j FDI_{t-j} + \xi_1 M_{t-1} + \dots + \xi_j M_{t-j} + \tau_t \quad (4)$$

$$j = 1, 2, \dots, N$$

where X is exports, FDI is foreign direct investment inflows, M is imports; μ_t , ν_t , σ_t , and τ_t are error terms with zero mean. In equation (1), the null hypothesis ‘ FDI does not Granger cause X ’ ($\theta_1 = \dots = \theta_j = 0$) is tested using a standard F-test (Wald test). It is rejected if the θ s are jointly significantly different from zero. Similarly, in equation (2) the null hypothesis ‘ X does not Granger cause FDI ’ ($\gamma_1 = \dots = \gamma_j = 0$) is rejected if the γ s are jointly significantly different from zero. The same procedure applies for equations (3) and (4).

Considering the ARDL model developed by Pesaran and Shin (1997), an error correction model for each of the four equations is derived:

$$\Delta y_t = \lambda_0 + \sum_{i=1}^r \beta_{yi} \Delta y_{t-i} + \sum_{i=0}^s \beta_{xi} \Delta x_{t-i} + \pi \rho_{t-1} + \varepsilon_t \quad (5)$$

where ρ_{t-1} is the lagged error correction term obtained from the residuals in each equation (equations 1 to 4) and ε_t is the random disturbance term. From equation (5) the null hypothesis that ‘ x does not Granger cause y ’ would be rejected if the lagged coefficients of the β_{xi} ’s are jointly significantly different from zero, using a standard F-test (Wald test). In case of cointegration between x and y , changes in one variable towards its long run equilibrium value may be a result of variations in the other variable. As well, the causality between x and y could be identified if the error term (ρ_{t-1}) is statistically significant. Notice that the Granger test results only indicate that the changes in x must come before the changes in y (Murkherjee *et al.*, 1998). A statistically significant coefficient on ρ_{t-1} (π) shows how the short run coefficients of the endogenous variable adjust towards the long run equilibrium in reaction to changes in the exogenous variables.

In order to obtain consistent results derived from the Granger causality procedure three steps are followed. The first step is to test the order of integration of the variables. The second step is to test for cointegration using the Johansen maximum likelihood approach. Finally, the third step is to carry out the Granger causality tests.

3.2 Empirical Analysis

The tests are carried out on annual data from 1970 to 2000. The data source is the World Development Indicators (2002). All variables are in real terms and are expressed in US dollars. Before we apply the Granger causality tests outlined in the previous section, it is necessary to determine the order of integration of the variables. The ADF test is used for this purpose. Table 4 (part A) reports the ADF (one lag) test for the log levels of the variables and first differences under the assumption of a constant and (part B) under the assumption of a constant and deterministic time trend. The ADF test results for unit roots confirm that all variables are integrated of order one in levels but integrated of order zero in first differences at the 5 per cent level of significance.

Table 4
Unit Root Test for Stationarity

Variables	PART A with Constant Only, sample period 1970-2000		PART B with Constant and Time Trend, sample period 1970-2000	
	Log Level ¹	Differences ¹	Log Level ²	Differences ²
X	-0.69	-13.33*	-3.77*	-14.72*
M	-0.34	-4.20*	-2.14	-4.35*
FDI	-1.65	-4.08*	-3.32	-4.00*

Notes: ¹The critical value for rejection of hypothesis of a unit root is -2.96. ²The critical value for rejection of hypothesis of a unit root is -3.57 for M and FDI, and -3.59 for X. The asterisk (*) denotes significance at the 5 per cent level.

Subsequently, on the basis of the above unit-root tests, a cointegration test is performed. The Johansen Full Information Maximum Likelihood (ML) method is a powerful cointegration test to check for the number of cointegrating vectors, particularly when a bivariate model is considered. Table 5 shows the Johansen's cointegration test results.

Table 5
Johansen's Cointegration Test Statistics
a) Variables in Cointegrating Vector: LFDI -LX

		Trace Test			
Null Hypothesis	Alternative Hypothesis	VAR =4	VAR =3	VAR =2	VAR =1
$r=0^a$	$r \geq 1$	40.44	61.92	11.58	9.66
$r \leq 1^b$	$r \geq 2$	4.41	5.94	3.09	2.22
		Maximum eigenvalue test			
$r=0^c$	$r \geq 1$	36.02	55.98	8.48	7.43
$r \leq 1^d$	$r \geq 2$	4.41	5.94	3.09	2.22

b) Variables in Cointegrating Vector: LFDI -LM

		Trace Test			
Null Hypothesis	Alternative Hypothesis	VAR =4	VAR =3	VAR =2	VAR =1
$r=0^a$	$r \geq 1$	23.28	25.20	23.18	13.20
$r \leq 1^b$	$r \geq 2$	4.83	3.52	2.58	4.37
		Maximum eigenvalue test			
$r=0^c$	$r \geq 1$	18.44	21.68	20.60	8.82
$r \leq 1^d$	$r \geq 2$	4.83	3.52	2.58	4.37

Notes: ^a The critical value at 5 % and 10 % is 21.18 and 17.88, respectively. ^b The critical value at 5% and 10% is 9.16 and 7.53, respectively. ^c The critical value at 5% and 10% is 15.87 and 13.81, respectively. ^d The critical value at 5% and 10% us 9.16 and 7.53, respectively.

In panel a), it is observed that when three and four lags are used in the procedure, the null hypothesis that LFDI and LX are not cointegrated ($r = 0$) is rejected using either the maximum eigenvalue test or the trace test at the 5 per cent level of significance. In other words, it indicates that there exists a unique cointegration vector among the variables involved. Similarly, for panel b) there is cointegration between LFDI and LM, when four, three and two lags are considered. Granger (1988) shows that if two variables are cointegrated, there should be a causal relationship between them in at least one direction.

Since the existence of cointegration between the variables is confirmed, the next step is to test for the causal relationships between FDI inflows, exports and imports. The literature offers different statistical methods to determine the optimal lags in Granger causality tests. The Schwarz Bayesian Criterion (SBC) and the Akaike Information Criterion (AIC) were used to determine the optimal lag-lengths in the ARDL and error correction models. Table 6 shows the results, which point to some patterns for the Granger causal links between FDI inflows, exports and imports in Mexico.

Table 6
Granger Causality Tests for FDI, Exports and Imports
based on Error Correction Models, 1970-2000

Regression	Order of lags in ECM	Wald test	Error Term	Causality
1) Δ LFDI on Δ LX ^a	(2,0)	9.85*	-0.53*	X ↔ FDI
Δ LX on Δ LFDI	(1,1)	8.93*	-0.04**	
2) Δ LFDI on Δ LM ^a	(3,0)	34.00*	-1.18*	M ↔ FDI
Δ LM on Δ LFDI	(4,2)	17.24*	-0.30**	

Notes: ^a A shift dummy, *d94* (which takes the value of 0 prior to 1994, and 1 afterwards), was included in the ARDL model. The asterisk (*) and double asterisk (**) denote significance at the 5 and 10 per cent level, respectively.

From the first set of regressions there is evidence of bi-directional Granger causality between exports and FDI, either considering the Wald test or the error term. This is an interesting result, which is supported by the theory and previous descriptive analysis, because it suggests that the performance of exports stimulates more FDI inflows to the country, and also FDI inflows encourage exports. Our results are consistent with those found by Alguacil *et al.* (2002). The second set of results support a bi-directional causality relationship between FDI and imports.

Two comments on these results may be made. First, as discussed in the literature, the Mexican government has followed the export-led growth model as a development strategy (Thornton, 1996; Abdunnasser and Manuchehr, 2000; Balassa, 1983; Alguacil *et al.*, 2002), where exports are promoted and stimulated by FDI. However, although it is true that there has been some upgrading of the type of Mexican exports, by means of MNCs' entry, it has not been enough to raise Mexico's sustainable output growth rate. For instance, average GDP growth in the pre-FDI liberalisation period 1970-1993 was over 4.3 per cent per annum compared to under 3.3 per cent per annum since 1994. Second, FDI has a close relationship with imports. Simultaneously as FDI has increased, the import content has intensified. As mentioned before, imports are demanded mainly to provide inputs for domestic and export products, and to incorporate technology to foster economic development. Thus, the orientation and allocation of FDI plays a major role in

the determination of Mexico's trade balance and economic growth (Pacheco-López and Thirlwall, 2004).

5. Conclusion

This paper has tried to counterbalance the euphoria relating to FDI inflows into Mexico. The Mexican experience shows that the modifications in the legal framework that regulated FDI, which started in 1989, were orientated towards the facilitation of FDI inflows into the country. These reforms were deepened by NAFTA. The investment provisions of NAFTA and other concessions from the Mexican authorities to foreign investors show that MNCs greatly benefited, as they have gained larger shares of the international and domestic market by displacing indigenous firms. However, the alleged benefits should not be exaggerated. Although it is true that integration of Mexico into the world economy has been fostered by the export orientation of MNC, it should be recognised as well that the country has lost control in the design of its economic development. If Mexico is really committed to embarking on a process of stable long run economic growth it is imperative for the government to work towards the integration of the domestic industry and the export orientated sector; where the efforts should be devoted to the strengthening of local industries.

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