The Impact of Trade Liberalisation on the Trade Balance, the Balance of Payments and Economic Growth: the Case of Mexico

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EUROPEAN TRADE STUDY GROUP
FIFTH ANNUAL CONFERENCE

11-13 September 2003
Madrid, Spain

Abstract

This paper examines the impact of trade liberalisation on the trade balance and balance of payments in Mexico. Two events are identified as being important in this regard. The first one is when trade liberalisation started in a serious way in 1985 and Mexico became a member of GATT in 1986. The second event is related to facts involved in Mexico's accession to NAFTA in 1994. Complete trade balance and balance of payments functions, starting from their simple expression, are specified. The models are then extended to include liberalisation indicators, defined as shift dummy variables. The econometric evidence, by applying time-series analysis, shows that the trade reforms launched during the mid-1980s worsened the position of the trade balance by between 14 and 18 percentage points. Regarding the effects of trade liberalisation related to NAFTA on the trade balance, a negative impact is shown during the immediate two years after NAFTA came out. The effects of liberalisation on the balance of payments are not significant. Subsequently, the empirical analysis investigates whether the changing trade performance of Mexico has affected its long run economic growth rate consistent with balance of payments equilibrium. Results indicate that the increase in the income elasticity of demand for imports, which has not been compensated by a higher rate of growth of exports, has contributed to the slowdown of Mexico's long run equilibrium growth rate. The findings have important policy implications for the credit-worthiness of the country, its ability to borrow, and the sustainability of growth.

JEL classification: F13, F14, F43, C22, O24

Keywords: Trade balance, balance of payments, trade liberalisation, NAFTA, time series analysis, Mexico.

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1. Introduction

The liberalisation of trade is strongly advocated as the means through which economies can accelerate their economic development. The prevailing opinion in trade-policy spheres is that expanded trade leads to prosperity. Thus, the impact of trade liberalisation on economic performance has been one of the topical issues of trade and development economics. During the mid-1980s Mexico was induced to adopt trade reforms as a central lever of the free-market strategy in combination with structural adjustment policies imposed by the International Monetary Fund, the World Bank and other multilateral institutions (Edwards, 1993; Rajapatirana, 1996; Skott and Larudee, 1998). As a consequence of the high internal and external debt in 1982 and the crisis in the international oil market, the country was largely excluded from international financial markets. It accepted almost any conditions from the international institutions in order to obtain financial assistance. The new development strategy involved diverse actions: the budget deficit was cut dramatically; price controls and subsidies were removed; the size of the public sector was greatly reduced through wide-ranging privatisation; foreign investment was encouraged by legislative reforms; and monetary

* I would like to thank Professor A.P. Thirlwall for helpful comments.

conservatism was combined with prices and incomes policies to control inflation. In fact, during 1985 the main trade reforms started and trade liberalisation[15] was institutionalised.
In 1986, Mexico joined the General Agreement on Tariffs and Trade (GATT). The following year, trade liberalisation was accelerated beyond the requirements of the GATT. This was a key component to halt the increase in prices, based on the assumption that competition from imports would put a ceiling on inflation for traded goods (Dornbusch and Werner, 1994; OECD, 1996). During the 1990s, with the negotiations of the North American Free Trade Agreement (NAFTA), the economy became very much more open to foreign trade and capital flows than previously.

This paper focuses on the impact of trade liberalisation on the balance of trade and the balance of payments of Mexico. To date, there has been very little published research on this topic. There have been a lot of studies of the effects of liberalisation on export performance and economic growth, but the monetary consequences of trade reforms have been ignored. This is an important issue because if liberalisation affects the balance of payments adversely, it has implications for the credit-worthiness of the country, its ability to borrow, and the sustainability of growth. This chapter also examines, therefore, whether the changing trade performance of Mexico has affected its long run economic growth rate consistent with balance of payments equilibrium.

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[15] *Cf.* Weiss (1992), Krueger (1998) and Greenaway *et al*. (1998) for different concepts of trade liberalisation.

Theoretically, the effects of trade reforms (meaning any measure taken to reduce export restrictions and import controls, considering tariff and non-tariff barriers and exchange rate distortions) on the trade balance and the current account of the balance of payments are *a priori* undetermined; therefore, it is entirely an empirical issue (Ostry and Rose, 1992).[16] Recent cross-section/panel studies in this field include UNCTAD (1999), Parikh (2002), and Santos-Paulino and Thirlwall (2002). All these studies find that trade liberalisation deteriorates the balance of trade and the balance of payments controlling for other factors. For instance, referring to the most recent and complete study, Santos-Paulino and Thirlwall (2002), considering a group of twenty-two developing countries for the period 1972-1997, found that trade liberalisation has worsened the trade balance by over one per cent of GDP and it has deteriorated the current account of the balance of payments by approximately 0.5 per cent of GDP on average. They found that the effects of liberalisation on the trade balance and current account of the balance of payments have been roughly the same across the regions of Africa, Latin America, East Asia and South Asia. There have been individual case studies for some Latin American countries (e.g. Khan and Zahler, 1985), but not for Mexico.

In Mexico, as in many other Latin American countries, the drastic reductions in trade restrictions went much further, in terms of speed and intensity, than the World Bank ever envisaged (Edwards, 1997). After 1985, when trade liberalisation was initiated in Mexico, the country experienced two balance of payments crises, one in 1986 and the other in 1994-95.

[16] Also, the effect of tariff changes on the level of output is ambiguous. The authors claim that the effect depends on the timing and expected duration of the tariff change, on the performance of real wages and exchange rates, on the values of several elasticities, as well as on institutional factors such as the degree of capital mobility. In other words, it depends on the characteristics of a specific economy.

Although each one had its particular causes, both crises originated in inappropriate macroeconomic policies —excessive government deficits and lax monetary policies— which resulted in vulnerable positions of the current and capital accounts[17] on the balance of payments; and both were preceded by trade reforms.

This paper is organised as follows. Section 2 gives a descriptive analysis, comparing the performance of the trade balance and the current account of the balance of payments before and after trade reforms. A distinction is made between the total trade balance and the non-oil trade balance, as well as the total current account and the non-oil current account of the balance of payments. Moreover, a succinct description of the trade balance by sectors and manufacturing sub-sectors is also presented. Section 3 outlines the model and describes the econometric techniques to be used in the following section. Section 4 measures the impact of trade reforms on the trade balance and current account of the balance of payments. Section 5 spells out the relation between the current account of the balance of payments and economic growth using a balance-of-payments-constrained growth model. In this section, we compare our results with those given by previous studies (Moreno-Brid; 1998, 2001), and the validity of the model is tested by assessing how close the estimated growth rate approximates the actual growth rate. Section 6 concludes.

2. Descriptive Analysis

2.1 Aggregate Analysis

[17] On the capital account liberalisation issue, see for example Singh (2002).

During the 1960s and early 1970s the agricultural sector was the main provider of foreign exchange. This sector financed imports required for industrialisation of the country (Fuji, 2000). When the trade surplus of the agricultural sector was insufficient to compensate for the trade deficit of the manufacturing sector, the government became more dependent on foreign investment. For a short time, the oil boom alleviated the constraint of the balance of payments. However, the foreign exchange obtained from oil exports was insufficient to sustain trade balance equilibrium. In this sense, the Mexican economy has been subject to the effects of frequent balance of payments crises. Before trade reforms were launched during the mid-1980s, import tariffs and non-tariff barriers were used in order to ameliorate the deficits on the trade balance. In fact, the performance of the trade balance relative to GDP (TB/GDP) has been very volatile. Table 1 shows the TB/GDP ratio from 1979 to 2000.

Table 1
Total Trade Balance, Non-Oil Trade Balance, Trade in Services, Total Current Account and Non-Oil Current Account Relative to GDP (%)

Year	TB/GDP	Non-Oil TB/GDP	Trade in Services/GDP	Current Account/GDP[a]	Non-Oil Current Account/ GDP
1979	-1.59	-5.34	-	-	-
1980	-1.37	-6.04	-3.67	-4.67	-9.71
1981	-1.27	-6.02	-4.37	-5.30	-10.39
1982	3.59	-4.81	-7.13	-3.01	-11.95
1983	9.47	-1.28	-6.33	3.94	-7.61
1984	7.51	-1.95	-5.90	2.38	-7.85
1985	3.24	-2.64	-3.79	0.34	-6.43
1986	3.88	-0.99	-6.16	-1.06	-7.15
1987	6.26	0.11	-4.61	3.02	-4.50
1988	1.42	-2.24	-3.95	-1.30	-6.19
1989	0.18	-3.35	-3.93	-2.61	-7.28
1990	-0.34	-4.18	-4.01	-2.84	-8.20
1991	-2.01	-3.96	-2.72	-4.66	-6.68
1992	-4.38	-6.67	-3.27	-6.72	-9.94
1993	-3.34	-5.18	-3.36	-5.80	-8.55
1994	-4.39	-6.16	-3.56	-7.05	-9.72
1995	2.48	-0.47	-4.41	-0.55	-4.88
1996	1.97	-1.54	-4.08	-0.75	-5.62
1997	0.16	-2.67	-3.37	-1.91	-6.04
1998	-1.90	-3.61	-3.40	-3.86	-7.02

1999	-1.16	-3.24	-3.07	-2.92	-6.31
2000	-1.39	-4.24	-2.99	-3.16	-7.23

Note: [a] Includes transfers, where remittances from workers are accounted for.
Source: Own calculations based on data from World Development Indicators (2002) and Banco de México.

During the late 1970s and early 1980s, the country had to import most of the equipment required for the oil industry; thus the trade deficit was driven by this type of imports. From 1982 to 1989 there was a trade surplus. During the 1990s, the deficit on the trade balance averaged 1.3 per cent of GDP. Before NAFTA was set up, the trade deficit relative to output increased rapidly from 0.18 per cent in 1989 to 3.3 per cent in 1993; and, in 1994, when NAFTA was implemented, the trade deficit relative to GDP was 4.3 per cent. This fact, among others, caused a severe contraction of GDP in 1995. During 1995, the ratio of the trade balance relative to output registered a surplus, but it did not last for long. After 1998, the deficit on the trade balance relative to GDP increased again.

Table 1 also shows the non-oil trade balance relative to GDP. From 1979 to 2000, each year registers a trade deficit, except in 1987. During this period, the trade deficit averaged 3.4 per cent of GDP. The trade deficits were very high during the first three years of the 1980s: in 1985; from 1989 to 1994, and from 1998 to 2000. It is important to differentiate the total trade balance from the non-oil trade balance because oil exports are not affected by trade reforms —but rather by different domestic and international regulations. Thus, in section 4, for the econometric estimations, we only consider the non-oil trade balance.

As with the non-oil trade balance relative to GDP, there is also a deficit on the trade in services as a share of GDP through all the period (Table 1). Although after 1995 it has a

tendency to decrease, partly as a result of Mexico's GDP slowdown, it is still relatively high compared to the non-oil trade balance. Undoubtedly, deficits on trade in services constrain even more the current account of the balance of payments.

In order to have a better understanding of trade in services it is necessary to mention that officially the liberalisation of trade in services in Mexico started when NAFTA was set up in 1994. The terms of trade in services are established in *Chapter 12: Cross-Border Trade in Services* (refer to NAFTA's text). Beyond NAFTA, the creation of the General Agreement on Trade in Services (GATS) was one of the agreements of the 1986–94 Uruguay Round negotiations, signed at the Marrakesh ministerial meeting in April 1994, whose results came into force in January 1995 (WTO). Mainly, trade liberalisation in services is based on regulatory reforms and its aim is to secure a more transparent and predictable regulatory environment for services across countries. According to Hoekman and Messerlin (1999) services are much more regulation-intensive than goods. Table 2 shows the classification of services considered by GATS.

Table 2
Liberalisation of Trade in Services by GATS

Business Services and Professional Services	**Education Services**
Accountancy services	**Energy Services**
Advertising services	**Environmental Services**
Architectural and engineering services	**Financial Services**
Computer and related services	**Health and Social Services**
Legal services	**Tourism Services**
Communication Services	**Transport Services**
Audiovisual services	Air transport services
Postal and courier, express mail services	Maritime transport services
Telecommunications	Services auxiliary to all modes of transport
Construction and Related Services	**Movement of Persons**
Distribution Services	

Source: WTO. Available at <URL: http://www.wto.org/english/tratop_e/serv_e/top#top> [Accessed 11 February 2003].

Besides NAFTA, other free trade agreements include liberalisation of trade in services, for instance the European Union-Mexico Free Trade Agreement came into force in July 2000.[18]

The last two columns of Table 1 show the total current account and the non-oil current account of the balance of payments relative to GDP. From 1979 to 2000, on average the deficit for the former was 2.3 per cent of GDP and 7.5 per cent for the latter. We focus our attention on two comparisons between these two different variables at the time of liberalisation. First, the position of the current account changed from a surplus of 0.34 per cent of GDP in 1985 to a deficit of 1.06 per cent of GDP in 1986, and then moved again to a surplus of 3.02 per cent in 1987; while, the non-oil current account increased its deficit from 1985 to 1986, and then it diminished from 1986 to 1987. Second, from 1993 to 1994 both accounts increased their deficits.

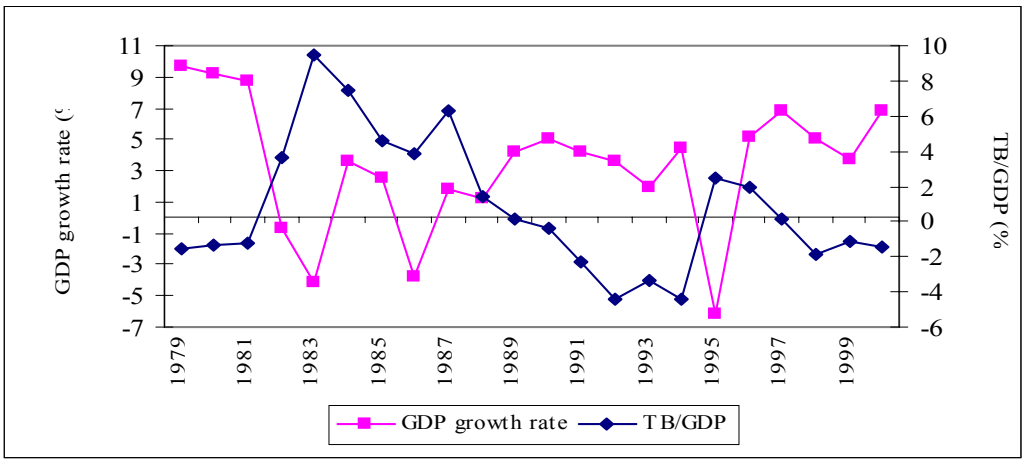
Turning to other relevant aspects, Mexico has achieved relatively high rates of growth, but in combination with trade disequilibria and phases of sharp decline. Thus, the trade balance relative to GDP shows opposite movements in relation to the output growth rate, and this inverse relationship has hardly changed for the last two decades. Every time that GDP growth increases, the trade balance relative to GDP decreases, and *vice versa.* Panel a) in Graph 1

[18] See Ferreira (2001) for the analysis of liberalisation of trade in services in the EU-Mexico Free Trade Agreement. The text of this trade agreement is available at <URL :http://europa.eu.int/comm/trade/bilateral/mexico/fta.htm>.

shows these variables from 1979 to 2000. This conflicting relationship applies as well for the non-oil trade balance relative to GDP and output growth rate, see panel b) in Graph 1.

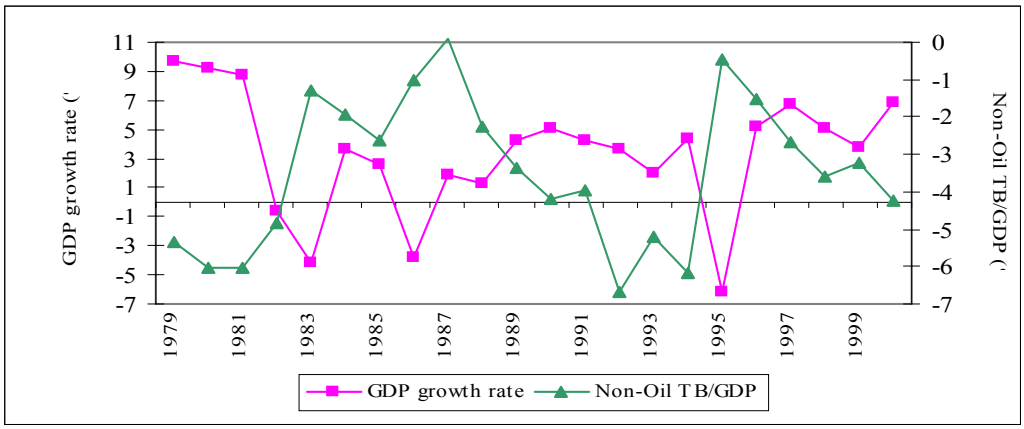
The first negative GDP growth rate was in 1982, and it was accentuated in 1983. A combination of domestic factors (i.e. accelerated domestic demand, high indebtedness of the country, high inflation, high fiscal deficit —17 per cent of GDP— and trade deficits financed by the inflow of short term capital at high interest rates) with international circumstances (i.e. fall in the price of oil, dramatic increases in real interest rates, and scarce availability of credit) caused the so-called debt crisis.[19]

Graph 1
a) GDP Growth and Trade Balance/GDP, 1979-2000



b) GDP Growth and Non-Oil Trade Balance/GDP, 1979-2000

[19] See Aspe (1992), Brailovsky (1992), Lustig (2001), and Villareal (2000).



The second negative growth rate occurred in 1986, when Mexico faced the second crisis of the 1980s. After 1982, the fiscal and monetary policies were adjusted to overcome the debt crisis. The privatisation of public firms was accelerated in order to alleviate the fiscal deficit (Aspe, 1993). However, the public finances were fragile because the public expenditure was relying excessively on oil. In fact, the economy was adversely affected when the price of oil fell from an average of US$25.5 a barrel in 1985 to US$12 in 1986. This, combined with other adverse external conditions, including high real interest rates and lack of international financial credit, resulted in large net resource transfers to the rest of the world. For instance, the high interest rates increased Mexico's debt payments; while the lack of external credit meant that little foreign capital was coming in. This led to devaluation of the real exchange rate in 1986. Despite the devaluation, imports continued to grow faster than exports, and caused a deficit on the non-oil current account of the balance of payments relative to GDP of approximately 7 per cent. The devaluation and higher public sector prices caused other prices in the economy to rise.

The third negative GDP growth rate occurred in 1995 when the GDP fell 6.5 per cent. The strong fall in economic growth was preceded by a high deficit on the current account of the balance of payments relative to GDP because consumption was stimulated by the expansion of domestic credit. In 1994, the deficit on the current account was 7 per cent of GDP (see Table 1). The 1994-95 balance of payments crisis, popularly known as the *Tequila* or *Peso* crisis, could be briefly explained by the private demand expansion, weak banking system, an overvalued exchange rate, and by the vulnerability generated by the massive portfolio capital inflows, especially from 1990 to 1993. Ros and Lustig (2000) argue that the critical problems resulted from the fact that the liberalisation of trade and the opening of the domestic bond and stock markets took place in the midst of a persistent real overvaluation of the peso and a high volatility of capital flows. Also, as the rate of inflation was forced to adjust to similar levels of Mexico's trade partners (Canada and US) in a very short period of time, the exchange rate was pegged. Moreover, the country experienced political turmoil and violence throughout 1994: the armed uprising by the *Zapatistas* in January (the same day that NAFTA came into effect), the assassinations of the presidential candidate in March and of the Secretary of the ruling party in September, and the resignation in November of the Assistant Attorney who was in charge of investigating the assassination of his brother (Secretary of the *Partido Revolucionario Institucional*). In order to maintain the Mexican peso-US dollar rate unchanged, the Mexican monetary authorities increased domestic credit and encouraged investors who feared a devaluation to switch from Mexican peso-denominated short term government debt to debt indexed to the dollar, called *Tesobonos* (Lustig, 2001). These decisions were clearly wrong.

It is interesting to note that except for the 1986 balance of payments crisis, the other two crises coincided with presidential elections. The economic environment was surrounded by institutional frictions between the public and private sector in relation to determining the scope of action of each sector in the economy. These political frictions influenced adversely the management of economic policy.

2.2 Disaggregated Analysis

A disaggregated analysis of the trade balance gives a more comprehensive understanding of Mexico's trade structure and about the tight links between GDP growth and trade. Table 3 shows the performance of the non-oil trade balance by main sectors, from 1980 to 2000. The agricultural sector has registered a very unstable trade balance pattern, shifting from trade deficit to surplus, but in most years there has been a deficit. The extractive sector has shown a more stable performance than the agricultural sector. During the 1980s, it had trade surpluses. However, after 1993 it experienced trade deficits, except in 1995. The manufacturing sector has registered systematic trade deficits. Notice that trade deficits during the 1990s were higher than during the 1980s.

Table 3
Trade Balance by Main Sectors, 1980-2000
(Millions of US$)

Year	Agriculture	Extractive	Manufacturing	Year	Agriculture	Extractive	Manufacturing
1980	-41.5	21.3	-1,151.8	1991	20.2	15.9	-1,221.7
1981	-78.3	33.9	-1,557.0	1992	-62.2	1.4	-1,838.9
1982	11.2	23.4	-879.4	1993	-10.8	-1.8	-1,589.0
1983	-42.7	31.7	-211.3	1994	-57.7	-0.7	-1,945.8
1984	-34.9	28.8	-370.0	1995	114.4	4.2	-9.8
1985	-16.5	24.8	-633.7	1996	-89.9	-11.7	-10.3

1986	96.7	26.8	-330.0	1997	-28.7	-22.5	-501.9
1987	36.2	26.6	-175.7	1998	-81.4	-27.5	-820.5
1988	-8.6	28.0	-551.3	1999	-46.1	-25.2	-863.6
1989	-20.7	18.1	-852.0	2000	-48.5	-33.7	-1,553.2
1990	7.6	19.0	-1,138.5				

Source: Own calculations based on data from Instituto Nacional de Estadística, Geografía e Informática (INEGI).

The performance of the trade balance by type of products is given in Table 4. Consumer goods have shown trade surpluses after the debt crisis and since 1991 the surpluses have increased noticeably because in 1991 there was a change in the compilation of the data. Since then, in-bond, *maquiladora*, products have been included in this classification. Intermediate goods show trade surpluses from 1980 to 1990, particularly from 1982. The most likely explanation for this is that oil exports are included in this category, which hides the evolution of other intermediary goods. After 1991 intermediate goods show continuous trade deficits. This shift cannot be explained by the performance of the trade balance in *maquiladoras* because it has registered surpluses. The most likely explanation is the decrease of intermediate good exports due to the economic slowdown in the US economy during the early 1990s in combination with an increasing demand for intermediate goods imports by Mexico. Capital goods exhibit trade deficits before 1994 and surpluses after 1995. This shift may be the result of the increase in automobile and auto-parts exports, some of the products favoured by NAFTA and by deregulation of foreign direct investment (Loria and Fuji, 1997; Máttar *et al.,* 2002; Dussel, 2002).[20]

Table 4
Trade Balance by Type of Products, 1980-1999
(Millions of US$)

[20] A consequence of NAFTA is that a large part of the trade is within firms (FitzGerald, 1999; Cimoli and Correa, 2002).

Year	Consumer Goods	Intermediate Goods	Capital Goods	Year	Consumer Goods	Intermediate Goods	Capital Goods
1980	-72.3	183.8	-413.4	1991[a]	388.9	-588.8	-363.9
1981	-100.4	315.3	-601.8	1992	310.8	-1,095.9	-484.8
1982	-10.4	894.0	-355.5	1993	533.8	-1,248.2	-336.8
1983	85.2	1,171.9	-144.7	1994	647.3	-1,716.0	-371.3
1984	105.7	1,075.5	-174.0	1995	1,493.2	-1,035.2	283.9
1985	56.9	776.6	-228.4	1996	1,813.0	-1,469.1	456.2
1986	154.7	360.6	-196.2	1997	1,965.7	-2,096.3	457.5
1987	238.8	521.9	-154.4	1998	2,237.6	-3,229.0	613.1
1988	181.9	100.4	-254.8	1999	2,511.5	-3,488.9	808.6
1989	61.1	27.6	-287.0	2000	2,696.5	-4,406.8	1,043.4
1990	36.9	66.3	-448.6				

Note: [a] After 1991 *maquiladora* products were added to the rest of the series.
Source: Own calculations based on data from Instituto Nacional de Estadística, Geografía e Informática (INEGI).

It is also interesting to examine which manufacturing sub-sectors have worsened or improved after trade reforms. Table 5 gives the trade balance for the nine manufacturing sub-sectors for the period 1980-1999. Three sub-sectors out of nine (Paper Products, Publishing and Printing; Chemicals, Rubber and Plastic Products; and, Non-Metallic Mineral Products) have trade deficits throughout the period. The Machinery and Equipment sub-sector had trade deficits before 1994; and, from 1995 to 1999 it had surpluses. Three sub-sectors (Textiles and Leather Products; Wood Products; and, Other Products) have shifted from deficits to surpluses, but after 1995 have had surpluses. The Basic Metals sub-sector is the only one that has experienced trade surpluses throughout the period.

Table 5
Trade Balance by Manufacturing Sub-Sectors, 1980-1999
(Millions of US$)

Year	Food Products, Beverages and Tobacco	Textiles and Leather Products	Wood Products	Paper Products, Publishing and Printing	Chemicals, Rubber and Plastic Products	Non-Metallic Mineral Products	Basic Metals	Machinery and Equipment	Other Products
1980	-33.2	-6.9	-2.3	-46.7	-146.1	-159.2	9.8	-717.2	-4.9
1981	-33.2	-18.6	-2.3	-52.0	-158.8	-191.4	16.9	-1,048.8	-7.2
1982	1.4	-10.0	0.0	-32.7	-123.8	-87.4	17.2	-610.1	-3.3
1983	16.4	12.0	4.9	-18.1	-4.3	-21.8	64.3	-197.3	4.7
1984	26.8	14.7	5.1	-23.4	-5.3	-45.0	53.3	-283.3	3.0

1985	20.2	4.2	1.9	-27.4	-63.7	-44.2	21.9	-426.1	0.2
1986	37.2	16.4	4.4	-24.4	-63.8	-28.8	60.2	-276.9	1.1
1987	71.1	32.9	7.6	-32.1	-59.2	-24.2	85.6	-201.2	0.7
1988	10.8	13.9	8.4	-39.7	-95.7	-60.8	96.5	-417.7	-3.5
1989	-62.2	-15.8	7.2	-55.4	-179.2	-81.1	119.6	-532.6	-12.2
1990	-132.0	-34.6	-0.5	-71.5	-163.1	-117.9	120.0	-722.4	-16.4
1991	-101.2	-18.6	1.3	-99.2	-360.4	-227.1	108.0	-536.7	12.2
1992	-164.2	24.5	-4.3	-127.8	-463.1	-271.6	85.5	-835.0	0.5
1993	-147.2	-62.9	0.3	-142.0	-495.5	-250.6	121.3	-610.0	-2.4
1994	-174.4	-76.0	-9.0	-206.5	-599.7	-310.5	118.8	-680.4	-8.1
1995	-7.3	106.8	22.5	-168.9	-471.5	-266.6	307.1	414.3	53.9
1996	-15.4	144.7	39.2	-166.0	-699.0	-340.7	281.9	689.5	55.6
1997	-21.8	222.1	48.8	-184.7	-946.5	-408.8	295.4	454.8	45.6
1998	-32.4	200.2	42.7	-197.7	-1,049.0	-457.0	221.5	424.4	26.7
1999	-31.3	207.4	36.9	-215.2	-1,177.7	-453.3	156.2	604.0	4.4

Source: Own calculations based on data from Banco de México and Instituto Nacional de Estadística, Geografía e Informática (INEGI).

It does not appear from the previous descriptive statistics that either the mid-1980s trade reforms or NAFTA have led to a positive and permanent improvement in the trade balance, but it is necessary to test, controlling for other variables.

3. The Model and Econometric Techniques

In order to evaluate the impact of trade reforms on the trade balance we estimate a model of the trade balance over the period 1980-2000. Special attention is paid to 1985 and 1986, when trade distortions were modified in a significant way, and to 1994 when Mexico joined NAFTA. Given the earlier estimates of the impact of trade liberalisation on the volume of exports and imports, the *a priori* expectation of the effects of trade reforms on the trade balance is uncertain. Also, the trade balance (and balance of payments) is measured in monetary terms, so the terms of trade also become important. The trade balance (TB) is defined as:[21]

[21] The trade balance excludes oil.

$$TB = \frac{X}{M} \quad (1)$$

where X and M are the value of non-oil exports and imports, respectively. Taking logs of the variables and differentiating with respect to time, the rate of growth of the trade balance is defined as:

$$tb = (p_x + x) - (p_m + m) \quad (2)$$

where x and m are the rate of change of the volume of exports and imports, respectively. The difference between the rate of change of export prices and import prices ($p_x - p_m$) measures the rate of change in the terms of trade, *tot*. Based on standard export and import equations,[22] we substitute and rearrange terms to obtain the following equation:

$$tb = \psi + \theta_1\, yus + \theta_2\, ym + \theta_3\, p + \theta_4\, tot + \tau_t \quad (3)^{23}$$

where *yus* is international income, *ym* is domestic income, p is the real exchange rate; ψ is a constant and τ_t is the error term. It is expected that θ_1 is positive, θ_2 is negative, θ_3 is positive, and θ_4 is positive. Our model (equation 3) is modified with the introduction of different trade liberalisation indicators. It is extended with the inclusion of export and import duties, and two

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[22] We take an export growth equation, in which exports are considered to be a function of price competitiveness measured by the real exchange rate —the real exchange rate is defined as $RER = E\left(\frac{P_{US}}{P_M}\right)$, where E is the nominal exchange rate (quantity of pesos per one US dollar), P_{US} represents US's prices and P_M is Mexico's prices— and international income. Regarding import growth function, we use an import growth equation, in which imports are considered to be a function of price competitiveness, measured by the real exchange rate, and domestic income.

[23] The explanatory variables of the trade balance equation encompass both the absorption and elasticity approaches to the balance of payments.

shift dummy variables. For the latter, tests showed the most significant structural breaks to be in 1985 and 1994. Thus, the estimated trade balance model is:

$$tb_t = \psi + \theta_1\, yus_t + \theta_2\, ym_t + \theta_3\, p_t + \theta_4\, tot + \theta_5 xd + \theta_6 md + \theta_7\, lib85_t + \theta_8 lib94_t + \tau_t \qquad (4)$$

where *xd* and *md* are export and import duties, respectively, and *lib85* and *lib94* are the shift dummy variables for each of the episodes of trade liberalisation, respectively. The sign of θ_5 is negative, θ_6 is positive, and θ_7 and θ_8 are undetermined.

As an alternative specification we test the impact of trade liberalisation on the ratio of the trade balance to GDP. This is the more normal measure of balance of payments fragility. The complete equation to be estimated is as follows:

$$\frac{TB}{GDP} = \rho + \eta_1\, yus_t + \eta_2\, ym_t + \eta_3\, p_t + \eta_4\, tot + \eta_5\, xd + \eta_6\, md + \eta_7\, lib85_t + \eta_8\, lib94_t + \sigma_t \qquad (5)$$

where ρ is the constant term and σ_t the error term. The explanatory variables of equation (5), and the expected signs of the parameters, are the same as those described for equation (4).

Additionally, as trade liberalisation not only affects merchandise trade but also services, we test for the impact of liberalisation on the rate of change of the current account of the balance

of payments (BP) and on the current account of the balance of payments as a share of GDP.[24] The BP model is specified as follows:[25]

$$\frac{dBP}{BP} \text{ and } \frac{BP}{GDP} = \lambda + \chi_1 yus_t + \chi_2 ym_t + \chi_3 p_t + \chi_4 tot + \chi_5 lib94_t + \upsilon_t \qquad (6)$$

where λ is the constant and υ the error term. The variables and the expected signs of the χs are similar to the variables and coefficients of equation (5).

Different econometric techniques to evaluate the impact of trade reforms on the trade balance and current account of the balance of payments are used. We estimate equations (5) and (6) using ordinary least squares. A structural stability test is applied to evaluate if the first period of trade reforms caused a structural change in the dependent variables. Outside sample forecasts are needed to test for structural stability relating to NAFTA. Rolling regressions show the evolution of the constant, and 'income and price elasticities', through different overlapping periods. Finally, ARDL and ECM models are used to test for long-run relationships among the variables that explain the trade balance, and to evaluate the speed of adjustment of the trade balance model after a shock.

4. Impact of Trade Liberalisation on the Trade Balance and Balance of Payments

[24]Differently from goods, tariffs and quotas generally are not restraints on trade in services. This makes it difficult to assess the extent of Mexico's openness to trade in services. However, considering that NAFTA was implemented in 1994, the shift dummy variable refers to this year.

[25] The current account of the balance of payments excludes oil.

The only major study to have looked at the determinants of Mexico's trade balance is Galindo and Guerrero (1997), but they pay no attention to the effects of trade reforms on the trade balance. Using the Johansen cointegration method and quarterly data from 1980 to 1995, they found that there is a long run relationship between the rate of growth of the trade balance, the rate of growth of domestic income, the rate of growth of US income and the rate of growth of the real exchange rate. The estimated domestic income elasticity is -0.75, the US income elasticity is 0.46 and the real exchange rate elasticity is 1.83.[26] Additionally, the authors argue that in the long run the nominal exchange rate tends to adjust to the inflation and interest rate gap between Mexico and US. This being so, the real exchange rate is not the best variable to offset a deterioration in the trade balance. They claim, however, that the Marshall-Lerner condition is satisfied.

i) Ordinary Least Square Estimations

Before starting to estimate the trade balance and current account of the balance of payments models using OLS, we first consider the stationarity of the variables. We test for stationarity of the rate of change of the trade balance, the ratio of the trade balance to GDP, the rate of change of the current account of the balance of payments, the ratio of the current account of the balance of payments to GDP, and the terms of trade. Unit root tests for stationarity are performed on the levels of the variables. Table 6 (Part A) presents the results of the ADF test (one lag) under the assumption of a constant. The rate of change of the trade balance, the rate

[26] Galindo and Guerrero (1997) used US income in nominal terms to estimate the foreign income elasticity. They do not give any argument for doing so; and, they do not make clear if the domestic income variable is in real or nominal terms.

of change of the current account of the balance of payments, the ratio of the trade balance to GDP, and the terms of trade are I(0). The ratio of the current account of the balance of payments to GDP is not stationary. Table 6 (Part B) also shows the results of the ADF test (one lag) with a constant plus a deterministic time trend. Only the rate of change of the trade balance and the rate of change of the current account are I(0). These results imply that we are not able to use the OLS method for the ratio of the current account of the balance of payments to GDP, otherwise the results will be spurious.

Table 6
ADF Test for Stationarity

	PART A with Constant Only, sample period 1970-2000	**PART B** with Constant and Time Trend, sample period 1970-2000
Variables	Log Level [1]	Log Level [2]
xd	-4.98*	-4.91*
tb	-4.09*	-4.53*
bp	-3.69*	-4.17*
TB/GDP	-2.72**	-2.66
BP/GDP	-2.30	-2.28
tot	-3.25*	-1.41

Notes: [1]The ADF critical value -3.04. [2]The ADF critical value is -3.67. The asterisk (*) and double asterisk (**) imply significance at the 5 per cent and 10 per cent level, respectively.

We first estimated a set of regressions using the OLS method considering the rate of growth of the non-oil trade balance as the dependent variable. The results are shown in Table 7.

Table 7
OLS Estimation for the Trade Balance: 1980-2000

Dependent variable: Trade Balance Rate of Growth (*tb*)				
Regressor	Equations			
	7.1	*7.2*	*7.3*	*7.4*
Constant	0.11 (1.26)	0.27 (2.60)*	0.11 (1.22)	0.29 (2.71)*
ym	-3.20 (-2.58)*	-4.42 (-3.64)*	-3.36 (-2.47)*	-4.30 (-3.48)*
yus	0.53 (0.28)	-1.56 (-1.81)	0.27 (0.12)	-1.21 (-0.61)
p	0.46 (1.55)	0.03 (0.11)	0.41 (1.19)	0.07 (0.23)
tot	0.03 (0.08)	-0.10 (-0.32)	-0.02 (-0.05)	-0.02 (0.08)

lib85		-0.14 (-2.33)*		-0.18 (-2.42)*
lib94			0.02 (0.38)	-0.06 (-0.86)
R^2	0.72	0.79	0.72	0.81
Durbin Watson	1.90	2.94	1.90	2.47
		Diagnostic Tests		
Serial Correlation	*0.915*	*0.366*	*0.932*	*0.321*
Functional Form	*0.800*	*0.965*	*0.989*	*0.835*
Normality	*0.058*	*0.960*	*0.038*	*0.961*
Heteroscedasticity	*0.388*	*0.031*	*0.337*	*0.061*

Notes: Values in parentheses correspond to "t"-statistics. The asterisk (*) for the "t" statistics denotes significance of the coefficient at the 5 per cent level. The diagnostic tests show probabilities. Export and import duties were included in the estimations, both of them show expected signs but none of them is significant. As the sample is not very large, we decided to exclude them to have more degrees of freedom.

Three points should be highlighted. First, the shift dummy variable for 1985, *lib85*, has a negative sign and is significant at the 5 per cent confidence level (equations 7.2 and 7.4). It influenced negatively the *tb* by between 14 and 18 percentage points. Second, the shift dummy variable for 1994, *lib94*, is not statistically significant. Third, the coefficient of *ym* has the expected sign and is significant in all the equations. However, *yus* is not statistically significant and shifts from a positive to negative sign when both shift dummy variables are included.[27] Although *p* is positive, it is not significant. The terms of trade variable *(tot*) are not statistically significant in any of the equations.

According to the estimated results, each period of trade liberalisation (*lib85* and *lib94*) had different effects on the trade balance. Trade reforms related to 1985 worsened the rate of change of the trade balance, but there is not a significant effect from NAFTA. The negative effect of the mid-1980s trade liberalisation on the trade balance is consistent with earlier

[27] As this is an unexpected result, because US is the main trade partner of Mexico, we tried different specifications of our model. We find that when the constant is excluded from the *tb* equation, both income elasticities, *ym* and *yus*, are statistically significant either at the 5 or 10 percent level; however, no dummy variable is significant. These results are in Table A1 in the Appendix.

findings: imports reacted faster than exports to trade liberalisation (see Pacheco-López, 2002 and 2003). The significant impact of trade liberalisation on import growth was in 1985, while export growth increased in 1986. However, it is largely domestic income growth that drives the performance of the trade balance.[28]

Considering the ratio of the trade balance to GDP (TB/GDP) as the dependent variable, no significant coefficients that represent the trade liberalisation indicators were obtained. None of the coefficients of *lib85* and *lib94* are significant. Table 8 shows the results. In this case, the coefficients of *ym* and *yus* have the expected sign. For instance, considering equation *8.2*, if *ym* increases by one per cent, it leads to a deterioration of 0.32 in the ratio of the trade balance to GDP; which is a strong effect. When both income coefficients are significant (equations *8.1* and *8.2*), *yus* is always higher than *ym*. The coefficient of *p* is negative and is not significant; while *tot* is positive but not significant. In general, if we consider the R^2, which is lower than 50 per cent, these results are rather weak.

Table 8
OLS Estimation for the Trade Balance /GDP: 1980-2000

Dependent variable: Trade Balance/GDP				
Regressor	Equations			
	8.1	*8.2*	*8.3*	*8.4*
Constant	-0.03 (-3.35)*	-0.04 (-3.21)*	-0.03 (-3.53)*	-0.03 (-2.29)*
ym	-0.34 (-2.24)*	-0.32 (-2.19)*	-0.36 (-2.25)*	-0.36 (-1.95)**
yus	0.40 (1.71)**	0.42 (1.82)**	0.35 (1.35)	0.37 (1.25)
p	-0.01 (-0.38)	-0.01 (-0.38)	-0.02 (-0.51)	-0.01 (-0.21)
tot	0.01 (0.29)	0.01 (0.22)	0.00 (0.15)	0.01 (0.24)

[28] Tables A2 and A3 in the Appendix show different estimations of the trade balance equation, which consider alternative years for each period of trade reforms (*lib86* and *lib87*; *lib95* and lib96).

lib85		0.00 (0.42)		0.00 (0.17)
lib94			0.00 (0.52)	0.00 (0.26)
R^2	0.47	0.47	0.48	0.48
Durbin Watson	1.23	1.27	1.24	1.19
Diagnostic Tests				
Serial Correlation	*0.076*	*0.108*	*0.096*	*0.078*
Functional Form	*0.929*	*0.726*	*0.993*	*0.896*
Normality	*0.781*	*0.687*	*0.680*	*0.671*
Heteroscedasticity	*0.764*	*0.783*	*0.806*	*0.685*

Notes: Values in parentheses correspond to "t"-statistics. The asterisk (*) for the "t" statistics denotes significance of the coefficient at the 5 per cent level and the double asterisk (**) denotes significance of the coefficient at the 10 per cent level. The diagnostic tests show probabilities.

The effects of liberalisation on the non-oil current account of the balance of payments are not picked up by the OLS estimations, according to the results given in Table 9. The shift dummy variable, *lib94*, considers liberalisation in trade of goods and services. The *lib94* coefficient is not statistically significant. The domestic income elasticity is the only coefficient that is statistically significant through all the equations. However, we should consider that many of the flows within the current account (i.e. interest payments) have more to do with financial liberalisation than with trade liberalisation in goods and services. From the descriptive analysis (section 2) we know that the invisible account of the balance of payments has not compensated trade deficits. Additionally, transfers included in the current account (i.e. workers' remittances) are not directly linked with any trade reforms.

Table 9
OLS Estimation for the Balance of Payments: 1980-2000

Dependent variable: Current Account Growth		
Regressor	Equations	
	9.1	*9.2*
Constant	0.07 (1.50)	0.08 (1.47)
ym	-3.11 (-4.18)*	-3.18 (-3.90)*
yus	1.44 (1.28)	1.29 (0.99)
p	0.21 (1.19)	0.18 (0.90)
tot	0.22 (1.07)	0.20 (0.90)

lib94		0.01 (0.26)
R^2	0.79	0.79
Durbin Watson	2.13	2.14
	Diagnostic Tests	
Serial Correlation	*0.751*	*0.747*
Functional Form	*0.677*	*0.798*
Normality	*0.117*	*0.084*
Heteroscedasticity	*0.104*	*0.092*

Notes: Values in parentheses correspond to "t"-statistics. The asterisk (*) for the "t" statistics denotes significance of the coefficient at the 5 per cent level. The diagnostic tests show probabilities.

We now supplement the above analysis with additional econometric techniques to test for the effect of trade reforms on the trade balance and current account of the balance of payments.

ii) Structural Stability, Rolling Regressions and Forecasts

First, to find out if there is evidence for structural stability of the rate of growth of the trade balance we applied the Chow breakpoint test. The Chow breakpoint test rejects the null hypothesis of structural stability in the trade balance for 1985 at the 10 per cent level of significance (the F-calculated, 2.48, is higher than the F-statistic, 2.43). This is further support of a structural break in the trade balance model, related to the mid-1980s trade reforms.

Second, we estimated rolling regressions to look for parameter variation in the basic trade balance model (equation 3), but focusing our attention on the change in the constant. The results, using a sample size of fourteen years, are shown in Table 10. The positive constant has decreased over the seven time periods. This predominant downward tendency suggests a worsening of the trade balance linked to the trade liberalisation reforms. After the period 1984-1997, the domestic income elasticity decreases and is not significant any more. We have to consider that the rate of growth of GDP improved from one year to the other, it changed from -4.2 per cent in 1983 to 3.6 per cent in 1984; while the non-oil trade deficit worsened

from 1983 (1,912 millions of US$) to 1984 (3,417 millions of US$). The foreign income coefficient is negative in four rolling regressions and is never significant. Also, the price coefficient does not follow a stable tendency, it increases through time and is only significant in the last four regressions. The terms of trade coefficient moves erratically and is not statistically significant in any of the equations.

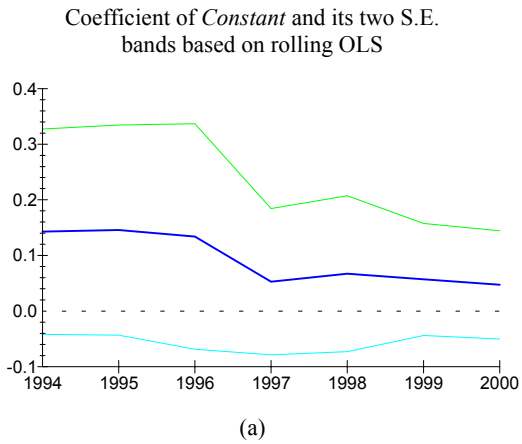
Table 10
Rolling Regressions for tb, (window size 14)

Dependent variable: *tb*							
Regressor	1981-94	1982-95	1983-96	1984-97	1985-98	1986-99	1987-00
Constant	0.14 (1.75)	0.15 (1.41)	0.14 (1.26)	0.03 (0.51)	0.05 (0.69)	0.04 (1.13)	0.05 (0.94)
ym	-5.27 (-2.93)*	-5.09 (-2.56)*	-5.11 (-2.39)*	-1.16 (-1.07)	-1.23 (-0.89)	-1.16 (-1.22)	-1.26 (-1.38)
yus	-0.20 (-0.09)	-0.61 (-0.25)	-0.08 (-0.03)	0.07 (0.04)	-0.45 (-0.21)	0.53 (0.37)	0.28 (0.20)
p	0.49 (1.40)	0.25 (0.65)	0.18 (0.40)	0.72 (2.28)*	0.71 (2.41)*	0.72 (3.55)*	0.63 (2.77)*
tot	0.43 (0.91)	0.13 (0.30)	0.16 (0.35)	-0.10 (-0.35)	0.09 (-0.32)	-0.10 (-0.54)	0.17 (0.45)

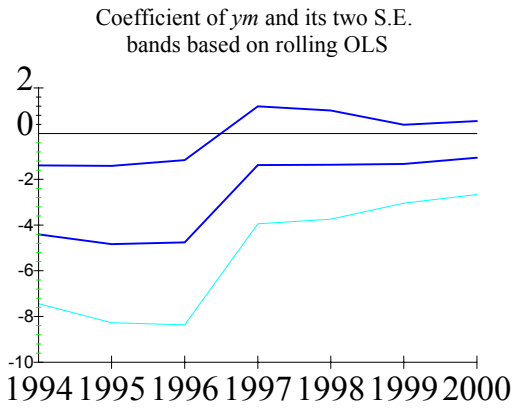
Note: The asterisk (*) denotes significance at the 5 per cent.

The "rolling" coefficients -*constant*, *ym*, *yus, p* and *tot*- with their standard errors are plotted on Graph 5.2 (a), (b), (c), (d) and (e) respectively. Through the analysis of these figures we observe that the *constant* exhibits a downward tendency after 1996; *ym* and *p* coefficients show an upward tendency from 1996 to 1997. Meanwhile, *yus* is relatively stable.

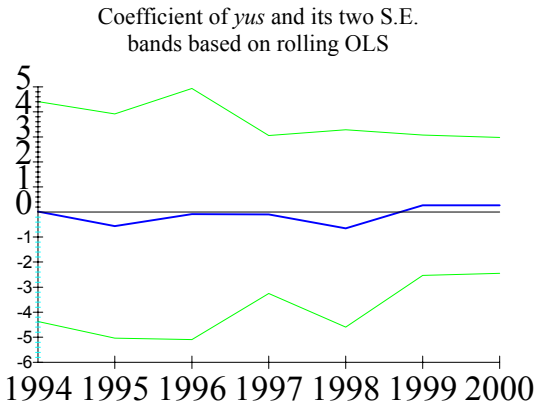
Graph 2
Rolling Coefficients for Trade Balance



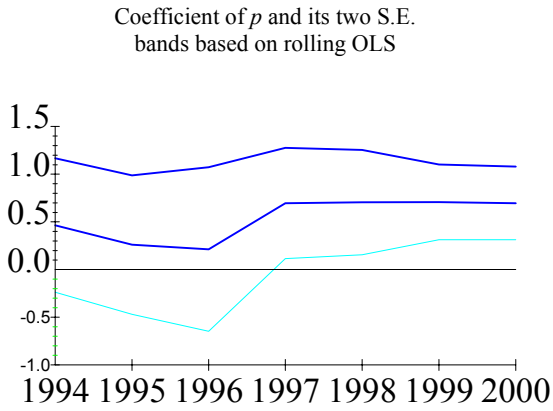
(a)



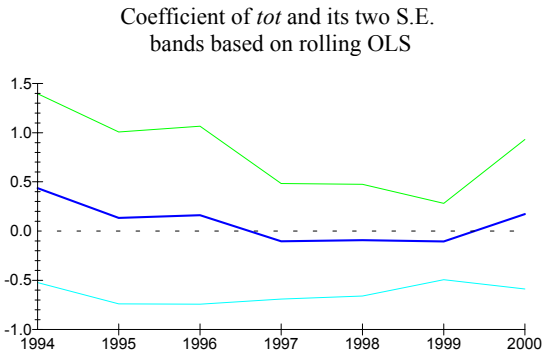
(b)



(c)



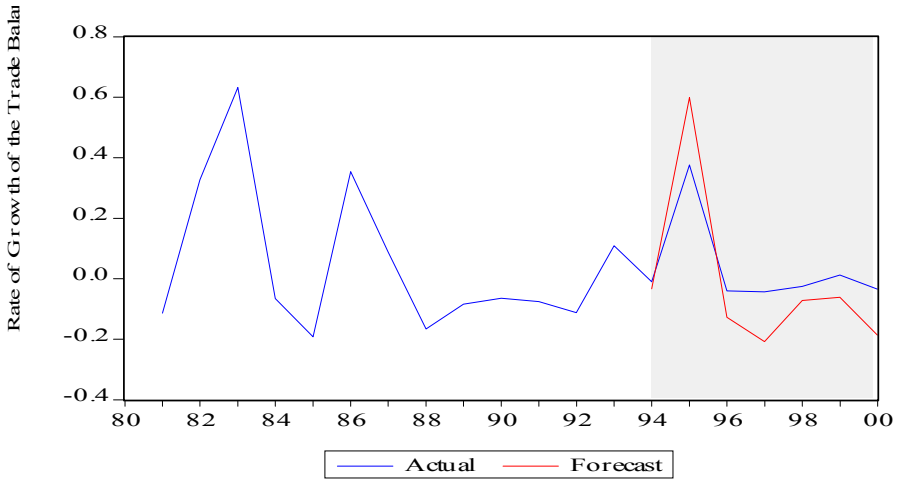
(d)



(e)

Third, to check our previous findings, concerning the effect of NAFTA on the trade balance, we estimate Mexico's trade balance up to 1993, then we make outside-sample forecasts, and compare the actual rate of change of the non-oil trade balance and the forecast model. If the actual trade balance performance is worse than predicted, this is *prima facie* evidence of an unfavourable structural break. The actual and the forecast trade balance models are shown in Graph 3.

Graph 3
Actual, and Single Equation Static Forecast for the Trade Balance



In this case, the latter over-predicts the former, which suggests that NAFTA deteriorated the trade balance performance. On the other hand, from 1996, the actual trade balance performance is better than forecast.

Regarding the statistics for the forecast evaluation, although the *rsm* is relatively moderate (0.12), the bias proportion of the Theil inequality coefficient is about 12 per cent. This implies that there is a small bias (as is observed in Graph 3).

Trade Balance Forecast Evaluation	
Root-mean square error	0.128203
Theil inequality coefficient	0.318550
Bias proportion	0.129320
Variance proportion	0.814432
Covariance proportion	0.056248

The results for the current account of the balance of payments are very similar to the ones obtained for the non-oil trade balance. The positive constant, estimated from the rolling regressions, decreased over the seven time periods, which can be interpreted as a worsening of the current account related to trade reforms (see Table A2 and Graph A1 in the Appendix).

The non-oil current account outside-sample forecast shows that NAFTA represents a deterioration on the current account (Graph A2 in the Appendix).

iii) ARDL and ECM models

Using two econometric techniques, ARDL and ECM models, we will try to corroborate the existence of a long run relationship among the variables that explain the rate of growth of the trade balance performance. Furthermore, we will investigate the speed of adjustment of the trade balance after it is affected by a shock.

First, we test for the existence of a long run relationship between the variables under investigation in the trade balance model using the F-test (Pesaran and Pesaran, 1997). In this case, the calculated F statistic is 11.6. Comparing it with the interval of the critical values of the F-test (2.85 to 4.04), it is above the upper critical value, allowing us to reject the null hypothesis of no long relationship between the variables.

We then estimated the long run coefficients and the ECM. We use one lag length, and the order of the ARDL model is (1,0,0,0). The long run coefficients and the ECM derived from the ARDL approach for the trade balance are:[29]

$$LTB = -29.08 - 1.27LYM + 2.73\ LYUS + 1.23\ LP - 0.28\ lib85 - 0.11\ lib94 \quad (7)$$

t-statistic (-3.94)* (1.21) (3.12)* (3.64)* (-2.00)* (-0.97)

$$tb = -23.93 - 1.04\ ym + 2.25\ yus + 1.05\ p - 0.23\ lib85 - 0.09\ lib94 - 0.82\ ecm_{-1} \quad (8)$$

[29] The terms of trade variable (TOT) is not included because it does not show a significant coefficient, and the rest of the variables perform better without it.

t-statistic (-2.11)* (-1.04) (2.38)* (4.79)* (-2.01)* (-0.94) (-5.74)*

where the L preceding each variable in equation (7) stands for the log of the variable; and lower case letters in equation (8) represent growth rates for the first three variables.[30]

From the equation that represents the long run coefficients, the trade liberalisation indicator related to the first period of trade reforms, *lib85*, is significantly negative. This means that the trade balance deteriorated as a result of trade liberalisation by approximately 23 per cent.[31] However, there is no significant impact of the second shift dummy variable, *lib94*, on the trade balance. The income and real exchange rate elasticities show the expected sign, and are statistically significant, except for the domestic income. The ECM shows the short run coefficients of the variables and the error correction term. The latter tells us that about 82 per cent of the discrepancy between the actual and the equilibrium value of the rate of growth of the trade balance is corrected within a year. [32]

From the previous empirical analysis, it is possible to say that the mid-1980s trade reforms worsened the trade balance. Regarding the second episode of trade reforms, related to

[30] When we substitute the rate of growth of the trade balance (*tb*) for the ratio of the trade balance to GDP (*TBY*), all the coefficients are lower than the coefficients using *tb* as the dependent variable. Moreover, the real exchange rate and *lib85* coefficients are statistically significant at the 5 and 10 per cent level, respectively.

$TBY = -2.31 - 0.11LYM + 0.23\ LYUS + 0.09\ LP - 0.02\ lib85 - 0.00\ lib94$ Long Run Model (7')
t-statistic (-3.94) (-1.33) (3.22) (3.48)* (-1.94) ** (-0.94)

$TBY = -1.95 - 0.09\ ym + 0.19\ yus + 0.07\ p - 0.01\ lib85 - 0.00\ lib94 - 0.84\ ecm_{-1}$ ECM (8')
t-statistic (-3.54) (-1.20) (1.20) (4.48)* (-1.97)** (-0.92) (-5.70)*

[31] This value is calculated from $e^{\beta-1}$, where β is the value of the coefficient.

[32] There is a long run relationship between the variables under investigation in the current account of the balance of payments model. The calculated F statistic is 13.24, which is higher compared with the interval values of the F-test. The ARDL and ECM models for the current account do not show a significant coefficient related to *lib94*, but income and price elasticities have the expected sign and are statistically significant. The results are presented in Table A5 in the Appendix.

NAFTA, the results cannot be considered as conclusive but they are certainly suggestive of a negative structural change in the trade balance from 1994 to 1995, but after 1996 there is evidence of a positive structural change. Although there is no definitive conclusion concerning the effect of trade liberalisation on the current account of the balance of payments, as well as for the trade balance, there is evidence for an unfavourable structural break during 1994 and 1995, afterwards the results are indicative of a positive effect.

5. Interaction between the Balance of Payments and Economic Growth

5.1 Theoretical Framework

The purpose of this section is to examine the interaction of the trade balance and economic growth by considering the balance-of-payments-constrained growth model, first formulated by Thirlwall (1979). Particularly, we are interested in whether Thirlwall's model is a good predictor of Mexico's long run growth rate, given that trade liberalisation is likely to affect the income elasticity of demand for imports.

Thirlwall's model says that the ultimate constraint on growth in an open economy is the balance of payments, and that a country's growth rate can be approximated by the inverse of the income elasticity of demand for imports times the rate of growth of exports. The balance-of-payments-constrained growth model is derived from two main equations (see footnote 23):

$$X = (P_d/P_f E)^{\eta} Z^{\varepsilon} \quad (9)$$

$$M = (P_d/P_f E)^{\psi} Y^{\pi} \quad (10)$$

where variables *X*, *M*, *Z* and *Y* are exports, imports, world income and domestic income, respectively; (P_d/P_f) is the ratio of domestic prices to foreign prices, and E is the nominal exchange rate measured as the domestic price of foreign currency. The parameters η (<0) and ε (>0) are the price and income elasticity of exports, respectively; ψ (>0) and π (>0) are the price and income elasticity of imports, respectively. Taking logs of (9) and (10) and differentiating with respect to time gives:

$$x = \eta\,(p_d - p_f - e) + \varepsilon z \tag{11}$$

$$m = \psi\,(p_d - e - p_f) + \pi y \tag{12}$$

where the lower case letters are the growth of the variables. Assuming long run equilibrium on the current account and that the rate of change of relative prices is constant over time ($p_d - p_f - e = 0$),[33] the balance of payments equilibrium growth rate can be written as:

$$y_b^1 = (\varepsilon/\pi)\, z \text{[34]} \tag{13}$$

or, combining equation (5.11) and (5.13), gives another definition:

$$y_b^2 = (1/\pi)\, x \tag{14}$$

Equation (5.14) is a dynamic version of Harrod's static foreign trade multiplier result (Harrod, 1933) that output in an open economy is determined by exports relative to the propensity to import.

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[33] McCombie and Thirlwall (1994) suggest that empirical evidence supports that in the long term relative price fluctuations measured in a common currency are minimal. However, McCombie (1997) emphasises that "the approach does not argue that relative prices have no effect on trade flows, only that over the long run their impact is quantitatively small".

[34] It can also be shown that this result holds if the Marshall-Lerner condition is just satisfied (i.e. $\psi + \eta = 1$).

The rate of growth of exports divided by the income elasticity for imports sets a rate of growth which cannot be exceeded in the long run without ever-increasing capital inflows. To allow for capital flows, Thirlwall and Hussain (1982) extended the original model as follows:

$$y_b^3 = \frac{\theta x - (1-\theta)(f - p_d)}{\pi} \tag{15}$$

where θ and (1-θ) represent the shares of exports and capital flows as a proportion of total receipts, respectively; and f is the rate of growth of nominal capital inflows. θ = P_dX/R and (1-θ) = F/R, where F is the value of nominal capital flows measured in domestic currency and R is total overseas receipts. Assuming no initial disequilibrium and no capital flows (i.e. θ =1), equation 5.15 yields equation 5.14. In case that there is initial disequilibrium but f = 0, the balance-of-payments constrained growth rate is reduced to:

$$y_b^4 = \frac{\theta x - (1-\theta)(p_d)}{\pi} \tag{16}$$

y_b^4 is less than y_b^3, assuming that p_d is positive. Subtracting equation (5.16) from (5.14) we see the absolute reduction in the level of the growth rate:

$$y_b^2 - y_b^4 = \frac{(1-\theta)(p_d + x)}{\pi} \tag{17}$$

If, initially, capital inflows finance the current account deficit and the growth rate is not lower than without initial disequilibrium, there must be a positive rate of growth of capital inflows to compensate. This rate is defined by setting equation (15) equal to (14) and solving for f:

$$f = p_d + x \tag{18}$$

As there is a limit to the ratio of the current account deficit to GDP and the ratio of international debt to GDP, McCombie and Thirlwall (1999) and Moreno-Brid (1998) reformulate the model to allow for the influence of external debt accumulation. Assuming a given long term ratio of the external debt to GDP and constant terms of trade, McCombie and Thirlwall derive the following expression (which coincides with the one derived by Moreno-Brid):

$$y_b^5 = \frac{\xi x}{\pi - (1 - \xi)} \tag{19}$$

where ξ is the export/import ratio at nominal prices. If the current account is zero (X/M =1), then equation (19) reduces to equation (14).

The implication of the extended model is that capital flows cannot permit an individual country to increase its growth rate above y_b^1 or y_b^2 by very much or for very long (McCombie and Thirlwall, 1999).

5.2. Overview of the Balance-of-Payments-Constrained Growth Model Applied to Mexico

There has been a lot of interest in the performance of the relationship between Mexico's GDP growth and its trade sector during recent decades. In particular, several studies have focused on the analysis of the balance of payments constraint to Mexico's long run economic growth;

most of them have considered Thirlwall's model. Warman (1993), Moreno-Brid (1998, 1999, 2001 and 2002), López and Cruz (2000) and Ocegueda (2000), by using different econometric techniques, all confirm Thirlwall's 'Law' for the Mexican economy. Loria and Fuji (1997) arrive at a similar conclusion that Mexico's economic growth is constrained by the balance of payments, but they follow a descriptive approach rather than an econometric one.

Warman (1993) estimates the basic (equations 13 and 14) and extended (equation 15) balance-of-payments-constrained growth models over the period 1961-1990. She estimates price and income elasticities of the import and export demand functions using OLS. Her estimations, either considering the static or dynamic specification of the import and export equations, show that the price elasticities of exports and imports do not satisfy the Marshall-Lerner condition. The specification used to estimate the income elasticity of demand for imports, however, does not include any variable which captures the impact of the mid-1980s trade reforms on imports. Considering the original model, she finds that the average predicted growth rates for the period 1961-1990, ranging from 4.9 to 5.7 per cent, are very close to the average actual growth rate of 5.1 per cent. When the sample was divided into two sub-periods, before and after the debt crisis (1961-1981 and 1982-1990), she finds that the extended model —which includes capital flows— approximates better to the actual growth rate. The results highlight the importance of export capacity and the income elasticity of demand for imports as determinants of long run economic growth. Moreover, the results imply that in the long run prices measured in a common currency stay fairly stable.

Loría and Fuji (1997) descriptively analyse the balance of payment constraint on Mexico's economic growth. They claim that the insufficient generation of foreign currency in relation to the growing demand from the manufacturing sector is the main constraint on Mexico's economic growth; this restriction has been intensified as a result of the macroeconomic reforms undertaken during the 1980s (i.e. adjustment and stabilisation programs implemented after the debt crisis; deregulation of the economy –trade and financial opening and privatisation of public firms). The authors describe the tendencies in the trade balance of the agricultural, mining and manufacturing sectors for the period 1980-1994; and they also analyse the shifts from trade surplus to deficit, and vice versa, for about 26 selected agricultural and manufacturing sub-sectors. In spite of the change in the composition of exports in favour of manufactured goods, the authors conclude that the country's trade composition constrains its economic growth.

López and Cruz (2000), using the Johansen cointegration method, test Thirlwall's Law for four Latin American countries (Argentina, Brazil, Colombia and Mexico) for the period 1965-1996.[35] They focus on three issues. First, they validate Thirlwall's Law through the existence of cointegration vectors between domestic output and exports for each country. The Granger causality relationship between domestic output and exports was tested; their findings suggest that causality runs from exports to output for all countries, except for Mexico. They also report the "equilibrium" (defined as "the inverse of the [long run] elasticity of exports with respect to output") and the estimated long run income elasticities of demand for imports (estimated by

[35] For most of the estimations, the authors use different time periods, even for the same country.

the cointegrating vector in the VAR for output and imports). The latter elasticity is higher than the former for all the economies, except for Brazil. The difference is wider for Mexico, and according to their results, López and Cruz claim that a growth rate of exports of 1 per cent was associated with a GDP growth rate of 2.2 per cent. In order to maintain foreign trade equilibrium, π should be 0.45 instead of 1.3. Second, after showing graphically that the real exchange rate has changed in Latin America economies, they argue that such variations affect domestic output in the long run. They support this argument because they found for each country a stable long run relationship between domestic output and the real exchange rate. However, as initially pointed out by Holland *et al.* (2002), López and Cruz are assuming a straightforward relationship between the real exchange rate and domestic output, but it is not so. Beyond the fulfilment of the Marshall-Lerner condition, changes in the domestic currency —appreciation or depreciation— affect the domestic output through private investment, consumption and debt position in foreign currency.[36] Hence, their criticism of Thirlwall's assumption about the stability of the terms of trade or the real exchange rate in the long run is rather weak. Finally, they tested whether the Marshall-Lerner condition holds for the group of countries in their study by estimating a VAR which includes the trade balance, domestic and foreign income, and the real exchange rate. Their findings suggest that a higher exchange rate worsens the trade balance for the Brazilian and Mexican economies. The authors disregard, however, the effects of trade liberalisation in these Latin American countries.

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[36] In their conclusions, López and Cruz (2000) recognise that even when the Marshall-Lerner condition holds, a higher real exchange rate is associated with a lower level of domestic output, e.g. this is the case for Argentina's economy. They explain this inverse relation by saying that "…this negative association is probably the result of a harmful impact of a higher real exchange rate on domestic demand." Therefore, implicitly the authors take into account the indirect relationship between domestic output and the real exchange rate.

Ocegueda (2000) also estimates the original balance-of-payments-constrained growth model over the period 1960-1997, applying the Engel and Granger method. He confirms the predictive power of the simple specification of Thirlwall's Law for the Mexican case. Ocegueda considers 1982 as the turning point for economic policy making arguing that after the debt crises all the macroeconomic variables were affected by the structural adjustment policies including trade liberalisation. After comparing estimates of GDP growth between two periods (1960-1982 and 1983-1997) he concludes that the balance of payments equilibrium growth rate worsened after 1982. He derives the conclusion by arguing that the income elasticity for imports (π) increased from 1.05 for the period 1960-1982 to 4.91 for the 1983-1997 period (the π for the second period is very high, about 2 percentage points higher than the one estimated by Moreno-Brid for a similar period). The import equation for the second sub-sample includes the ratio of licensed imports to total imports as a variable to account for trade liberalisation.

Moreno-Brid in various papers (1998, 1999, 2001 and 2002) has also thoroughly examined the balance of payments equilibrium growth rate for the Mexican economy. Two main conclusions emerge. First, the results support the extended version of Thirlwall's model (based on an alternative concept of long run equilibrium defined as a constant ratio of the current account deficit to domestic income; see Moreno-Brid, 2001) as a better predictor of Mexico's long run economic growth rather than the original model. Second, the income elasticity of

demand for imports has increased as a result of trade liberalisation, which can explain Mexico's economic growth slowdown since the mid-1980s.

Moreno-Brid (2001), in his most complete work, estimates the original and extended balance-of-payments-constrained growth model from 1967 to 1999. The predicted growth rate of the extended model is 4.4 per cent, which is very close to the actual growth rate of 3.8 per cent. He applies the Johansen cointegration method to estimate the import equation.

The estimated income elasticity of demand for imports for that period is 1.7. [37] He includes the index of the production-weighted coverage of import licences —which takes into account the effects of trade liberalisation— in the import demand specification used to estimate π. The value of the variable lies between zero and one (it equals zero when all licence requirements on imports have been eliminated, and it equals one when they are compulsory on every importable good or service). When the sample is divided into sub-periods (1968-1983 and 1982-1997; or, 1969-1984 and 1983-1998; or, 1970-1985 and 1984-1999) he finds that as the income elasticity of demand for imports increases, the actual growth rate decreases from one period to the other. For instance, for the first two sub-periods (1968-1983 and 1982-1997) π increases from 1.57 to 3.54, and the actual growth rate slows from 5.5 per cent to 1.6 per cent.

[37] In earlier studies, Moreno-Brid (1998 and 1999) estimates implicitly the income elasticity of demand for imports. In other words, he divides the average annual growth rate of imports by the annual GDP growth rate. Doing this, he shows, for different periods, the following income elasticities for imports, π:

Table 1 in Moreno-Brid (1998)	1950-1975 $\pi = 0.95$	1976-1981 $\pi = 2.03$	1982-1987 $\pi = 77.15$ (sic)	1988-1994 $\pi = 6.34$	1988-1997 $\pi = 5.59$	
Table 1 in Moreno-Brid (1999)	1950-1994 $\pi = 1.29$	1950-1996 $\pi = 1.27$	1950-1981 $\pi = 1.16$	1982-1996 $\pi = 2.59$	1950-1975 $\pi = 0.95$	1976-1996 $\pi = 2.17$

In any case, one of his main conclusions is that π has constrained Mexico's economic growth. Table 11 summarises Moreno-Brid's (2001) results.

Table 11
Balance of Payments Constrained Economic Growth

Period	y_b^2	y_b^4	GDP growth rate (%)	Exports growth rate (%)	π
1967-1999	4.78	4.40	3.87	8.47	1.77
1968-1983	5.85	5.46	5.52	9.17	1.57
1969-1984	5.54	5.29	5.34	8.47	1.53
1970-1985	5.62	5.17	5.05	8.66	1.54
1982-1997	2.19	2.86	1.65	7.74	3.54
1983-1998	2.76	3.26	2.63	8.59	3.11
1984-1999	2.91	3.70	2.79	9.14	3.14

Source: Moreno-Brid (2001), from Table 4.7.

5.3 Effect of Trade Liberalisation on Mexico's Economic Growth

We turn now to our own estimates of the impact of trade reforms on Mexico's economic growth using Thirlwall's model. The effect of trade reforms on Mexico's GDP is measured by changes in the income elasticity of demand for imports and the rate of growth of exports. As the former has increased over time, according to previous studies, this means a negative effect of trade liberalisation on economic growth, unless offset by a faster rate of growth of exports. Thus, we estimate the long run elasticity of demand for imports using the ARDL technique, for fourteen sub-periods. We find an increase in the long run income elasticity of demand for imports. The results are presented in Table 12. In spite of considering different sub-periods, our results are consistent with the elasticities that Moreno-Brid (2001) estimated (see Table A4 in the Appendix).

Table 12
Long Run Income Elasticities of Demand for Imports
(Selected sub-periods, 1973-1999)

Period	π	Period	π

1973-1987	1.21	1980-1994	2.47
1974-1988	1.50	1981-1995	3.34
1975-1989	1.85	1982-1996	4.56
1976-1990	2.09	1983-1997	4.43
1977-1991	2.31	1984-1998	3.12
1978-1992	2.20	1985-1999	3.15
1979-1993	2.04		

Source: Own estimations based on data from World Development Indicators (2002).

Notice that there is a remarkable jump in π from the period 1981-1995 to the period 1982-1996, which must be due to the increase in the rate of growth of imports in 1996 (the annual rate of growth of imports in 1995 was -15 per cent, but in 1996 was 23 per cent).

We consider the full sample and two different sub-periods to estimate the balance-of-payments-constrained growth model (equation 14), taking the mid-1980s trade reforms as a break point, and using different income elasticities of import demand. Table 13 shows the results. In each period, the estimated Harrod foreign trade multiplier is higher than the actual growth rate of GDP (y); for the first sub-period (1973-1985 or 1973-1986), the difference is higher than for the second sub-period (1986-1999 or 1987-1999).[38] Another point to notice is that in spite of having an increasing rate of growth of exports, π has increased as well, in part as a result of trade liberalisation (Moreno-Brid, 2001; Ocegueda, 2000), which has led to a reduction in the actual rate of growth of GDP.

Table 13
Impact of Trade Reforms on Mexico's GDP (Selected sub-periods)

	Harrod trade	Actual	Export	Terms of

[38] The estimations of the balance of payments equilibrium growth rates differ from those reported by Moreno-Brid (2001), because our rates of growth of exports are higher than the ones he presented. The only explanation for this is that the figures which he shows are in real (1980) Mexican pesos, while ours are in real (1995) US dollars (the terms of trade varied during the 1980s).

Period	multiplier $y_b^2 = x/\pi$	Growth Rate [a] (y)	Growth Rate (x) [a]	π	Trade [b] (1995=100)
1973-1999	4.4	3.6	9.8	2.2	-1.40
1973-1985	6.9	5.0	9.0	1.3	-0.55
1973-1986	5.8	4.3	8.7	1.5	-2.62
1986-1999	2.9	2.8	9.2	3.1	-2.19
1987-1999	3.2	2.8	10.5	3.2	-0.10

Notes: [a] Figures are in real terms at 1995 US dollars. [b] The terms of trade are calculated as the ratio of Mexico's export price index to its import price index, where all prices are expressed in US dollars.
Source: Own calculations based on data from World Development Indicators (2002) and Banco de México.

The adverse effect of relative prices movements may be one explanation of the shortfall of the actual rate of growth. For instance, the sub-periods which include 1986 (1973-1986 or 1986-1999) have on average a faster deterioration than the other two sub-periods (1973-1985 or 1987-1999), see last column in Table 13. This is because in 1986 the negative change in the terms of trade was approximately 29.4 per cent. Also, the significant price elasticity of demand for imports may have an adverse effect on the actual rate of growth.

A formal test of whether the actual growth of a country can be predicted from its balance of payments equilibrium growth rate was proposed by McCombie (1989). The test consists of estimating the hypothetical income elasticity of demand that equates the actual and the balance of payments equilibrium growth rates (i.e. $\pi' \equiv x/y$), and to compare π' with the estimated π. If π' does not differ significantly from π, nor will actual GDP growth and y_b^2 differ significantly. Thus the hypothesis to be tested is whether or not $\pi = \pi'$. This was undertaken by estimating the *t*-statistic from the standard error of π for the null hypothesis that $\pi = \pi'$, and evaluating whether or not the null hypothesis is rejected at the 95 per cent confidence level. The results are reported in Table 14.

Table 14
Testing for whether π and π´ are significantly different
(Selected sub-periods)

Period	π	π´	Absolute value of the *t* statistic [a]
1973-1999	2.2	2.7	1.51
1973-1985	1.3	1.8	2.93*
1973-1986	1.5	2.0	2.57*
1986-1999	3.1	3.2	0.17
1987-1999	3.2	3.7	0.94

Notes: [a] The *t*-statistic is based on the null hypothesis that $\pi = \pi'$. The asterisk (*) denotes that π differs significantly from π´ at the 5 per cent confidence level.
Source: Own calculations based on data from World Development Indicators (2002) and Banco de México.

The balance of payments equilibrium growth rate is not refuted for the full sample or for the two post mid-1980s trade reform sub-periods. For the other two sub-periods, 1973-1985 and 1973-1986, there is a statistically significant difference between π and π´, although the discrepancies are not very large.

The analysis concludes with several findings. Even without considering the influence of capital flows on the balance of payments —which certainly would yield better approximations between the actual and estimated growth rates— it is shown that after the mid-1980s trade reforms the equilibrium long run rate of economic growth (y_b^2) has declined considerably, from 6.9 per cent to 2.9 per cent (considering 1973-1985 and 1986-1999) or, alternatively, from 5.8 per cent to 3.2 per cent (1973-1986 and 1987-1999). The slowdown of Mexico's economic growth can be linked to an increase in the long run elasticity of import demand, which has not been compensated by a sustained expansion of exports. Also, the causes of the slowdown in the economy reflect the high dependence of the under-developed industrial sector on foreign trade. Trade liberalisation has reinforced such performance, promoting and

facilitating access to a wide variety of imported goods. It is necessary to remember, however, that trade liberalisation was preceded by many other macroeconomic reforms (i.e. transformations in the scope and scale of the State's intervention in economic affairs), which altered Mexico's growth performance.

6. Conclusions

The chapter has analysed the impact of trade liberalisation on Mexico's trade balance and current account of the balance of payments, and has used a balance-of-payments-constrained growth model to evaluate Mexico's long term growth especially after the mid-1980s trade reforms. This is an area not previously researched for Mexico, but it is an important issue because trade liberalisation in goods and services may hamper Mexico's long run economic growth if imports grow faster than exports. We tried to disentangle the effects of the first episode of trade reforms, which officially was initiated in 1985, from the second period of trade liberalisation, related to NAFTA, when trade liberalisation in services was formally included.

The trade reforms launched during the mid-1980s worsened the position of the trade balance by between 14 and 18 percentage points in 1985. Although the effect is fairly small, it is negative, showing that trade liberalisation, among other factors, contributed to a deterioration in the position of Mexico's trade sector. Regarding the effects of trade liberalisation related to NAFTA on the rate of growth of the trade balance, a negative impact is shown during the two years immediately after NAFTA was instituted. The effects of liberalisation on the current

account of the balance of payments are not significant. Harrison and Hanson (1999) have argued that the fact of not seeing considerable trade liberalisation effects is because trade reforms were initiated in conjunction with real exchange depreciation, and also because Mexican firms maintained output by cutting profit margins and wages. However, the analysis here controls for changes in the real exchange rate.

Finally, our analysis was extended to compare the performance of Mexico's long run economic growth before and after trade reforms; and, we also compare our results with previous studies (e.g. Moreno-Brid, 2001). The findings corroborate that the long run income elasticity of demand for imports has increased over time; the change is most likely linked to trade reforms. The increase in the income elasticity of demand for imports, which has not been compensated by a higher rate of growth of exports, has contributed to the slowdown of Mexico's long run equilibrium growth rate.

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Appendix

Table A1
OLS Estimation for the Trade Balance: 1980-2000

Dependent variable: the Trade Balance Rate of Growth (*tb*)

Regressor	Equations			
	A1.1	*A1.2*	*A1.3*	*A1.4*
ym	-2.14 (-2.30)*	-2.07 (-2.17)*	-2.24 (-2.20)*	-2.01 (-1.85)**
yus	2.55 (2.53)*	2.79 (2.59)*	2.43 (1.91)**	2.88 (1.91)**
p	0.70 (3.03)*	0.68 (2.89)*	0.67 (4.48)**	0.69 (2.48)*
tot	-0.13 (-0.40)	-0.23 (-0.62)	-0.16 (-0.45)	-0.22 (-0.56)
lib85		-0.03 (-0.65)		-0.03 (-0.60)
lib94			0.01 (0.21)	0.00 (0.09)
R^2	0.69	0.70	0.69	0.70
Durbin Watson	1.95	2.01	1.92	2.02
Diagnostic Tests				
Serial Correlation	*0.970*	*0.955*	*0.931*	*0.940*
Functional Form	*0.662*	*0.469*	*0.766*	*0.401*
Normality	*0.015*	*0.055*	*0.011*	*0.070*
Heteroscedasticity	*0.611*	*0.578*	*0.602*	*0.580*

Notes: Values in parentheses correspond to "t"-statistics. The asterisk (*) for the "t" statistics denotes significance of the coefficient at the 5 per cent level and the double asterisk (**) denotes significance of the coefficient at the 10 per cent level. The diagnostic tests show probabilities.

Table A2
OLS Estimation for the Trade Balance: 1980-2000

Dependent variable: Trade Balance Rate of Growth (*tb*)							
Regressor	*lib94*		*lib95*			*lib96*	
	A1.1	*A1.2*	*A1.3*	*A1.4*		*A1.5*	*A1.6*
Constant	0.19 (1.57)	0.19 (1.49)	0.10 (1.21)	0.19 (1.45)		0.12 (1.43)	0.18 (1.43)
ym	-3.87 (-2.74)*	-3.86 (-2.61)*	-3.33 (-2.53)*	-3.87 (-2.64)*		-3.85 (-2.82)*	-4.14 (-3.05)*
yus	-0.60 (-0.27)	-0.60 (-0.25)	0.31 (0.15)	-0.62 (-0.26)		-0.15 (-0.07)	-0.79 (-0.34)
p	0.23 (0.63)	0.23 (0.60)	0.42 (1.31)	0.23 (0.60)		0.38 (1.26)	0.24 (0.65)
tot	-0.02 (-0.07)	-0.02 (-0.06)	-0.01 (-0.03)	-0.03 (-0.08)		0.02 (0.07)	0.10 (-0.28)
lib86	-0.07 (-1.01)	-0.07 (-0.89)		-0.07 (-0.86)			-0.05 (-0.61)
lib94, lib95, lib96		-0.00 (-0.17)	0.03 (0.45)	-0.00 (-0.03)		0.08 (1.13)	0.04 (0.77)
R^2	0.74	0.74	0.72	0.74		0.74	0.75
Durbin Watson	2.18	2.18	1.93	2.18		1.94	2.13
Diagnostic Tests							
Serial Correlation	*0.648*	*0.641*	*0.969*	*0.635*		*0.983*	*0.676*
Functional Form	*0.778*	*0.776*	*0.875*	*0.835*		*0.840*	*0.817*
Normality	*0.288*	*0.287*	*0.030*	*0.284*		*0.034*	*0.248*
Heteroscedasticity	*0.264*	*0.266*	*0.317*	*0.251*		*0.268*	*0.212*

Notes: Values in parenthesis correspond to "t"-statistics. The asterisk (*) for the "t" statistics denotes significance of the coefficient at the 5 per cent level. The diagnostic tests show probabilities.

Table A3
OLS Estimation for the Trade Balance: 1980-2000

Dependent variable: Trade Balance Rate of Growth (*tb*)					
	lib94			*lib95*	*lib96*
Regressor	*A2.1*	*A2.2*		*A2.3*	*A2.4*
Constant	0.25 (1.69)	0.26 (1.61)		0.22 (1.51)	0.27 (1.97)

ym	-4.30 (-2.80)*	-4.31 (-2.71)*		-3.90 (-2.71)*		-4.74 (-3.20)*
yus	-1.61 (-0.61)	-1.61 (-0.59)		-0.86 (-0.36)		-1.56 (-0.71)
p	0.08 (0.18)	0.07 (0.17)		0.21 (0.57)		0.16 (0.47)
tot	0.16 (0.44)	0.20 (0.47)		0.21 (0.47)		0.36 (0.86)
lib87	-0.11 (-1.20)	-0.12 (-1.12)		-0.09 (-0.98)		-0.12 (-1.35)
lib94, lib95, lib96		-0.01 (-0.22)		-0.01 (-0.20)		0.02 (0.27)
R^2	0.74	0.74		0.74		0.77
Durbin Watson	2.14	2.15		2.14		2.22
Diagnostic Tests						
Serial Correlation	*0.734*	*0.719*		*0.748*		*0.609*
Functional Form	*0.829*	*0.707*		*0.908*		*0.286*
Normality	*0.268*	*0.228*		*0.173*		*0.204*
Heteroscedasticity	*0.247*	*0.282*		*0.266*		*0.366*

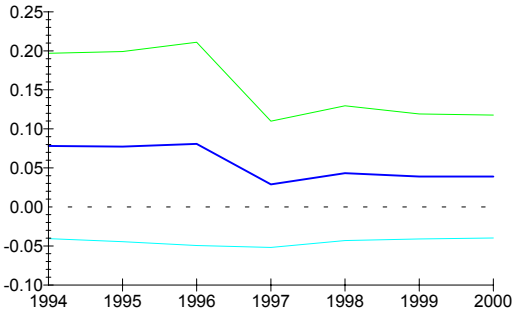
Notes: Values in parentheses correspond to "t"-statistics. The asterisk (*) for the "t" statistics denotes significance of the coefficient at the 5 per cent level. The diagnostic tests show probabilities.

Table A4
Rolling Regressions for Current Account of the Balance of Payments
(window size 14)

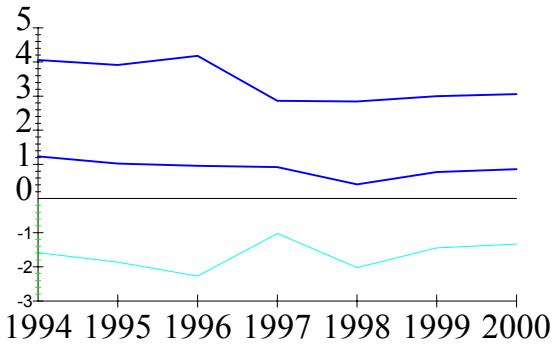
Dependent variable: *ca*							
Regressor	1981-94	1982-95	1983-96	1984-97	1985-98	1986-99	1987-00
Constant	0.14 (2.31)*	0.11 (1.66)	0.10 (1.56)	0.08 (1.24)	0.05 (1.18)	0.05 (1.18)	0.05 (1.36)
ym	-4.59 (-4.58)*	-4.17 (-3.47)*	-4.00 (-3.10)*	-1.48 (-1.64)	-1.52 (-1.87)	-1.50 (-2.01)*	-1.61 (-2.24)*
yus	0.82 (0.65)	0.65 (0.44)	0.72 (0.45)	0.86 (0.86)	0.40 (0.32)	0.71 (0.63)	0.51 (0.45)
p	0.21 (1.09)	0.08 (0.36)	0.09 (0.35)	0.44 (2.36)*	0.44 (2.54)*	0.44 (2.77)*	0.37 (2.09)*
tot	0.53 (1.99)	0.30 (1.14)	0.29 (1.09)	0.12 (0.73)	0.13 (0.81)	0.13 (0.87)	0.33 (1.11)

Note: The asterisk (*) denotes significance at the 5 per cent.

Graph A1
Rolling Coefficients for Current Account of the Balance of Payments
Coefficient of *Constant* and its two S.E.
bands based on rolling OLS

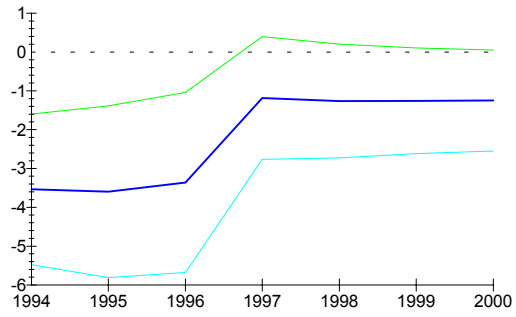


(a)



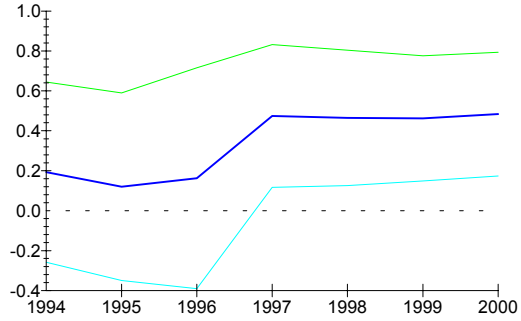
(c)

Coefficient of *ym* and its two S.E. bands based on rolling OLS



(b)

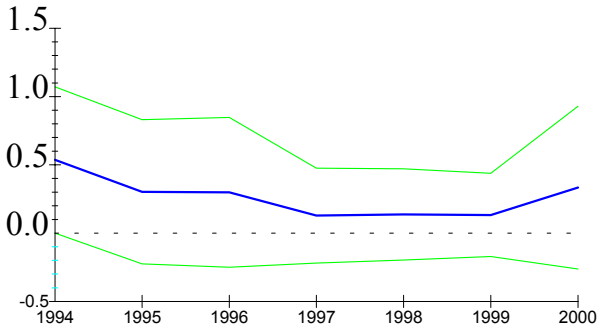
Coefficient of *p* and its two S.E. bands based on rolling OLS



(d)

Coefficient of *yus* and its two S.E. bands based on rolling OLS

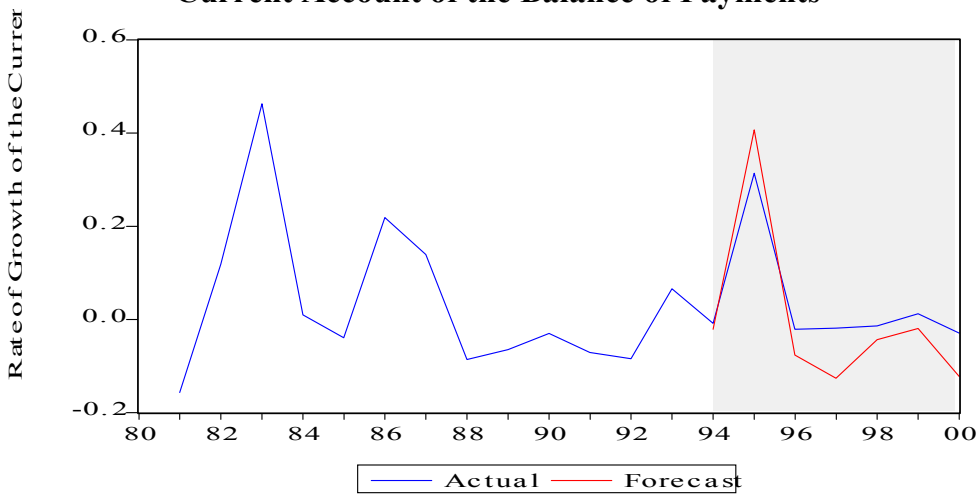
Coefficient of *p* and its two S.E. bands based on rolling OLS



(e)

Graph A2

Actual and Single Equation Static Forecast for the Current Account of the Balance of Payments



Forecast Evaluation	
Root-mean square error	0.069603
Theil inequality coefficient	0.239169
Bias proportion	0.235997
Variance proportion	0.648081
Covariance proportion	0.115952

Table A5
ARDL (1,0,0,0) Long Run Coefficients and Error Correction Model for the Current Account of the Balance of Payments

LBP = -19.51 – 1.38LYM + 2.25 $LYUS$ + 0.62 LP - 0.03 $lib94$	Long Run Model	(5.7'')
t-statistic (-5.66)* (-2.38)* (6.22)* (3.08)* (-0.44)		
bp = -17.86 – 1.26 ym + 2.06 yus + 0.57 p - 0.02 $lib94$ - 0.91 ecm_{-1}	ECM	(5.8'')
t-statistic (-4.31)* (-1.97) (3.56)* (4.06)* (-0.44) (-6.09)*		

Table A6
Income Elasticities of Demand for Imports

Period	π	Period	π
1968-1983	1.39	1977-1992	1.46
1969-1984	1.48	1978-1993	1.60
1970-1985	1.46	1979-1994	1.65
1971-1986	1.56	1980-1995	1.55
1972-1987	1.62	1981-1996	2.66
1973-1988	1.55	1982-1997	3.53
1974-1989	1.46	1983-1998	3.10
1975-1990	1.50	1984-1999	3.14
1976-1991	1.60		

Source: Moreno-Brid (2001), from Table 4.4.