

Trade Reform and Manufacturing Performance in Mexico: from import substitution to dramatic export growth

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Abstract. Since the trade liberalisation of the mid 1980s the trade regime facing Mexican manufacturers has changed dramatically. The economy has moved from one where import substitution behind tariffs and some licensing restrictions was the norm to a highly open trading environment with virtual free trade between Mexico and its largest trade partner the USA and modest tariffs of around 10 per cent with other countries. Since the late 1980s manufactured exports have grown dramatically at one of the fastest rates of any economy, although financed by large capital inflows the net trade balance in manufactures remains negative. This paper surveys the recent evidence on the impact of this liberalisation process on manufacturing performance. Various performance indicators can be used to assess the impact on manufacturing. Here four are discussed: (1) revealed comparative advantage measures of net trade balance; (2) efficiency wage estimates of unit labour costs; (3) total factor growth; (4) export growth. The performance of different branches of manufacturing is examined using these indicators and tests are conducted to establish links between movements in these indicators and the degree of exposure to foreign competition experienced by the various branches. The general conclusion is that the evidence is ambiguous with only some studies supporting the view that the greater the trade liberalisation in a branch the greater will be the subsequent improvement in performance.

Introduction

The programme of trade reform introduced in Mexico in the period 1985–87 was one of the most far-reaching of any developing economy. In a relatively brief period import quota restrictions were removed for most goods, and import duties were lowered to an average of around 10 per cent. Further, with the commencement of NAFTA in 1994, apart from a limited number of sensitive sectors, trade between Mexico and its main trading partner the USA became on a totally unrestricted basis. Trade reform was a central plank of the strategy of ‘neo-liberalism’ pursued

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more or less consistently since the emergence of the debt crisis in 1982.¹ This strategy involved a rigorous application of what has become orthodox policy advice; the government budget deficit was cut dramatically; price controls and subsidies were removed; the size of the public sector was greatly reduced through wide-ranging privatisations; current and capital account restrictions were removed; foreign investment was encouraged by legislative reform; and monetary conservatism was combined with a form of prices and incomes policy to stabilise inflation.

By the end of the 1990s the result was to create an economy very much more open to foreign trade and capital flows than was the case in the 1970s or early 1980s. In constant prices total exports rose from around 8 per cent of GDP in 1980 to 28 per cent in 1996.² Manufactured exports have grown at what can only be described as a dramatic rate of 20 per cent annually in current dollars over the period 1985–96. Over this period their growth exceeded significantly that of the famous Asian Tigers (South Korea, Singapore, Hong Kong and Taiwan). This rapid growth combined with weaker oil prices meant that manufactures rather than oil became the main source of export revenue. By 1996 oil accounted for only 12 per cent of export revenue compared with 55 per cent in 1985.³ However, in response to trade liberalisation, imports also increased substantially with the estimated marginal propensity to import rising from 9 per cent in the 1970s to 14 per cent in the period after the liberalisation.⁴ For most years of the post-liberalisation period imports have exceeded exports and this, combined with a large deficit on factor services (principally interest repayments on foreign debt) has been covered by large foreign capital inflows. Mexico has become one of the major recipients of foreign portfolio and direct investment, so that foreign savings were as much as 6–7 per cent of GDP at the peak of foreign inflows in the early 1990s.⁵

Despite what appears superficially to be a highly successful and comprehensive shift away from policies based on government intervention, trade controls and import substitution, legitimate doubts

¹ For an authoritative assessment of the programme of trade reform, see A. Ten Kate, 'Trade liberalization and economic stabilization in Mexico: lessons of experience', *World Development*, vol. 20 (1992). For a broader discussion of the 'neo-liberalism' strategy, see J. Weiss, 'Economic policy reform in Mexico: the liberalism experiment' in R. Aitken, N. Craske, G. Jones and D. Stansfield (eds.), *Dismantling the Mexican State* (Basingstoke, 1995).

² Banco de México, *The Mexican Economy 1997*, (Mexico DF, 1997), p. 209. These figures treat maquiladora exports on a value-added basis; that is imported inputs are not included as part of their exports.

³ *Ibid.*, p. 215.

⁴ G. Fuji and E. Loria, 'El sector externo y las restricciones al crecimiento económico de México', *Comercio Exterior*, vol. 46, no. 6 (1996), p. 122.

⁵ Banco de Mexico, *The Mexican Economy 1997*, p. 245.

remain concerning the overall effectiveness of this liberalisation strategy. GDP growth has been well below East Asian standards; until 1997 in no year since the trade reforms of the mid-1980s has growth exceeded 5 per cent annually and the average for 1987–96 is only 2.6 per cent, or roughly the rate of population increase. This average is brought down by the severe drop in GDP of 6 per cent in 1995 as a result of the speculative run on the peso commencing in late 1994, which generated severe monetary contraction in 1995. The vulnerability of the economy to short-term decisions of foreign investors is one of the key criticisms of the current strategy. Explanations for the 1994–5 crisis vary; some see it as a result of a misalignment of the real exchange rate, which had been appreciating since 1987, others see excessive credit creation by the central bank as the main culprit. The interpretation of the economists of the Banco de México is set out forcefully by Gil-Díaz and Carstens; they argue that the real exchange rate appreciation since 1987 was simply the result of the earlier large nominal devaluations feeding through to domestic prices; that central bank credit expansion was a response to, not a cause of, loss of foreign exchange reserves; and that the explanation for the crisis lies primarily in ‘a politically triggered speculative attack, not a crisis based on a misalignment of real phenomena’.⁶

Despite the dramatic growth of manufactured exports, the import intensity of export production and the trade deficit in manufactures have prompted concern that sources of funding to cover the large bill for manufactured imports may not be available in future. Further, the desirability of fostering efficient local linkages or production chains between exporters and local input suppliers is recognised in official policy.⁷ The new instruments for stimulating linkages are to be measures such as improvements in infrastructure, provision of finance and improvements in information, rather than, as in an earlier period, trade protection. Finally, doubts remain concerning the underlying efficiency of the manufacturing sector; for example whether rapid export growth has been due to falling real wages rather than to improvements in productivity and technical change.⁸

This article focuses on this latter issue of industrial efficiency in the post liberalisation period by surveying some of the more significant recent

⁶ F. Gil Díaz and A. Carstens, ‘Some hypotheses related to the Mexican 1994–95 crisis’, *Banco de México Serie Documentos de Investigación*, no. 9601, (Mexico, 1995).

⁷ See the Programme of Industrial Policy and Foreign Trade of the Ministry of Trade and Industrial Development, May 1996 summarised in 1996. *Comercio Exterior*. Programa de Política Industrial y Comercio Exterior vol. 46, no. 6.

⁸ J. Casar, ‘La competitividad de la Industria Manufacturera Mexicana 1980–90’, *El Trimestre Económico* vol. 60, no. 1 (1993).

contributions to the literature and, where appropriate, contrasting these with the results of earlier work by the author.⁹ The question is of importance not just for Mexico since, despite the wealth of studies on the impact of trade reform across a range of countries, relatively little is known about the process of transition from a trade policy of import substitution to that of a more open economy. Here the primary concern is to establish which parts of manufacturing have experienced the greatest efficiency gains post-liberalisation, and to test whether the degree of improvement can be linked with previous levels of or changes in protection. The focus is on the period from the second half of the 1980s, when trade reform commenced, to the early 1990s. This is the period in which the once-for-all competitive stimulus of import liberalisation should be felt. Beyond these dates one would pick up the dynamic or long-run consequences of reform, which are the more difficult to identify both empirically and conceptually. The remaining sections of the article are organised as follows. Section two describes the evolution of manufacturing post-1985 in terms structural change and output growth. Section three discusses methodological issues relating to the impact of trade reform on performance. Sections four, five and six discuss different measures of performance. Section four discusses changes in the net trade balance and revealed comparative advantage. Section five analyses growth of labour productivity and changes in unit labour costs and alternative estimates of total factor productivity growth. Section six considers the evidence on manufactured export growth.

Structural change in manufacturing

Overall manufacturing growth post-liberalisation has been both erratic and relatively modest. In 1993 prices if we compare the two peak years of 1985 and 1994 the simple arithmetic average growth of total value-added is 3.3 per cent and the logarithmic growth between the two years is 2.5 per cent annually.¹⁰ This type of simple comparison is highly sensitive to the base year for comparison. Manufacturing growth has been negative in 1986, 1993 and 1995, but was over 6 per cent in 1985, 1989 and 1990. Inclusion of the recession year of 1995, when total value added fell by nearly 5 per cent will lower these averages. As has been pointed out,

⁹ J. Weiss, 'Trade policy reform and performance in Manufacturing: Mexico 1975-88', *Journal of Development Studies*, vol. 29, no. 1 (1992); J. Weiss, 'Export response to trade reform: recent Mexican experience', *Development Policy Review*, vol. 10, no. 1 (1992); J. Weiss, 'Trade liberalization in Mexico: concepts, measures and short-run effects', *Weltwirtschaftliches Archiv*, band 128, heft 4, (1992).

¹⁰ Data cited here come from the national accounts of INEGI. See INEGI, *Sistema de Cuentas Nacionales de México*, Instituto Nacional de Estadística Geográfica y Informática, (Mexico, various).

Table 1. *Structure and growth of manufacturing*

Category	1985 (%)	1988 (%)	1994 (%)	Change 1985/94 ^(a)	Change 1988/94 ^(a)
Food, drink, tobacco	27	27	27	29.7	29.1
Textiles, clothing, leather	11	10	9	2.0	11.8
Wood, wood products	4	4	3	0.7	2.5
Paper, printing	5	5	5	30.5	28.4
Chemicals, petroleum	17	17	16	22.3	19.2
Non-metallic minerals	8	8	8	33.3	31.9
Basic metals	4	5	5	28.8	16.3
Machinery, equipment	22	22	25	46.7	45.0
Others	2	2	2	38.6	50.3

Source: Calculated from INEGI (various).

Note ^(a) change refers to percentage growth in value-added over period.

growth of manufacturing in the import-substitution decade of the 1970s was higher at around 7 per cent annually.¹¹

In response to a rapid trade reform one would not expect a uniform response within the manufacturing sector. In fact, if resources are to be reallocated in line with long-run comparative advantage, arguably the more heterogeneous the response the better as efficient activities grow rapidly and inefficient ones contract. Table 1 summarises the shift in composition of manufacturing taking as reference points the peak years of 1985 and 1994 and also the first full post-liberalisation year 1988.

The main shift which emerges from Table 1 is the decline of about two percentage points in the share of the traditional branches of textiles, clothing and leather, and the rise of around three percentage points in the share of machinery and equipment. Branches covering textile, clothing and leather and also wood and wood products have barely grown at all since 1985, whilst within the broad grouping of machinery and equipment it is automobiles and electronics that have been the most dynamic. These latter are technologically sophisticated, relatively capital and skill-intensive, products. They are quite distinct from the simple labour-intensive manufactures in which liberalising developing economies might be expected to have a short-run comparative advantage.

Assessing the impact of trade reform

An important question is how far we can explain the pattern of manufacturing development after liberalisation by the protection previously enjoyed by different branches. In other words have the previously more protected branches found it more difficult to adjust to a significantly

¹¹ J. Casar, 'El sector manufacturero y la cuenta corriente: evolución reciente y perspectivas' in F. Clajivo and J. Casar (ed.), *La Industria Mexicana en el Mercado Mundial*, El Trimestre Económico Lecturas 80 (Mexico, 1994).

more competitive market environment? Alternatively, have the branches where liberalisation has been most marked had a greater efficiency gain? The economic consequences of trade reform have been widely debated in the literature, and despite the central place trade liberalisation measures occupy in current reform programmes, academic discussions are relatively guarded concerning the beneficial effects to be expected from such measures. Theoretically trade policy will be one of several potential influences on economic performance in tradeable activities; market structure, technological levels and ownership are other important possible influences. Hence in principle one would expect the degree to which trade reform improves performance to vary with the accompanying market, technological and ownership conditions. For example, in an influential survey Rodrik points out that benefits most widely anticipated from the trade liberalisation – improved incentives for previously sheltered producers, increasing returns and technological innovation – need arise only under certain restrictive conditions and that under alternative assumptions a protected domestic market can create equivalent benefits.¹² A strict test of the impact of trade reform would allow other conditions to be held constant and explore the consequences of changes in trade policy alone for particular branches of economic activity.¹³ If changes in a measure of trade policy are correlated with changes in a measure of economic performance with the expected sign this can be taken as evidence that trade policy has a beneficial effect. On the other hand, lack of any correlation can be interpreted as evidence for the absence of such a positive effect. In principle, under certain conditions, relating principally to internal resource immobility, the consequences of reform may be negative, which would be implied by a significant negative correlation between a measure of the degree of liberalisation and performance. Application of such an approach is subject to familiar problems of establishing causation, as well as specific measurement difficulties, since it requires indicators of both the degree of change in trade policy as well as measures of economic performance.

For Mexico a number of alternative measures of the restrictiveness of trade policy are available. Ten Kate and Ten Kate and de Mateo report several alternative measures including the share of domestic production protected by import licenses, nominal and effective rates of protection and

¹² D. Rodrik, 'Closing the Technology Gap: Does Trade Liberalization Really Help?' in G. Helleiner (ed.), *Trade Policy, Industrialization and Development: New Perspectives* (Oxford, 1992).

¹³ We adopt this approach in Weiss 'Trade liberalization in Mexico'. A more recent application is the model of Iscan, see T. Iscan, 'Trade liberalization and productivity: a panel study of the Mexican Manufacturing industry', *Journal of Development Studies*, vol. 34, no. 5 (1998).

average tariff rates.¹⁴ The former has the disadvantage that it does not indicate whether licenses were easy or difficult to obtain. The reliability of the nominal and effective protection estimates is open to doubt because of their negative values which indicate that even before full liberalisation domestic prices in Mexico were below world levels. In this article actual tariff rates are used as a measure of potential nominal protection. Hence change in trade policy is picked up by changes in tariff rates. A potentially important omission is that tariff indicators will not pick up the effect of the industrial programmes used in the 1980s to provide selective support to automobiles, computers and pharmaceuticals. Activities in these areas were granted special treatments including delays to the process of liberalisation and special access to tax credits and imported inputs. As a condition for this special support producers were required to match their expenditure on imports with export sales to achieve an overall foreign exchange balance, and to maintain a given minimum differential between local and import prices. In automobiles and computers, particularly, such programmes had an important impact on export expansion. These special programmes were only removed by the early 1990s, several years after liberalisation elsewhere was complete.¹⁵ However, although the impact of such programmes is not captured by tariff data, insofar as the programmes raised domestic relative to world prices, their effect will be picked up in the nominal and effective protection estimates.

In terms of performance indicators several alternatives are available. Here we discuss the evidence concerning three separate types of efficiency indicator for which there are secondary estimates. These are: revealed comparative advantage ratios; productivity and efficiency wage measures; export growth. This article discusses the studies of others who have tried to link these efficiency measures with the trade policy position, and in addition provides its own simple bi-variate tests on the secondary data.

Trade balance

If imports grow by more than exports of similar goods this may be interpreted as a decline in competitiveness. However, where non-identical manufactured goods are involved intra-industry trade will be taking place and a declining net balance need not reflect a loss of competitiveness, since specialisation in particular lines will be occurring. Intra-industry trade is likely to be particularly significant in the equipment and transport

¹⁴ A. Ten Kate, 'Notas sobre la apertura comercial de Mexico: experiencias y lecciones' *Ensayos Sobre Política Económica*, no. 15, (Bogotá, 1989); A. Ten Kate and F. de Mateo, 'Apertura comercial y estructura de la protección en México: estimaciones cuantitativas de los ochenta', *Comercio Exterior* vol. 39, no. 4 (1989).

¹⁵ J. Ros, 'Mexico's Trade and Industrialization Experience since 1960', in G. Helleiner (ed.), *Trade Policy and Industrialization in Turbulent Times* (London, 1994).

Table 2. *Share of trade in manufacturing at constant prices (1982-95)*^(a)

Per cent	1982	1985	1988	1989	1990
Imports in internal demand ^(b)	10.9	9.3	12.4	13.8	15.5
Exports in domestic production	4.3	7.8	16.1	16.0	16.3
Net trade balance in domestic production ^(c)	-7.4	7.7	-0.9	-2.9	-4.9
Per cent	1991	1992	1993	1994	1995
Imports in internal demand ^(b)	17.7	20.7	21.4	25.0	23.2
Exports in domestic production	16.6	17.4	19.2	22.4	31.5
Net trade balance in domestic production ^(c)	-7.4	-10.8	-10.0	-11.6	4.9

Source: computed from INEGI (various).

Notes: ^(a) For 1982 and 1985 values are at 1980 prices; for all other years values are at 1993 prices. ^(b) Internal demand is domestic production plus imports minus exports. ^(c) Net trade balance is exports minus imports.

branches of manufacturing. Since the mid-1980s both for manufacturing in the aggregate and for the majority of branches imports have increased by more than exports. Table 2 gives the aggregate position showing a rising deficit and an increase in the share of imports in internal demand up to 1994.

The case of individual branches or sub-sectors has been examined in detail by Casar, who has calculated revealed comparative advantage indicators for two digit manufacturing branches for the 1980s.¹⁶ Casar uses a revealed comparative advantage indicator (RCA) where

$$RCA_i = (X - M)_i / ((X + M)_m / 2) * (X_{iw} / X_w), \quad (1)$$

where X and M are exports and imports respectively, i refers to industrial branch i , m refers to total for Mexico, and w refers to world total.

From (1) RCA for branch i is given as the net trade balance in i divided by the share of exports of i in total world trade in manufactures multiplied by the average of total Mexican imports and exports of manufactures. RCA will be positive where exports exceed imports and will be larger the higher is the ratio of the net trade balance for a branch to the average Mexican manufactured trade relative to the share of the branch in world trade.¹⁷

The pattern which emerges clearly from this disaggregated branch analysis is that in general over the 1980s RCA indicators have declined indicating a worsening trade balance. If one compares the beginning and

¹⁶ J. Casar, 'La competitividad de la Industria Manufacturera Mexicana'.

¹⁷ RCA indicators are useful primarily to compare relative competitiveness of activities at a single point in time. A significant limitation is that measures such as equation (1) will not capture changes in the overall trade deficit and thus will not reflect macro-competitiveness (I owe this point to the comment of an anonymous JLAS referee).

Table 3. Revealed comparative advantage ratios 1987–90: The nine gainers

Branch	Gain in RCA 1987–90	Share in value added (%) in 1988
12 Processed fruits	0.49	0.9
17 Edible oil	1.19	0.9
34 Basic petrochemicals	0.64	1.1
35 Basic chemicals	0.33	1.5
36 Fertilisers	1.0	0.6
40 Other chemicals	0.31	1.6
51 Non electrical machinery	0.17	2.1
58 Transport equipment	0.32	0.6
59 Other manufactures	0.19	1.9
Total		11.2

Source: calculated from data in Casar 'La competitividad de la Industria Manufacturera Mexicana 1980–90', *El Trimestre Económico* Vol. 60 no. 1 (1993), Appendix table B.

end of the decade out of 42 branches examined, 15 had a negative RCA in 1980–1; these represented approximately 21 per cent of manufacturing value-added. In 1989–90 15 branches covering 38 per cent of value-added had negative RCA.¹⁸ If we focus on the post-liberalisation period of 1987–90 the RCA ratio declined, indicating a rise in imports relative to exports, in all but nine branches. These nine gainers covered 11 per cent of total manufacturing value-added. The branches where the RCA ratio rose rather than fell are given in table 3, together with their share in value-added in manufacturing.

There is little evidence that the fall in RCA ratios, that is the growth of imports relative to exports, tended to be stronger in branches where the impact of trade liberalisation was greatest. Although several alternative measures of the pre-reform level of protection are available we use here the branch average rate of tariff.

When we rank branches by the rise in the RCA ratio and the change in the tariff rate over 1987–90 we find a Spearman Rank Correlation coefficient of -0.09 (insignificant at the 10 per cent level). The sign of the relationship as indicated by the Spearman coefficient is negative. Hence the implication that branches with the highest falls in their RCA ratio, where imports rose most rapidly relative to exports, tended to be those branches where the rate of import tariff fell least. However, the lack of statistical significance implies that little can be read into this relationship. A ranking comparison of the pre-reform level of protection and the change in the RCA ratio finds a positive, but still insignificant, relationship.

¹⁸ See J. Casar, 'La competitividad de la Industria Manufacturera Mexicana', p. 124, table 3.

As noted above because of the existence of intra-industry trade in manufactures changes in RCA indicators are not conclusive evidence of changes in competitiveness after liberalisation. For more substantive evidence on this we turn to productivity-based measures.

Productivity change

To assess the impact of liberalisation on efficiency we consider evidence from several sources. First, we examine estimates of movements in unit labour costs, similar to the concept of efficiency wages. Secondly, we survey recent estimates of total factor productivity growth normally recognised as the most rigorous indicator of changes in efficiency and technical change.

The unit labour cost data come from Hernández,¹⁹ who defines unit labour cost (ULC) as

$$\text{ULC} = W/(e^*p), \quad (2)$$

where W is total payments per person hour in local currency, e is the nominal exchange rate and p is labour productivity.

Branches where productivity rises by more than wages in US\$ will have a negative rates of increase of ULC, whilst branches where productivity growth is above average, whilst wage growth is below-average, will have a below average rise in ULC.

The average annual change in ULC is calculated for 48 manufacturing branches by Hernández.²⁰ Only branch 56 (Automobiles), where productivity growth has been rapid does ULC fall after 1987. Again we use the Spearman Rank Correlation test to establish whether there is any correspondence in ranking by rise in ULC and alternatively the change in or pre-liberalisation level of average tariff protection. Although the sign of the coefficient is negative in the first comparison, implying that a below average fall in protection is associated with an above average rise in ULC again the coefficient is insignificant. Similarly for ranking by level of protection in 1985 the coefficient is positive, implying that relatively high protected branches pre-liberalisation had above average increases in ULC. Again, however, it is insignificant.²¹

Whilst the ULC indicator contains only single factor labour productivity data more comprehensive total factor productivity estimates for Mexico based on national accounts data are available in Brown Domínguez (1994), Tybout and Westbrook (1995) and Iscan

¹⁹ E. Hernández, 'Mexico: competitividad laboral y tipo de cambio', *Comercio Exterior*, vol. 46, no. 2 (1996).

²⁰ *Ibid.*

²¹ These comparisons use growth of ULC 1987-93 taken from Hernández, *Ibid.* table 1, and both change in average protection 1987-90 and the level of protection in June 1985. Comparable detailed protection data are not available after 1990.

Table 4. *TFP summary estimates*

	1984-7 ^(a) (%)	1987-90 ^(a) (%)	NRP 1985 ^(b) (%)	Change NRP ^(c) (%)
Food, beverages, tobacco	-2.0	11.6	35.7	-20.6
Textiles, apparel, leather	0.2	0.8	41.8	-24.5
Wood	2.3	0.8	36.5	-19.0
Paper, printing, publishing	6.2	3.4	19.2	-9.9
Chemicals, rubber, plastic	-2.5	4.7	31.4	-17.0
Non-metal minerals	5.7	5.4	29.3	-15.4
Basic metals	2.8	8.9	24.0	-12.7
Metal products, machinery, equipment, others	1.2	13.9	33.2	-18.3
All manufacturing ^(d)	0.8	10.5	33.3	-18.6

Source: TFP estimates from Brown and Domínguez, 'The dynamics of productivity performance in Mexican Manufacturing 1984-90', *The Developing Economies*, vol. 32 no. 3 (1994), Table 2. Protection data from Ten Kate, 'Notas sobre la apertura comercial de México: experiencias y lecciones', *Ensayos Sobre Política Económica* no. 15 (Bogotá, 1989), Table 5.

Notes: ^(a) Average annual growth. ^(b) NRP is average rate of tariff weighted by branch share in production at June 1985. ^(c) Change in NRP is the percentage point change in weighted average tariff June 1985-December 1987. ^(d) Excluding petrochemicals.

(1998).²² The first two derive their data from large firm or plant level surveys, whilst the latter uses national accounts data.

Total factor productivity growth (TFP) is the residual growth of value-added not explained by growth of factor inputs and is estimated empirically as

$$TFP = gV_a - (a_1 \cdot gK + a_2 \cdot gL), \quad (3)$$

where V_a is value added, K is capital inputs, L is labour inputs, g is rate of growth, and a_1 and a_2 are the weights on capital and labour, respectively, measured as the average share of the costs of the respective factors in value added.

Most empirical studies find TFP growth to be closely correlated with growth of output due to dynamic returns to scale, but policy related factors such as trade liberalisation may also be significant. Brown and Domínguez cover the period 1984-90, and their results for sub-sectors of manufacturing are summarised in table 4 along with the average protection and its change for the different sub-sectors.²³

Table 4 indicates a sharp rise in TFP growth after 1987. All manufacturing sub-sectors experienced a reduction of average protection of 10 percentage points or more during the 1985-7 period, with average

²² F. Brown and L. Domínguez, 'The dynamics of productivity performance in Mexican manufacturing 1984-90', *The Developing Economies*, vol. 32, no. 3 (1994); J. Tybout and D. Westbrook, 'Trade liberalization and dimensions of efficiency change in Mexican Manufacturing industries', vol. 39 (1995); and T. Iscan, 'Trade liberalization and productivity'.
²³ See Brown and Domínguez, *Ibid.*

Table 5. *Protection in high and low productivity growth branches*

Branches	NRP ^(a) 1985 (%)	Change in NRP ^(b) 1985–7 (%)
High productivity	33.7	– 18.9
Low productivity	34.7	– 20.3

Source: Calculated from TFP estimates of Brown and Domínguez, ‘The dynamics of productivity performance’, Table 2 and protection data of Ten Kate ‘Notas Sobre la apertura comercial de México’, Table 5.

Notes: ^(a) NRP is average rate of tariff weighted by branch share in production at June 1985. ^(b) Change in NRP is the percentage point change in weighted average tariff June 1985–December 1987.

manufacturing protection falling from 33 per cent to below 15 per cent. However, at the sub-sector level it is difficult to ascertain any clear link between either initial protection pre-liberalisation or change in protection and productivity performance.

As a test of this latter relationship we look at the more disaggregate branch level and take the two sets of 14 branches with the highest and lowest TFP growth. In table 5 we show the average protection in 1985 and the change in protection 1985–87 for the two groups. In neither instance however are the differences in means statistically significant.

Again lack of any relation between protection and productivity is confirmed by the regression analysis of Brown and Domínguez who explain branch TFP by a regression model containing as explanatory variables output growth in each branch, the ratio of exports to output and of imports to output in each branch and a measure of trade liberalisation.²⁴ This latter is proxied by the change in the level of branch production protected by import licences between 1985–8. In their analysis only the output growth variable is significant. However, as we have noted the share of domestic output for which competing imports are subject to licensing restrictions is an imperfect proxy for the tightness of trade controls, since it gives no information on how easy it is to obtain licenses. Even where the share of output covered by licensing is high, protection may still be low if there is no difficulty in obtaining licenses.

The limitations of this protection indicator may explain why another study (Iskan, 1998) finds that changes in the Effective Rate of Protection taken from Ten Kate and de Mateo (1989) are a significant variable in explaining variations in TFP levels between branches, with an expected negative sign.²⁵ An above average fall in protection is thus associated with an above-average once-for-all shift in the level of total

²⁴ *Ibid.*, p. 288.

²⁵ See T. Iskan, ‘Trade liberalization and productivity’ and Ten Kate and de Mateo, ‘Apertura comercial’.

Table 6. *Explanation of export growth 1983–94*

Group	Explained annual ^(a) growth (%)	Actual annual growth (%)	NRP ^(b)
Rubber	1.53	14.28	35.6
Plastics	1.52	17.52	37.6
Cement and non-metallic minerals	2.97	8.12	28.4
Iron and steel	2.92	10.62	13.4
Transport equipment	1.15	15.42	34.2
Professional equipment	1.13	16.96	50.8
All manufactures	-1.67	12.08	33.3

Source: Data on exports come from Graf, 'El crecimiento de las exportaciones y el desempeño de la productividad en la Industria Manufacturera en México', *Banco de México Serie Documentos de Investigación* no. 9605 (Mexico, 1996), Table 7 and on protection from Ten Kate Table 5.

Notes. ^(a) Growth in exports explained by RULC. ^(b) NRP is average rate of tariff at June 1985 weighted by branch share in production.

factor productivity. Hence the conclusion that branches with greater falls in protection had greater productivity gains. This also supports the earlier analysis by Weiss, where changes in nominal protection are found to be a significant factor in explaining productivity performance. However the Iscan study finds no relation between the initial level of protection pre-reform and subsequent performance in TFP growth.²⁶

Tybout and Westbrook decompose plant-level TFP growth into three components; a scale effect (where output expansion results in greater efficiency), a share effect (where output re-allocation between plants creates greater efficiency) and a residual effect (picking up a range of potentially important factors including learning, innovation, managerial effort and capacity utilisation).²⁷ In the aggregate it is this latter effect which dominates with the scale effect, which is often stressed in theoretical discussions of the benefits from trade liberalisation, both small and, for some branches, negative. Our concern is with any possible link between these results and liberalisation. Tybout and Westbrook test for this using rank correlation analysis, but as with our results here find no link between changes in degree of protection and TFP performance.²⁸ The only robust result to emerge from their study is that the initial degree of openness to foreign trade, as measured by the import share in production in 1984 is significantly and positively correlated with subsequent TFP growth. Hence it is the more open branches pre-reform, not those with greater tariff or licence reductions, that show the greater efficiency gains. This

²⁶ Weiss, 'Trade policy reform and performance'.

²⁷ Tybout and Westbrook, 'Trade liberalization and dimensions of efficiency change'.

²⁸ *Ibid.*, p. 74.

result appears to contradict that of Iscan who finds that initial protection has no influence on subsequent productivity growth.²⁹ However, this can be explained by the fact that whilst Tybout and Westbrook use import share as their measure of openness pre-liberalisation the Iscan study uses the effective rate of protection. From the evidence presented by Tybout and Westbrook these two indicators are not correlated significantly.³⁰ Further Iscan in a multivariate analysis found a robust positive relationship between imported input use in 1980 and productivity growth over the subsequent period, but no significant relationship between period average import penetration ratios (which are the Tybout and Westbrook openness measure) and productivity growth.

Export growth

As noted at the outset, export growth for manufactures has been rapid and impressive. Although a strong export performance is often interpreted as unambiguous evidence of improved performance export growth can arise from a number of factors. The most detailed recent study on export performance is Graf (1996), who uses a regression model to explain export performance 1983–94 in the aggregate and at the sub-sector level for 18 manufacturing groups.³¹ The model is as follows:

$$X = a + b_1 \cdot \text{RULC} + b_2 \cdot \text{CAP} + b_3 \cdot \text{USM} + u, \quad (4)$$

where X is manufactured exports, RULC is unit labour costs in the USA relative to Mexico, CAP is an index of production capacity in Mexico, USM is an index of US imports, u is an error term, and all values are logarithmic. Equation (4) combines a demand variable (USM), a supply side variable (CAP) and a competitiveness variable (RULC). Here our concern is the relative impact of improved competitiveness as an explanatory variable for export growth. For all manufactured exports the coefficient on RULC is significant with the expected positive sign. It is also significant with the expected sign for 11 out of the 18 groups. However, for manufactured exports from the seven groups Textiles, Leather, Shoes, Wood, Chemicals, Glass, and Electrical machinery there is no relationship found between improved competitiveness and higher exports.

Where there is a relationship it is also of interest to establish its magnitude. Table 6 gives the sub-groups where there is a significant

²⁹ T. Iscan, 'Trade liberalization and productivity'.

³⁰ Tybout and Westbrook, 'Trade liberalization and dimensions of efficiency change', p. 72.

³¹ J. Graf, 'El crecimiento de las exportaciones y el desempeño de la productividad en la Industria Manufacturera en México', *Banco de México Serie Documentos de Investigación*, no. 9605, (Mexico, 1996).

relation between competitiveness and exports and where RULC explains more than one percentage point annual growth in exports 1983–94.

In all cases growth actually explained by improved competitiveness is a small proportion of actual growth and in no instance does competitiveness account for more than three percentage points of export growth annually. Again there is no clear pattern in relation to protection before the liberalisation reforms with a majority of the groups in table 6 having above-average nominal protection tariff protection.

In a regression model Weiss (1992) found a significant association between export growth and changes in nominal protection.³² To explore further the link between pre-reform protection levels and export growth we apply the Spearman rank correlation test by comparing rankings by export growth and protection. Again there is no statistically significant relation between ranking by export growth and alternatively rankings by nominal protection in 1985 and the change in nominal protection 1985–7.

Conclusions

Our survey of the recent literature reveals few associations between either pre-reform protection levels or change in protection during the reform period and various measures of performance. The only significant exceptions are in the productivity studies. Allowing for other influences on performance Iscan (forthcoming), and also Weiss (1992), find a relation between greater change in protection and TFP growth, whilst Tybout and Westbrook (1995) find that it is the initial level not the change in protection that matters.³³ Differences between these studies may be due in part to differences in methodology, since the latter use a form of simple correlation analysis (similar to that applied in this paper), whilst Iscan applies a much more sophisticated multiple regression model using panel data. However, it is more difficult to establish a clear link between pre-reform protection levels or subsequent degrees of liberalisation and trade performance, as measured either by indicators of net trade balance, such as RCA ratios, or export growth. The important implication is that higher productivity growth is not in itself an adequate explanation for trade performance. This may be because in branches with relatively high productivity growth either world trade is growing relatively slowly or competitor economies are experiencing even higher productivity growth. Alternatively, in some branches with weak productivity performance the trade effect may be more favourable due to the impact of non-price

³² Weiss, 'Export response to trade reform'.

³³ T. Iscan, 'Trade liberalization and productivity'; Weiss, 'Trade policy reform and performance'; Tybout and Westbrook, 'Trade liberalization and dimensions of efficiency change'.

factors, such as the industry programmes or the growth of world trade. The implication of the results at hand is that some branches have no doubt benefited from liberalisation, in terms of a positive impact on their productivity level. This does not mean however that the overall trade balance of manufacturing has shifted in Mexico's favour, and despite the dramatic export growth of recent years financing the current account of the balance of payments remains a critical issue for macro-economic management which has not been resolved by the shift to a much more open trade regime.