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LOCATION CHOICE, MARKET STRUCTURE AND BARRIERS TO TRADE: FOREIGN INVESTMENT AND THE NORTH AMERICAN FREE TRADE AGREEMENT

A.J. VENABLES AND S. VAN WIJNBERGEN

ABSTRACT

Much of the excitement around the North American Free Trade Agreement (NAFTA) has been generated by anticipations of a strong foreign investment response. Nevertheless, the plethora of applied papers about the NAFTA have all either ignored DFI or kept it exogenous. In this paper we provide support, with empirical underpinning, for the anticipation of a strong DFI response; however this support is qualified by the demonstration that no such DFI response will be forthcoming unless the NAFTA is used to drastically reform the agriculture and services sectors in Mexico.

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A.J. Venables and S. Van Wijnbergen*

* CEP LSE and CEPR; and University of Amsterdam, CEP LSE and CEPR; respectively. The research reported on in this paper was supported by the World Bank under Research Grant no. 67665M. We are indebted to Mary Amiti, Fernando Clavijo, Adriaan ten Kate and Santiago Levy for many helpful discussions and extensive help in putting together the data base underlying the work reported on in this paper. We also express our gratitude to SECOFI and INEGI in Mexico for their extensive help in data collection. Annexes detailing the mathematical structure and calibration of the model, data sources and computercode (in GAUSS) are available on request from the authors. The views expressed here are our own and do not reflect those of the Mexican Government or any of the Institutions we are associated with.

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1: Introduction

On December 17, 1992, Mexico, the USA and Canada signed an agreement to open up trade to each other in merchandise and services over a period not exceeding 15 years. This agreement is the first free trade agreement between partners of such different size and stage of development, and as such is of unique interest. The NAFTA (North American Free Trade Agreement) capped a long period of sweeping Mexican reforms, all geared to reorient the economy away from Government intervention towards an open, private sector based trading environment. The NAFTA, following a similar, although less sweeping agreement between Canada and the USA concluded about ten years earlier, extends this process and cements it into an international treaty.

An analysis of the NAFTA is, moreover, of wider interest. As progress with the multilateral approach to trade liberalization has slowed down, bilateral FTAs are increasingly en vogue as an alternative way of breaking down barriers to trade. As long as a FTA does not lead to higher tariffs to third parties, the agreement is in fact GATT legal and is considered compatible with the multilateral channel pursued under GATT. We do not pursue the strategic issues raised by this block-wise approach to global trade liberalization, but focus on the consequences of the NAFTA on the countries involved, with special emphasis on the smaller and less developed partner, in this case Mexico.

There are a variety of channels through which NAFTA will have an impact

on Mexican welfare. There are the standard static effects of welfare changes: allocative efficiency gains, changes in the extent economies of scale are exploited, second best interactions in imperfectly competitive markets, shifts in rental incomes and so on. Most of these factors are likely to lead to small welfare gains simply because the trade barriers are not that high to begin with, at least outside agriculture and services.

Of more interest, although much harder to assess, are the dynamic effects one can expect. Much of those dynamic effects are likely to stem from increased foreign presence in Mexican markets. There is empirical evidence linking a foreign presence in a sector to faster productivity growth (Blomstrom and Wolff (1989)). Moreover, increased foreign entry might have a strongly pro-competitive effect in Mexico's highly protected service industries, which in turn will greatly affect competitiveness in especially manufacturing. Thus NAFTA's impact on market structure and DFI in Mexico is likely to be of key importance for long term productivity benefits of NAFTA to materialize. That impact is therefore the focus of this paper.

The NAFTA negotiations have generated a large literature attempting to measure the welfare effects a NAFTA would lead to (See Shiells (1992) for a compendium of quantitative studies). Most of this literature uses static computable general equilibrium models (cf for example Robinson et alii (1992), Bachrach and Mizrahi (1992), Roland-Holst et alii (1992)), without attempting to endogenize DFI, market structure or in any other way address potential dynamic gains from trade. Only one or two studies focus on dynamic aspects (McCleery (1992), Young and Romero (1992)). Of those, McCleery (1992) has such a high

level of aggregation (traded/non-traded goods) that credible modelling of the trade distortions NAFTA is supposed to remove is not really possible. Romero and Young (1992) have more detail but focus their entire analysis on the impact of the NAFTA on Mexico's cost of capital and from there on Mexico's steady state capital stock. Foreign investment is not considered.

The theoretical framework we adopt highlights several salient features of this agreement. One, the countries involved are clearly of very unequal size: Mexico's GDP is about 3% of the combined GDP of the USA and Canada (USC). Such asymmetries are crucial in location choice if trading costs are significant and economies of scale are present (Krugman and Venables (1990)). Trading costs could be caused by explicit tariffs, costs of services required to effect trade, or, the factor highlighted in Krugman and Venables (1990), transport costs. Two, wage costs are dramatically different in Mexico and the USC, an issue of obvious importance for location choice of firms. Three, although we focus the location choice analysis on the industrial sector, both wage differences and trading costs in that sector will be affected significantly by the opening up of agriculture and of financial and transport services envisaged under this agreement. These sectors will therefore be brought into the analysis, although in a somewhat sketchy manner. Four, there is a significant third party, mostly trading with and investing in the US, with a clear vulnerability to aggressive trade policy in the US: Japan. Because of the third party interest, we take a three-country approach to modelling the impact of the NAFTA on DFI: Mexico, the US and Canada (USC) and the Rest of the World (RW).

Agricultural trade liberalization is likely to lead to major income

redistributions inside Mexico and therefore presents a special set of adjustment problems in its own right; these are analyzed elsewhere (Levy and van Wijnbergen (1992a,b)). However, because of its large impact on labor markets, one should expect significant interactions between agricultural trade liberalization on the one hand, and industry trade liberalization and DFI on the other. In particular, wage costs play an important role in DFI decisions. We therefore decided to take a full-fledged General Equilibrium approach to the Mexico side of the model. However, because of the size difference between Mexico on the one hand and USC and RW on the other, wage and capital costs in USC and RW are kept exogenous.

The industrial sector in Mexico is modeled with great care. In particular the cost structure is fully based on empirical estimation, incorporating economies of scale where empirical evidence supports that assumption. Moreover, we explicitly endogenize the role of the services sector in both production and trade. Finally, an important feature of the analysis is the endogeneity of market structure and degree of competitiveness (as measured by number of firms active in an industry), both in Mexico and in the other two geographical segments of the model.

The remainder of the paper is organized as follows. Section 2 sketches the structure of the model used. Section 3 describes the data used to estimate various parameters in the model and to calibrate the macroeconomic structure. Section 4 presents the results. We first analyse the gains from industrial trade liberalization Mexico can expect if it would liberalise unilaterally (as it has done to a substantial degree in the past five years). We then demonstrate the additional gains and DFI

impact Mexico can expect from the matching US liberalization. Next we assess the impact on DFI and welfare aspects of complementing the industrial deregulation of trade by free trade in agriculture and opening up of financial services to foreign entry. Finally we show how the potential use of trade policy in the US against the third party influences DFI decisions in Mexico. Section 5 concludes.

2: Model Structure

The model divides the world into three countries, Mexico, the US and Canada (USC) and the rest of the world (RW). Mexico is described by a full general equilibrium model with endogenous factor prices. In USC and RW, some industrial sectors are described by partial equilibrium models of industry supply and demand. However, in USC and RW the cost of capital and labor costs are considered exogenous to the experiments looked at in this paper. This seems in keeping with the size difference between Mexico on the one hand and the other two regions on the other. The Mexican economy is divided into 16 sectors, listed in table 1. Sectors may be perfectly or imperfectly competitive, as indicated by an X in the first two columns of that table.

Table 1: Sectoral listing.

Industry	Perfect competition	Imperfect competition	Exports	Imports
1:Agriculture	X			X
2:Oil extracting & refining	X		X	
3:Food processing		X	X	X
4:Other food	X		X	
5:Textiles	X		X	

6:Apparel	X			X
7:Heavy chemicals		X	X	X
8:Other chemicals & pharmaceuticals		X	X	X
9:Steel		X	X	X
10:Electrical products		X	X	X
11:Electronics		X	X	X
12:Vehicles		X	X	X
13:Vehicle parts		X	X	X
14:Other manufacturing & minerals	X			X
15:Transport,communications & finance		X		
16:Other services	X			

2.1 *Perfectly competitive industries*

Perfectly competitive sectors are assumed to produce a homogenous output. This output is tradeable internationally, except in the sector "other services". The output of tradable perfectly competitive sectors is assumed to be perfectly substitutable with goods available on the world market. The world price is assumed given; Mexico is a price taker in these sectors.

This assumption has three consequences. First, there cannot be two way trade in the output of any of the perfectly competitive sectors, so we represent trade by the net trade only; (the direction of net trade is indicated by X in columns 3 and 4 of table 1). Second, and contrary to all the CGE studies mentioned before (cf Shiells (1992)), there are no welfare effects arising from induced terms of trade changes in these products. We regard this as a desirable property of the model, since there is no evidence that Mexico has significant monopoly power in world markets for any of the industries we characterise as

perfectly competitive. Third, since demand curves for these goods are horizontal, quantities must be determined by supply. We assume that there is a specific factor in each of these sectors, generating upward sloping supply curves.

2.2 *Imperfectly competitive sectors*

Each firm in an imperfectly competitive sector produces its own product variety and operates under increasing returns to scale. In each sector, firms are located in Mexico, USC and RW, and compete in each of these markets, so generating intra-industry trade. We assume that the three markets are segmented, and that firms are Cournot competitors in the Mexican market. We ignore oligopolistic interaction in USC and RW; there firms derive market power only from product differentiation (the Chamberlinian 'large group' case).

A major innovation of the model is that we allow for firms of different nationalities to be located in each country, although to keep down the dimensionality of the model we do not allow all possible combinations of nationality and location. We assume that: (a) Mexican owned firms operate only in Mexico; (b) USC firms operate in USC and in Mexico; and (c) RW firms operate in Mexico, USC and RW. This gives 6 types of firms, identified by nationality (of ownership) and location (of production); all firms of a particular type are symmetric. These location pattern assumptions are chosen so as to focus sharply on decisions concerning DFI in Mexico.

Unit costs depend on the level of a firm's output, through economies of scale; on their location, via factor prices; and on their nationality, which determines the efficiency of their technology.

Demand for output of each of the imperfectly competitive sectors is allocated in a three-stage way, according to a nested structure of CES sub-utility functions. Given expenditure on the sector as a whole (stage 1), the consumer divides expenditure between products of different *nationality* within that sector (stage 2). Finally, expenditure on products of a given sector and nationality is allocated over the different varieties (stage 3). All products of a particular nationality and sector enter the consumer's utility function symmetrically (although their prices may differ because of their location of production). The Hicksian elasticity of demand for consumption of the aggregate of all products of a given nationality is denoted η. The Hicksian elasticity of demand for such a single product is denoted ϵ.

This demand structure implies, among other things, that consumers do not care about the location of production of a commodity, although they may care about its nationality. In other words consumers know that a Mexican product is different from a USC product, but they do not care whether the USC product has been *produced* in USC or in Mexico. The reason for making this assumption is that in many if not most cases, consumers actually do not know where products have been made.

We shall assume that products of a given nationality are much closer substitutes than aggregate commodities of different nationality ($\eta > \epsilon$). There is another source of asymmetry: other parameters positioning demand curves may be nationality specific, so it is still possible that there are perceived differences according to nationality of firms apart from the difference captured by $\eta \neq \epsilon$.

We assume that firms located in Mexico but not of Mexican nationality use

Mexican labor, but import their capital requirement, and repatriate after-tax earnings on capital and pure profits. Foreign firms in Mexico are controlled independently of firms in their home country [1]/, and produce distinct varieties. We think that this is empirically the case in most of the industries we study, although it does mean that our modelling of foreign direct investment does not capture multinationals sourcing a particular product from different locations simultaneously.

One sector which plays a particularly important role is the services sector, comprising transport, communications and finance. This is different from other imperfectly competitive sectors in so far as its output is non-tradable, and (initially) supplied only by Mexican firms. An important feature of the model is the explicit incorporation of services as a cost factor in trade. As discussed before, such factors can interact with economies of scale to yield dramatic shifts in location choice of firms across countries. The precise way this is modeled is that exporting requires as an input the output of sector 15, transport, communications and finance. We assume the supplier of the services is located in the country from which the exports originate. Of course the eventual incidence of the service cost will in standard ways depend on relative elasticities.

2.3 *General Equilibrium*

Each sector of the economy uses the output of other sectors as

[1] In USC and RW we ignore oligopolistic interaction, so this assumption is not restrictive.

intermediates, and uses three primary factors -- skilled labour, unskilled labour, and capital. Labour is assumed to be internationally immobile but mobile domestically. However, we assume that in agriculture the value marginal product of unskilled labour is only 50% of the wage elsewhere in the economy. The persistence of such intersectoral wage differences is well documented for the US (cf Katz and Summers (1989)); similar evidence for Mexico is reported in Levy and van Wijnbergen (1992), on which our estimate of 50% is based. Any reallocation of labour out of agriculture therefore has beneficial welfare effects. Issues of Mexican-US migration, left out by these assumptions, can be judged from the impact of the various experiments on the unskilled wage in Mexico. In perfectly competitive sectors some capital is assumed to be sector specific, an assumption made for reasons explained earlier. International capital flows take place in the form of foreign direct investment only, as described above. The price of the two types of labour and of capital are therefore determined by supply and demand within the Mexican economy.

The Mexican government receives revenue from factor taxation, profits taxation, and a consumption tax. All sectors are subject to a flat 35% profit tax, based on the residence principle: all firms located in Mexico are treated alike, independent of the nationality of the owners. We assume the tax treatment is similar in USC and RW. This is *de facto* true for the US[2]. As to the RW, there is no hope of capturing the diversity of tax practices in the various countries Mexico,

[2] The US formally uses the source principle for US firms, with a tax credit arrangement to offset foreign tax payments. But profits made abroad only lead to a domestic tax liability once repatriated, which brings it close to a residence based system.

the US and Canada trade with at this level of aggregation. We therefore simply assume the RW tax system is similar. The Mexican government purchases a fixed vector of goods, and sells a fixed quantity of foreign assets (this corresponds to the balance of trade deficit in the base equilibrium). Any remaining government surplus (or deficit) is distributed to the consumer in a lump sum manner. We abstract from income distribution issues, so we assume that there is a single representative Mexican consumer who receives factor income and profits (excluding income repatriated by foreign firms operating in Mexico) and government surplus. We use the utility of the consumer as a measure of welfare.

3: Data Description and Calibration.[3]

The main sources for production side data are the 1985 I/O table (adjusted to 1989 data using the RAS procedure) and the Industrial Survey conducted by INEGI and complemented by surveys investigating the nationality of ownership of each firm. We define a firm as being Mexican if more than 50% of its equity is Mexican owned. If not, it is either USC or RW owned according to whether USC or RW has the larger proportion of equity ownership.

Some of the information derived from this survey is given in table 2. The right hand section of this table divides supply according to four types: Mexican production
(firms located in Mexico) divided according to nationality of ownership, and USC production (irrespective of ownership). The shares of each of these sources of

[3] Annexes containing a detailed description of data sources and calibration procedures are available on request.

supply in the Mexican market is illustrated (and does not add to 100%, because of RW imports). We see USC nationality firms located in Mexico are present in all industries, having significant market shares in other chemicals and vehicles. RW owned firms are particularly important in food processing, vehicles and vehicle parts.

Table 2: Industry Characteristics.

Sector	Mexican import tariff	US import tariff	Return to scale	Firm location	Firm nationality	Share of Mex market	%sales going to Mex	%sales to USC
1:Agriculture	30.0%	/	0					
Other perfectly competitive tradables	14.8%	3.3%	0					
3:Food processing	11.6%	4.7%	34%	Mex	Mex	63.8%	95.0%	4.8%
				Mex	USC	4.2%	87.0%	12.9%
				Mex	RW	24.8%	98.0%	0.7%
				USC	(all)	3.9%		
7:Heavy chemicals	8.8%	1.9%	30%	Mex	Mex	64.6%	76.0%	10.7%
				Mex	USC	4.6%	74.9%	7.8%
				Mex	RW	5.2%	88.4%	5.5%
				USC	(all)	17.7%		
8:Other chemicals	14.6%	2.5%	27%	Mex	Mex	41.0%	93.7%	4.1%
				Mex	USC	33.8%	91.7%	4.7%
				Mex	RW	12.6%	91.9%	5.4%
				USC	(all)	7.3%		
9:Steel	10.7%	2.1%	17%	Mex	Mex	62.9%	85.9%	9.4%
				Mex	USC	5.1%	90.1%	9.6%
				Mex	RW	13.4%	99.8%	0.2%
				USC	(all)	11.8%		
10:Electrical products	15.9%	4.4%	25%	Mex	Mex	28.2%	81.6%	11.1%
				Mex	USC	8.7%	85.9%	13.4%
				Mex	RW	7.8%	91.6%	4.9%
				USC	(all)	32.5%		
11:Electronics	17.6%	4.4%	25%	Mex	Mex	14.1%	34.2%	65.6%
				Mex	USC	2.4%	97.7%	1.0%
				Mex	RW	12.9%	75.5%	13.0%
				USC	(all)	30.6%		
12:Vehicles	30.0%	2.5%	21%	Mex	Mex	45.7%	98.8%	1.2%
				Mex	USC	15.8%	79.3%	20.3%
				Mex	RW	35.3%	94.9%	2.8%
				USC	(all)	2.3%		

13:Vehicle parts	13.2%	2.5%	21%	Mex Mex USC RW USC (all)	16.6% 37.5% 61.1% 1.0% 55.7% 41.8% 14.1% 21.1% 57.1% 32.9%
14:Transport, communications & finance		/	/	Mex	100% 100% 0

An important issue for the results is the extent to which different types of firms located in Mexico are oriented towards the USC market relative to the Mexican market (see also Table 2). In some cases we see that DFI appears to be supplying the Mexican market exclusively; USC firms in electronics and RW firms in food processing, steel and vehicles sell less than 3% of their output to USC. Conversely, all suppliers in vehicle parts and Mexican firms in electronics sell more than 40% of their output to USC.

We also use the industrial survey to derive some of the parameters of the technology in each sector. Firms in the industrial sector have a unit cost function which is linear in intermediates, combines primary factors in a CES cost aggregator, and may exhibit non-constant returns to scale in the CES cost aggregator. Intermediate technical coefficients come from the input output matrix. Factor shares in the CES aggregator come from the industrial survey, which breaks down value added in each industry by skilled labour, unskilled labour, and capital plus profits. Returns to scale are estimated econometrically for each sector on the basis of the industrial survey. Cost functions were estimated for each industry under a variety of different specifications. The best estimates of returns to scale are given in column 3 of table 2, expressed in the form of the increase in average costs which would be experienced if a Mexican firm were to reduce its scale to 50% of its base level. The estimated returns to scale are significant, and broadly in line with those found in other studies. The functional form employed in the model allows for decreasing average and marginal cost. (Details of this are given in the annex).

Furthermore, we allow for possible differences in the efficiency with which

firms of different nationality use primary factors, and set these differences such that USC firms are 12.5% more efficient than the Mexican firms, and RW firms are 15% more efficient (see Guffen, van Wijnbergen and Venables (1993) for evidence on such productivity differences). Finally, firms face different factor prices according to their location. We set Mexican unskilled wages at 20% of wages in the both USC and RW, and Mexican skilled wages at 25% of USC and RW levels. The price of capital in Mexico is 125% of that in USC and RW, but this premium is paid only by Mexican owned firms -- USC and RW firms import capital.

We approximate the Mexican income tax system by a tax on unskilled labour income of 10%, on skilled labour income of 20%, and on capital and profits, of 35%. The 35% rate applies to repatriated as well as retained earnings.[4] Mexican consumption faces a flat 10% consumption tax by assumption.[5]

Tariff data are aggregated on an import weighted basis for the US (applied also to Canada) and for Mexico. The Mexican data were subject to two adjustments, raising the tariff on vehicles to 30% (from 18%) to capture other trade barriers, and setting the agricultural tariff at 30%. The automobile correction is made to capture local content rules, export surplus requirements and a ban on all imports from companies not actually producing cars in Mexico (cf Lopez-de-Silanes e.a. (1992) for a more structured treatment of this market). The 30% tariff

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[4] The lower average tax rate for unskilled labor is due to the personal income exemption. The higher tax rate on capital is chosen to reflect the fact that Mexico's corporate and personal income tax systems are not integrated, with double taxation of dividend income as a result.

[5] This is the basic VAT rate in Mexico. Some luxury products face a higher tax and some necessities a lower one; this would only marginally affects sectoral tax rates at our level and definition of aggregation.

rate is in line with price differentials on comparable models once corrections have been made for differential rates of commodity taxation in the two countries. The agricultural tariff adjustment is made to capture the import ban on maize (the rate is set well below maize price differentials because maize constitutes only a part of agricultural output; cf Levy and van Wijnbergen (1992b)). The resulting tariff structure, aggregated up to our sector classification, is listed in table 2. Mexican tariffs are generally around 4 to 5 times higher than USC tariffs.

4: Direct Foreign Investment and the North American Free Trade Agreement.

Introducing all NAFTA related trade liberalization measures at once would more than likely lead to results that are difficult to interpret. We therefore introduce groups of measures in stages, in the hope of better clarifying the mechanisms at work. In the first step, Mexico unilaterally reduces its tariffs and other trade barriers in industry (see Table 3 below, Section 4.1). We then implement matching USC trade barrier removal, also only in industry (Table 4). In the next step (Section 4.2), we also introduce agricultural trade liberalization, mostly because of the very large impact these measures will have on factor markets and from there on industry and DFI (Table 5). In the final step (Section 4.3) we come to the core of this paper and trace the impact of opening up the service sector[6] to DFI,both directly and indirectly, through its impact on DFI elsewhere (Tables 6, 7 and 8). This last experiment constitutes a comprehensive assessment of the FTA, since all steps are taken cumulatively. Section 4.4 ventures out beyond the actual agreement and explores the "beach-head Mexico" theory of

[6] Transport, communications and finance.

DFI by assessing the impact of US trade policy towards the rest of the world on DFI in Mexico (Table 9).

We conduct all experiments in two stages. First, we simulate the effects of the policy change letting firm scale change, but holding the number of firms (of all types in all locations) constant. We refer to this as the short run. Second, we let firms enter and exit the industry, and refer to this as the long run. Different rules could be followed for determining the entry and exit of firms. In this paper we assume that the number of firms located in USC and in RW is held constant, and the number of firms in Mexico (Mexican, USC and RW) adjusts until their profits are back to the level of profits they attained in the base run. Other entry rules are possible; in runs not reported here we have imposed that entry of a USC or RW firm in Mexico is associated with exit of a USC or RW firm located in USC. This approach simulates relocation of firms, rather than new entry. Results from this rule are very similar to those reported here.

4.1 *Trade liberalization in industry*

Consider initially the implications of trade liberalization in the non-oil industrial sectors only (sectors 3 - 15), i.e. a unilateral reduction in tariffs in Mexican industry directed against the USC. Tables 3A and 3B summarise the quantitative results.

The results show small effects at the aggregate level, but pronounced effects at the disaggregate level. Whether an industrial sector expands or contracts depends essentially on whether the sector is a net exporter or importer in the base case. Thus, the electrical products sector experiences a decline in output; imports

from USC have a high share of the Mexican market in this industry (32.5%, table 2), and none of the firms located in Mexico export much of their output to USC (at most 13.4%, table 2). Conversely, electronics and vehicle parts experience an increase in output; these industries have high import shares, but they also have firms which are very heavily oriented towards exporting to the USC (over 50% of sales for Mexican firms in electronics and vehicle parts and RW firms in vehicle parts), and consequently expand significantly when tariffs are reduced. However, notice that USC firms in electronics export almost none of their output (1%, table 3), and are consequently severely squeezed.

The mechanism should be clear: output is reduced in import competing industries, which now face cheaper imports. This feeds through into significant reductions in Mexican factor prices relative to foreign prices (the bracketed numbers in table 3A) and hence costs. The resulting real depreciation explains why the wage falls less (and in the case of unskilled wages, actually increases) in terms of the CPI. In response to the changes in factor prices, output expands in agriculture -- for which protection remains in place in this experiment -- and in industries which are strongly export oriented, (electronics and vehicle parts).

The net effect of this is, may be surprisingly, *a welfare loss*, amounting to 1% of expenditure in the long run. There are two reasons for this result. First, agriculture has expanded -- and is operating with a value marginal product of labour less than that elsewhere in the economy. Thus resources are diverted from a high productivity segment of the economy to a lower productivity sector. Second, some of the larger industrial sectors, which are operating with price in excess of marginal cost, contract under this scenario, leading to a loss of rents.

Thus the welfare loss is a classic second best result where the benefits associated with tariff reductions are more than offset by the impact of those reductions on existing distortions in the economy: the remaining inefficiencies in agriculture and the existence of positive price-cost margins and thus suboptimal production levels in several industries.

It is clear from table 3B that long run effects are generally magnifications of short run effects. Short run expansion is associated with increased profits and consequent long run entry; but entry by one type of firm reduces profits of all types of firm in the industry, so firms that do *relatively* less well in the short run, may be forced to exit in the long run as competition increases.

Table 3A: Mexican free trade in industrial goods, Aggregate Results

	% Change in welfare	% Change in factor prices deflated by CPI (*Foreign Prices*): Skilled	Unskilled	Capital		Increase in Foreign-Owned Capital by Nationality:
Short run	-1.3%	-2.2% *(-6.4%)*	3.0% *(-1.5%)*	-2.0% *(-5.4%)*	USC	-20.1%
Long run	-1.0%	-1.4% *(-5.0%)*	2.7% *(-1.2%)*	-0.3% *(-4.1%)*	ROW	33.5%

Table 3B: Mexican free trade in industrial goods, Sectoral Results

	Short Run		Long Run	
Sector	% Change value added	% Change production by firms' nationality: Mex USC RW	% Change valued added	% Change production by firms' nationality Mex USC RW
Competitive Sectors				
Agriculture	10.9%		9.2%	
Others	-5.5%		-8.1%	
Imperfectly Competitive Sectors				
Other services	-1.0%		-0.0%	
Food processing	-4.3%	-2% -11% -2%	-4.8%	-0% -80% -2%
Heavy chemicals	4.4%	5% 2% 10%	4.3%	3% -15% 38%
Other chemicals	-1.6%	-2% -3% 2%	-2.3%	-2% -13% 20%
Steel	4.6%	4% 3% 3%	11.7%	9% 8% 21%
Electrical products	-6.5%	-4% -19% 5%	-25.6%	-3% -100% -48%
Electronics	20.8%	25% -32% 21%	43.5%	36% -100% 84%
Vehicles	-6.0%	-7% -2% -4%	-8.6%	-5% -36% -1%
Vehicle parts	23.0%	11% 10% 31%	123.0%	5% 398% 204%
Transport, communications & finance	0.6%	0.6% 0	1.3%	1.3% 0

The magnitude of output changes for particular types of firms and particular industries is large; it comes directly from the fact that the model is sparing in its use of 'dampening devices', such as sector specific factors or Armington assumptions. We do not regard it as implausible that sectors in which firms export over 50% of their output should expand dramatically in response to trade liberalization.

There is, finally, a strong but patterned response of DFI. Two features stand out. First, DFI from outside the NAFTA *increases* by slightly over 33% as Mexico becomes a more attractive platform for exports to the US in response to

lower factor costs (and tariffs against RW remain in place). Most of this increase comes in vehicle parts and electronics, areas where RW firms are strictly oriented towards the US market. However, DFI from the US actually falls as direct export to Mexico becomes more attractive with lower Mexican tariffs. See in particular the electronics industry, where US firms outside the Maquila area[7] direct 97.7% of their sales towards the domestic
(Mexican) market. In the long run, US presence in that market segment stops altogether.

If unilateral liberalization of industrial trade imposes a welfare cost on Mexico, what of bilateral liberalization through NAFTA? Table 4 reports the effects of a bilateral liberalization of industrial trade for Mexico and USC.

The results are interpreted readily in terms of those from the previous experiment, bearing in mind that USC base import tariffs are generally 4 to 5 times lower than Mexican ones. Noteworthy features are the dramatic expansion of production of electronics and vehicle parts. These sectors gain from the reduction in Mexican factor prices relative to foreign prices, and, since they are heavily export oriented,in addition from USC tariff reductions. The overall welfare effect of the experiment is negative, this again being due to the expansion of the agricultural sector and contraction of some imperfectly competitive industries. The DFI response is also similar to what came out in the previous experiments.

[7] The Maquila area refers to the zone just South of the US border where large reprocessing activities take place in response to pecularities in the US tariff structure.

Table 4A: Mexican AND USC free trade in industrial goods.

	% Change in welfare	% Change in factor prices deflated by CPI (*Foreign Prices*): Skilled Unskilled Capital Labour		Increase in Foreign-Owned Capital by Nationality:
Short run	-1.1%	-1.8% 2.8% -0.7% *(-5.9%) (-1.4%) (-4.8%)*	USC	-15.7%
Long run	-0.2%	-0.4% 2.3% 0.6% *(-3.4% -0.8% -2.4%)*	ROW	47.1%

Table 4B: Mexican and USC free trade in industrial goods.

	Short	Run	Long	Run
Sector	% Change value added	% Change production by firms' nationality: Mex USC RW	% Change valued added	% Change production by firms' nationality Mex USC RW
Competitive Sectors				
Agriculture (1)	10.2%		7.2%	
Others	-6.8%		-11.4%	
Imperfectly Competitive Sectors				
Other services (16)	-0.6%		1.2%	
Food processing (3)	-2.0%	-1% -2% -2%	-3.0%	1% -59% -2%
Heavy chemicals (7)	5.0%	6% 3% 10%	2.5%	3% -26% 18%
Other chemicals (8)	-0.8%	-1% -2% 3%	-2.0%	-2% -12% 16%
Steel (9)	6.3%	6% 6% 3%	18.2%	14% 26% 30%
Electrical products (10)	-3.0%	-1% -10% -3%	-16.2%	-2% -100% -51%
Electronics (11)	36.1%	45% -32% -31%	77.0%	72% -100% 118%
Vehicles (12)	-4.5%	-7% 6% -3%	-6.2%	-7% -18% -2%
Vehicle parts (13)	31.0%	16% 18% 42%	192.0%	7% 606% 319%
Transport,communications & finance (15)	1.3%	1.3% 0	2.7%	-2.7% 0

The experiments discussed so far put in sharp focus the importance of agriculture and its remaining inefficiencies for industrial competitiveness in

Mexico and Mexico's attractiveness as an export platform towards the US. This brings us to the next section, which adds agricultural trade liberalization to the analysis.

4.2 *Trade liberalization in industry and agriculture*

We now add to the previous experiment free trade in agriculture. Agriculture is an importing sector, protected by an import tariff of (on average) 30%. The direct effect (holding factor prices constant) of removing trade barriers is that the volume of agricultural output falls by around 40%. This is consistent with the detailed agricultural study of Levy and van Wijnbergen (1992a,b).

Short and long run effects on the economy as a whole are given in table 5 and are radically different from the industry-alone runs. The key difference between this experiment and the previous one is that the release of unskilled labour from agriculture reduces the equilibrium wage of unskilled labour, by some 17 - 18% relative to prices and wages in USC and RW. Such a major reduction in unskilled wages of course benefits all other sectors of the economy; the sectors that use unskilled labour most intensively are electrical products and motor vehicle parts, and it benefits these most. Also noteworthy are the changed fortunes of the food processing industry. This contracted in the previous experiment, but now expands, on the basis of lower priced agricultural inputs.

Aggregate welfare gains from the experiment are now positive and of a significant order of magnitude, reaching 1.6% of base income in the short run, and 3.15% in the long run -- in an experiment which directly affects less than half of the economy. Measuring changes in factor prices relative to the consumer price index we see considerable gains for skilled labour (long run 7.6%) and capital

(long run 4.7%). Unskilled labour suffers a significant reduction, however, of around 12.5%. But this is in terms of the overall consumer price index; the price of agricultural products has fallen significantly more than the index as a whole -- because of the direct effect of the reduction in agricultural protection. Relative to agricultural products the unskilled wage increases by around 13%. Since the rural poor tend to consume more agricultural products (Levy (1991)), the impact of this package of reforms on their welfare is about neutral.

Table 5A: Mexican and USC free trade in industrial and agricultural goods

	% Change in welfare	% Change in factor prices deflated by CPI *(Foreign Prices*): Skilled Unskilled Capital Labour				Increase in Foreign-Owned Capital by Nationality:
Short run	1.6%	4.3% *(-3.1%)*	-12.5% *(-18.7%)*	4.9% *(-2.5%)*	USC	25.4%
Long run	3.2%	7.6% *(1.5%)*	-12.4% *(-17.3%)*	4.7% *(1.1%)*	ROW	66.3%

Table 5B: Mexican and USC free trade in industrial and agricultural goods

	Short Run			Long Run		
Sector	% Change value added	% Change production by firms' nationality: Mex	USC	RW	% Change valued added	% Change production by firms' nationality Mex USC RW
Competitive Sectors						
Agriculture (1)	-36.3%				-40%	
Others	11.4%				3%	
Imperfectly Competitive Sectors						
Other services (16)	3.6%				7%	
Food processing (3)	17.6%	10%	77%	12%	2.7%	3% 405% 10%
Heavy chemicals (7)	13.4%	14%	14%	22%	10.4%	9% -14% 32%
Other chemicals (8)	4.4%	3%	3%	9%	3.3%	1% -5% 21%
Steel (9)	14.5%	14%	17%	11%	32.0%	24% 74% 51%
Electrical products (10)	6.8%	8%	5%	11%	-12.8%	6% -100% -2%
Electronics (11)	48.5%	56%	-24%	44%	96.6%	82% -100% 160%
Vehicles (12)	0.3%	-4%	17%	1%	0.6%	-6% 11% 1%
Vehicle parts (13)	41.2%	24%	30%	55%	256.0%	11% 1900% 390%
Transport,communications & finance (15)	4.7%	4.7%	0		8.0%	8% 0

The impact on DFI of adding agricultural trade liberalization to the experiment is dramatic. Agricultural trade liberalization, through its impact on wages, leads to such an improvement in competitiveness that both US and RW investment in Mexico increase substantially. While there are still some sectors

where the US basically withdraws or reduces its presence (electronics, chemicals, electrical products), that is more than offset by strong expansion almost everywhere else (see Table 5B). In particular food processing and vehicle parts profit from a large influx of US investment. RW investment increases across the board both in the short run and in the long run. This experiment clearly indicates the drag agricultural protection is currently exercising on industrial competitiveness in Mexico.

4.3 *NAFTA and liberalization of transport, communications and finance*

In experiments conducted so far, Mexican access to USC markets has benefited from a reduction in USC import tariffs. However, these tariff levels pale into insignificance alongside the transport and communications costs of undertaking trade between Mexico and USC. Industry interviews indicate that these costs may well take up 30 to 40% of total costs; when coupled with evidence that these sectors are operating at cost levels several times higher than those of their US equivalents (Musalem e.a. (1991)), the special importance of opening up the transport and communications sectors should be clear.

This sector of the Mexican economy is entirely closed to foreign firms, and is characterized by only limited domestic competition. Not surprisingly therefore, factor productivity levels in Mexican firms are much lower than in comparable USC firms -- estimates reported in Musalem et alii (1991) have put them at one third for banking and insurance. The experiment we conduct in this section is to add to the experiment of the preceding section the following: USC firms with

factor productivity double[8] that of Mexican firm enter the service sector (transport, communications and finance). The cost levels including intermediates of these firms are 60% of those of Mexican firms. We simulate the effects of entry under two different entry rules: (A) restricted entry; (B) unrestricted entry. In all cases, factors move across borders, but products do not. This is in line with the structure of the NAFTA agreement in financial services, which allows operation of foreign firms through subsidiaries but disallows cross-border product trade or even branch operations. A crucial assumption is that when a foreign firm establishes a subsidiary in Mexico, it operates at foreign levels of efficiency.

Under rule (A) we allow USC firms to take a long run share of one third of the market. Results are reported in table 6. Two new forces are at work. First, and most important although obviously not surprising, the price of sector 15 output drops substantially, which in turn lowers the costs of exporting from Mexico substantially. Second, the substantial reduction of output by domestic firms in this sector (slightly less than one third) releases skilled labour into the economy, leading to an overall drop in the real skilled labour wage.

The sectors that expand most dramatically are those that benefit from the reduction in trading costs. Most notable are electrical products -- where contraction now becomes expansion; electronics, where output more than doubles; and vehicles where output increases by a factor of more than 5 -- although still accounting for only around 3% of GDP.

[8] On the presumption that the productivity differences in the subsectors not covered by Musalem et alii are smaller than those found in their study.

Table 6A: NAFTA with partial US entry in transportation and financial services.

	% Change in welfare	% Change in factor prices (deflated by CPI (*Foreign Prices*): Skilled Unskilled Capital Labour				Increase in Foreign-Owned Capital by Nationality:
Short run	2.4%	1.4% *(-7.5%)*	-11.3% *(-19.1%)*	5.6% *(-3.7%)*	USC	59.9%
Long run	5.0%	5.4% *(-1.6%)*	-11.2% *(-17.1%)*	8.7% *(1.6%)*	ROW	92.2%

Table 6B: NAFTA with partial US entry in transportation and financial services.

	Short Run				Long Run			
Sector	% Change value added	% Change production by firms' nationality: Mex	USC	RW	% Change valued added	% Change production by firms' nationality Mex	USC	RW
Competitive Sectors								
Agriculture (1)	-33.6%				-38.7%			
Others	19.2%				6.4%			
Imperfectly Competitive Sectors								
Other services (16)	5.4%				4.5%			
Food processing (3)	21.0%	13%	99%	15%	36.5%	37%	583%	12%
Heavy chemicals (7)	21.1%	21%	27%	10%	18.7%	15%	10%	59%
Other chemicals (8)	9.5%	7%	10%	16%	9.4%	4%	3%	32%
Steel (9)	22.4%	23%	32%	18%	50.0%	36%	160%	74%
Electrical products (10)	18.8%	18%	26%	27%	14.5%	11%	-14%	55%
Electronics (11)	64.7%	73%	-15%	62%	131.3%	102%	-100%	237%
Vehicles (12)	4.9%	-3%	34%	4%	9.0%	-8%	63%	0%
Vehicle parts (13)	53.3%	3%	43%	71%	450.0%	14%	3380%	516%
Transport, communications & finance (15)	-1.0%	-34%	++	0	4.5%	-31%	++	0

The impact on DFI is major. DFI from all sources almost doubles compared to the previous case, which was an identical experiment except that the services sector remained closed to foreign-owned companies. Most of the new DFI flows to export based industries; as a consequence, raising aggregate exports

substantially. The overall effect on welfare also increases substantially, to 2.4% and 5% of GDP in the short and long run respectively. The message should be clear: even a moderate opening up in the services sector will substantially increase the benefits Mexico can obtain from the NAFTA, and is essential for a strong DFI response

Consider next the fully unrestricted entry case. Now the price of sector 15 output drops by no less than 40%. This amounts to a 10 percentage points reduction in trade costs which is several times larger than the reduction in USC tariffs. In fact, it means that the combined barrier of trade costs plus tariffs on sales from Mexico to USC is now reduced by an amount approximately equal to the reduction in Mexican import tariffs. The second force at work is that productivity gains in sector 15 release a considerable amount of skilled labour. In the long run the price of skilled labour falls (relative to foreign labour) by 4.1%, whereas, without service sector liberalisation, it rose by 1.5%.

The welfare effects of this experiment are startling (Table 7). In the short run, welfare increases by 5.5%, and in the long run by 14.2%. This comes from significant expansion of imperfectly competitive industrial sectors; from the contraction of agriculture with its low marginal product of labour; and from increased factor productivity in sector 15. This sector accounts for 11% of GDP and, in the long run, factor productivity in this sector is doubled by the experiment. Looking at returns to factors of production, we see that unskilled labour does rather better in this experiment than in the previous one, though it still loses relative to the consumer price index. Skilled labour does less well, although it still gains. Capital does much better, with its real price increasing by

17%; this reflects the fact that Mexican owned production expands, as well as foreign owned. This expansion has to draw capital from the Mexican capital market, and neither of the contracting sectors -- agriculture nor transport, communications and finance -- are capital intensive.

Table 7: Unrestricted US entry in transportation and financial services

	% Change in welfare	% Change in factor prices (deflated by CPI *(Foreign Prices*): Skilled Labour	Unskilled Labour	Capital		Increase in Foreign-Owned Capital by Nationality:
Short run	5.5%	5.6% *(-7.4%)*	-6.3% *(-17.8%)*	9.4% *(-3.9%)*	USC	197%
Long run	14.2%	5.4% *(-4.1%)*	-7.0% *(-15.3%)*	17.1% *(6.6%)*	ROW	127%

DFI increases substantially as trading costs in Mexico fall. This experiment and the one where agricultural liberalization alone was added to the industrial elements of the NAFTA both point in the same direction: substantial welfare benefits can be expected, but will only materialize if and when agriculture and services are also opened up to foreign entry.

All of the spectacular effects of the last two experiments came from the replacement of inefficient domestic firms in services by one or more efficient foreign firms. In reality one would expect to see substantial cost reduction to take place in the domestic part of the sector too; this has been the pattern in Spain for example, after its entry in the EC and the ensuing foreign entry in banking. Our final experiment in this subsection therefore traces the consequences of bringing the domestic services sector up to international standards.

In this experiment no foreign entry takes place in the services sector, but there are similar beneficial effects as extensive foreign entry would have had on

the rest of the economy, as output costs fall to a similar degree in this sector. Thus one can expect similar effects on DFI in the rest of the economy, and even slightly larger welfare benefits (cf Table 7), since now all rents earned in the industry stay in Mexico, instead of only the 35% captured by the corporate income tax. This experiment indicates the potentially large benefits that better regulatory control over monopoly practices and improved competition policy could yield in Mexico's service sector!

Table 8: NAFTA without services, but domestic productivity improvements to foreign levels in services

	% Change in welfare	% Change in factor prices deflated by CPI *(Foreign Prices)*: Skilled Labour	Unskilled Labour	Capital		Increase in Foreign-Owned Capital by Nationality:
Short run	11.4%	-2.2% *(-12.7%)*	-9.0% *(-18.9%)*	14.5% *(2.2%)*	USC	130.3%
Long run	15.8%	2.5% *(-5.9%)*	-9.1% *(-16.5%)*	19.2% *(9.5%)*	ROW	99.6%

4.4 *NAFTA and the "Beach-head" Theory of DFI: the Impact of Higher US external Tariffs.*

Our final experiment speculates about the possible effect on Mexico of the US (and Canada) adopting a more aggressive trade policy towards the rest of the world by raising import tariffs on non-NAFTA imports by 20%. We assume that these tariffs only apply to the sectors which we have modelled as imperfectly competitive on the presumption that lobbying power is concentrated in those industries. The assumptions on the rest of NAFTA are those of Table 5 (free trade in industry and agriculture).

The effects of this change are to make Mexico more attractive as a location for investment by firms from RW. This is documented in table 8. RW exports to USC from outside NAFTA are now more expensive in the US, so RW production in Mexico increases substantially. Increased supply from these firms induces some contraction of USC firms, and, as usual, these effects are magnified once entry and exit are allowed. The effect of increased RW activity in Mexico is to raise Mexican factor prices, to substantially increase DFI once entry is allowed (i.e. the long run) and a substantial consequent increase in Mexican welfare. Long run welfare increases by 4.8% instead of by 3.2% as in the case of Table 5 (same NAFTA set up but without the increase in USC external tariffs). Thus the net welfare effect of higher USC tariffs is no less than 1.6% of Mexican GDP (keep in mind, though, that a 20 percentage point increase in external tariffs, even if only in the non-competitive sectors, is a major increase in protection).

Table 9: Higher USC external tariff of 20%

	% Change in welfare	% Change in factor prices deflated by CPI (*Foreign Prices*): Skilled Labour	Unskilled Labour	Capital		Increase in Foreign-Owned Capital by nationality:
Short run	1.8%	4.7% *(-2.3%)*	-12.7% *(-18.5%)*	5.4% *(-1.6%)*	USC	5.8%
Long run	4.8%	8.8% *(4.6%)*	-13.1% *(-16.4%)*	9.2% *(5.0%)*	ROW	139.7%

5: Conclusions

Much of the excitement around the NAFTA has been generated by anticipations of a strong foreign investment response. Nevertheless, the plethora of

applied papers about the NAFTA have all either ignored DFI or kept it exogenous. In this paper we provide support, with empirical underpinning, for the anticipation of a strong DFI response; however this support is qualified by the demonstration that no such DFI response will be forthcoming unless the NAFTA is used to drastically reform the agriculture and services sectors in Mexico.

The analytical framework used focuses on the implications of economies of scale, trading costs and size difference between the countries concerned for the plant location and export structure choice of multinational firms. Much effort has been devoted to empirically estimating all the important parameters pinning down the production structure, in contrast to the more "off-the-shelf" CGE models used so far in the analysis of the NAFTA.

While the analysis suggests a strong DFI response to the NAFTA as a whole, industrial free trade alone produces no such result. In fact, US DFI is predicted to actually decline in response to tariff cutting in industry alone, as exporting to Mexico becomes cheaper while the cost of services in Mexico remains at two to three times their US levels. This is to some extent offset by the prediction of higher DFI from regions outside North America into Mexico. The impact on welfare shows only minor efficiency gains which, in general equilibrium, are just offset by the fact that some high-rent industries contract and that resources flow into less efficient but still protected agriculture. Overall a small decline in welfare, both in the short run and in the long run, occurs.

These somewhat lacklustre results are reversed dramatically once liberalization of agriculture and services are brought in. A point that is clearly highlighted in these experiments is the importance of agriculture and its

remaining inefficiencies for industrial competitiveness in Mexico and Mexico's attractiveness as an export platform towards the US. The experiments sofar suggest that the objective of the NAFTA will not be realized without liberalizing agriculture and so releasing the labor that continues to be employed in low value added activities in that sector. But if agriculture is liberalized, Mexico can not only expect a substantial DFI response to the NAFTA, both from the US and elsewhere, but also substantial welfare gains.

Once services are brought in, with their pre-liberalization costs at two-to-three times those in the US, the results become truly spectacular. Since the high cost of services act as a strong deterrent to producing in and exporting from Mexico, cutting services' costs by two has a major impact on plant location choice in favour of Mexico. This also leads to major welfare gains from the NAFTA as a whole, well into double digit percentages of GDP.

The analysis clearly demonstrates the importance of distinguishing DFI by source country. In response to a NAFTA in industry alone, DFI from the rest of the world rises, while DFI from the US actually falls. This distinction is also important in our last experiment, aimed at highlighting a more intangible argument behind the DFI response to NAFTA, the possibility of higher US external tariffs. Such a tariff increase, compatible with the NAFTA agreement which after all is not a customs union, triggers a substantial DFI response from outside the NAFTA region.

In the end, the conclusions for policy are clear. Small tariff changes do little for welfare. But general equilibrium matters -- reform of the most sheltered sectors in Mexico (agriculture and services), sectors that supply industry directly

or indirectly, will have dramatic effects on industrial performance, welfare and DFI in Mexico.

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