# The Trade and Investment Effects of Preferential Trading Arrangements — Old and New Evidence

PRODUCTIVITY COMMISSION

Staff
Working Paper

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May 2003

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# Abbreviations

## Abbreviations

| | |
|---|---|
| ABS | Australian Bureau of Statistics |
| AFTA | ASEAN Free Trade Area |
| ANZCERTA | Australia New Zealand Closer Economic Relations Trade Agreement |
| APEC | Asia Pacific Economic Cooperation |
| ASEAN | Association of South East Asian Nations |
| BIT | Bilateral Investment Treaty |
| CAP | Common Agricultural Policy |
| CER | Closer Economic Relations (short for ANZCERTA) |
| CGE | Computable General Equilibrium models |
| CRTA | Committee on Regional Trade Agreements |
| CUSFTA | Canada United States Free Trade Area |
| EEC | European Economic Community |
| EFTA | European Free Trade Area |
| EU | European Union |
| FDI | Foreign Direct Investment |
| GATS | General Agreement on Trade in Services |
| GATT | General Agreement on Tariffs and Trade |
| GCC | Gulf Cooperative Council |
| GDP | Gross Domestic Product |
| GSP | Generalised System of Preferences |
| IMF | International Monetary Fund |
| LAFTA | Latin American Free Trade Area |
| LAIA | Latin American Integration Association |

| MERCOSUR | Southern Common Market (Mercado Común del Cono Sur) |
| MFN | Most Favoured Nation |
| MITI | Ministry of International Trade and Industry |
| MLI | Member Liberalisation Index |
| NAFTA | North American Free Trade Agreement |
| OAS | Organization of American States |
| OECD | Organisation for Economic Cooperation and Development |
| PATCRA | Papua New Guinea Agreement on Trade and Commercial Relations |
| PPP | Purchasing power parity |
| PTA | Preferential Trading Arrangement or Agreement |
| ROO | Rules of Origin |
| RTA | Regional Trading Arrangement or Agreement |
| SITC | Standard International Trade Classification |
| SPARTECA | South Pacific Regional Trade and Economic Cooperation Agreement |
| SPS | Sanity and Phytosanitary |
| UN | United Nations |
| UNCTAD | United Nations Conference on Trade and Development |
| WDI | World Development Indicators |
| WTA | World Trade Analyzer |
| WTF | World Trade Flows database |
| WTO | World Trade Organisation |

# SUMMARY

# Summary

The number of preferential trading arrangements (PTAs) has grown dramatically over the last decade or so. By the end of 2000, there were 191 agreements in force that had been notified to the World Trade Organisation, compared with 40 in 1990.

The coverage of preferential trading arrangements has also tended to expand over time. The preferential liberalisation of tariffs and other measures governing merchandise trade remains important in many agreements. But they increasingly cover a range of other issues — services, investment, competition policy, government procurement, e-commerce, labour and environmental standards.

This paper examines, both theoretically and empirically, the effects of the trade and non-trade provisions of PTAs on the trade and foreign direct investment flows of member and non-member countries.

## Trade provisions

Theoretical work has always highlighted that while the merchandise trade provisions of PTAs can boost trade among members, this is often at the expense of non-members. So whether it benefits a country to join a PTA depends on the cost structures in partner countries, compared with the cost structures in third parties. If a preferential trade arrangement diverts a country's imports from a low-cost third party to a higher-cost preferential trade partner, it can be made worse off. Conversely, the opportunity for benefits is greater where the PTA partner is at world's best competitiveness, and where liberalisation under the PTA encourages imports from that source.

Traditionally, there have been two ways of evaluating the effects of PTAs empirically.

- Ex post econometric approaches. These cannot measure the effects of PTAs on the economic welfare of member or non-member countries directly, since this is unobservable. But they can examine the effects of actual PTAs as written, complete with non-trade provisions, on actual trade and investment flows.

- Ex ante computable general equilibrium analyses. These generally have enough economic structure to be able to draw inferences about the economic welfare of

member and non-member countries. But they typically have a very idealised and tariff-oriented treatment of PTA provisions.

Since the purpose of this paper is to shed light on the effects of the non-trade provisions of PTAs, it uses econometric techniques to look at the effects of some existing PTAs, particularly those containing significant non-trade provisions, on the actual trade and investment flows of member and non-member countries.

Because the paper uses econometric techniques, it cannot look at PTAs in prospect (including those being negotiated by Australia). And while it can examine the effects of existing PTAs on trade and investment flows, it cannot draw strong direct inferences about the consequences for economic welfare. The trade and investment effects are not always good indicators of the likely welfare effects, as elaborated in the next chapter. But trade and investment effects are still likely to be of interest in their own right.

New empirical work outlined in chapter 4 suggests that of the 18 recent PTAs examined in detail, 12 have diverted more trade from non-members than they have created among members. What is more, some of the apparently quite liberal PTAs — including EU, NAFTA and MERCOSUR — have failed to create significant additional trade among members (relative to the average trade changes registered among countries in the sample).

Part of the reason for this more negative finding than in previous studies is the rigorous statistical test that has been applied to ascertain whether intra-bloc trade is significantly greater after bloc formation (or expansion) than before. In the past, this was assessed, at best, only by reference to the point estimates from various cross sections. But the finding is also consistent with the observation that many of the provisions needed in preferential arrangements to underpin and enforce their preferential nature — such as rules of origin — are in practice quite trade restricting.

## Non-trade provisions

While the increasing focus of PTAs on non-trade provisions may suggest that conventional concerns about trade diversion are outmoded, some theoretical literature suggests that such a conclusion would be premature.

On the one hand, in an increasingly integrated world economy, even minor *trade* concessions can have a significant impact on *investment* flows. And if investment is attracted into one PTA partner in order to serve the markets of the others, then the trade from such 'beachhead' positions can constitute traditional trade diversion.

On the other hand, the *non-trade* provisions of PTAs, particularly those related to investment and services, can also have a significant impact on *investment* flows. But the preferential nature of the PTA provisions may mean that investment is diverted from a low-cost to a higher-cost host country, and such investment diversion can also be harmful.

The analysis in chapter 5 is among the first to check these propositions empirically. It finds little evidence of beachhead investment, or an unwinding of 'tariff-jumping' investment, in response to the trade provisions of PTAs. Only for SPARTECA and the US-Israel agreement, for example, is there (weak) evidence of foreign direct investment responding in beachhead fashion to trade provisions. And the result for US-Israel is further qualified by the imprecision of the intra-bloc effect with just two countries involved.

Chapter 5 does find evidence that foreign direct investment responds significantly to the non-trade provisions of PTAs. Interestingly, this is in contrast to a lack of response of FDI to bilateral investment treaties.

Further, for most of those agreements where non-trade provisions have affected FDI, the result has been net investment creation rather than diversion.

Although it is a weak test, this suggests that on balance, the non-trade provisions of these PTAs have created an efficient geographic distribution of FDI. This is consistent with the fact that at least some of the non-trade provisions (eg commitments to more strongly enforce intellectual property rights ) are not strongly preferential in their nature.

Further, the theoretical literature has stressed that if the non-trade barriers are of the sort to raise the real resource costs of doing business, rather than simply to create rents that raise prices above costs, then preferential liberalisation will be beneficial, even in the absence of net investment creation.

However, the trade that may be generated from the new FDI positions may still be diverted in the 'wrong' direction in response to the trade provisions of PTAs, and may therefore contribute to the net trade diversion found in chapter 4.

Thus the results of this research suggest that there may be real economic gains from the non-trade provisions of third-wave PTAs, but they also suggest that there are still economic costs associated with the preferential nature of the trade provisions. And these costs could be magnified in a world of increasing capital mobility.

Thus the findings of this research on the effects of the non-trade provisions of PTAs are more positive than those on the trade provisions. This suggests there could be real benefits if countries could use regional negotiations to persuade trading partners

to make progress in reforming such things as investment, services, competition policy and government procurement, especially if this is done on a non-preferential basis.

# 1   Introduction

On 13 January 2002, the Prime Ministers of Japan and Singapore signed an agreement to create a preferential trading arrangement. The event is noteworthy, not just because the bilateral arrangement is between two of Australia's major trading partners. Until then, Japan had been the last major economy in the world not to belong to a preferential trading arrangement.[1]

The agreement itself typifies many of the so-called 'third wave' of preferential trading arrangements, or PTAs.

In third wave agreements, provisions governing merchandise trade are often less important than they were in the first or second waves, at least in relative terms. In the case of Japan and Singapore, both countries already have zero or very low tariffs on imports of non-agricultural products. Trade in agricultural products between them is minimal, but because of the sensitivity of the trade in cut flowers and goldfish, agricultural and fishery products (along with some petrochemical and petroleum goods) have been excluded from the bilateral agreement altogether.

Third wave agreements cover an increasing range of 'new age' issues — these can include services, investment, competition policy, government procurement, e-commerce, labour and environmental standards. In the Japan-Singapore Economic Agreement for a New Age Partnership, as it is called, e-commerce and services are of particular importance.

Figure 1.1 shows the discernible upward trend in the breadth of coverage of PTAs over recent times. On the vertical axis is an index measure of breadth of coverage, with provisions governing merchandise and non-merchandise trade scored separately. The index is described in appendix A and has been applied to a number of separate PTAs that have been established or had their membership changed in recent times. On the horizontal axis is date of establishment. Coverage has clearly tended to increase in the more recently established or expanded PTAs, and this has generally been because of an expansion in the coverage of non-merchandise trade issues.

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[1] APEC (to which Japan belongs) is not a preferential arrangement. The Bogor goals of free and open trade and investment by 2010 (for developed economies) and 2020 (for developing economies) are intended to be achieved on a non-discriminatory, most favoured nation basis.

Figure 1.1　**Member Liberalisation Index for selected PTAs**

Index score ranges between zero and one



PTA (and its date of establishment)
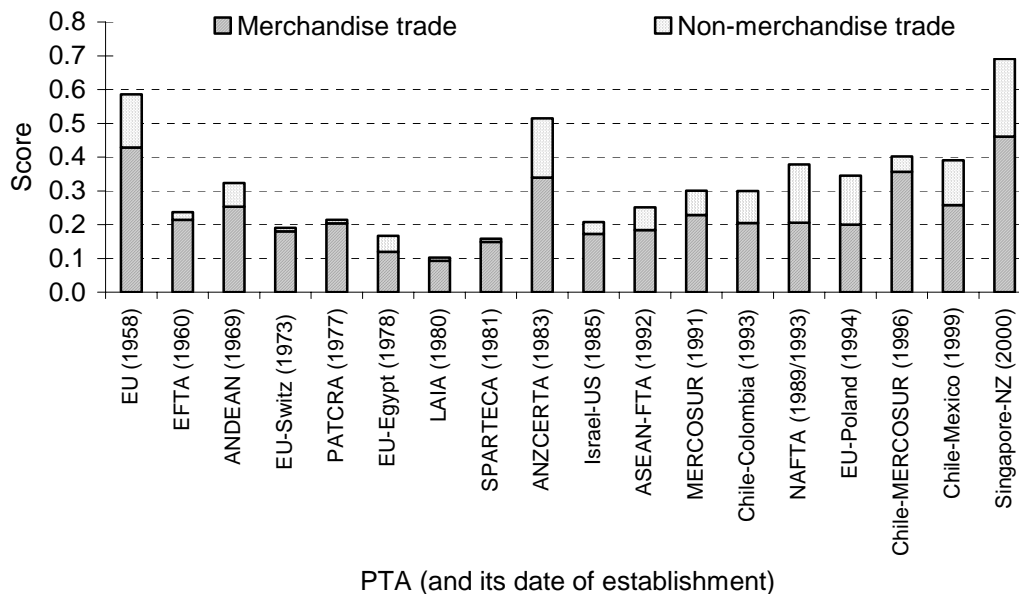
*Data source:* Appendix A.


## 1.1　First wave

By contrast, the 'first wave' of PTAs was more limited in scope, and preferential liberalisation of merchandise trade generally played a more central role (EU being an important early exception). In part, this was because general tariff levels were higher to start with.

A key event in the first wave was the formation of the European Economic Community (now European Union) in 1958, after several political agreements failed at the draft stage. Although EEC establishment was driven primarily by the political goal of cementing European unity after two disastrous World Wars, internal trade liberalisation was an important economic feature.

There was also a number of attempts to create PTAs among developing countries. These were aimed at reducing the costs of import-substituting industrialisation by preferentially opening up the markets of the developing country members and exploiting economies of scale within that forum.

The focus of theoretical work on PTAs at the time was to challenge the popular notion that any sort of trade liberalisation, even preferential, was a step in the right

direction, and therefore beneficial to PTA members and to the world as a whole. The static analysis of PTAs, begun by Viner (1950), pointed out that although PTA formation reduced one distortion, namely, the average tariff on imports in general, it exacerbated another, namely, the geographical disparity in import tariffs. This was a classic situation of 'second best', with no clear presumption in favour of gains to either members or the world as a whole. The final outcome has defied generalisation, though many analysts have chanced their arm. The answer 'depends', and the devil is in the detail. The static theory of gains and losses from preferential trading arrangements is summarised in chapter 2.

The literature has also recognised that if the answer 'depends', then the question is an empirical one. Various analysts have examined the trade effects of various PTAs, trying to determine whether they have encouraged imports in general — trade creation — more than they have pushed the geographic source of imports in the 'wrong' (higher cost) direction — trade diversion. There is a degree of apparent consensus about which PTAs have been beneficial and which have not. There have also been recent generalisations that PTAs as a whole are generally beneficial. The existing empirical literature on trade creation and trade diversion is reviewed in chapter 3.

## 1.2    Second wave

By the end of the 1960s, the PTAs established among developing countries as part of the first wave had largely collapsed.

> The problem was that, rather than use trade liberalisation and hence prices to guide industry allocation, the developing countries attempting such unions sought to allocate industries by bureaucratic negotiation and to tie trade to such allocations, putting the cart before the horse and killing the forward motion. (Bhagwati 1999, p. 10)

The European Union (and its use of PTAs as a foreign policy instrument) is the main legacy from the first wave.

Interest in PTAs revived early in the 1980s as the United States reacted first to EU expansionism and the loss of EU markets, and then to the uncertain prospects for launching the Uruguay Round, by selecting partners for bilateral and regional trade arrangements.

The United States had emerged from the 1930s experience of competitive tariff protection with a strong distaste for preferential trading arrangements and a firm commitment to multilateral trade liberalisation and the most favoured nation (MFN) principle — that trade concessions granted to any individual member of what was then the General Agreement on Tariffs and Trade (GATT) must be extended to all

other GATT members. This was in contrast to the British, who wanted a continuation of the Imperial Preferences in their favour. Although the US position did not rule out discrimination against non-GATT-members, it ensured trade concessions must be extended to countries accounting for the overwhelming bulk of world trade in any given commodity. The United States acceded to Article XXIV of the GATT, which allowed the formation of preferential trading arrangements under certain circumstances. Box 1.1 gives a brief description of the provisions of Article XXIV, along with the two other mechanisms by which PTAs can be created in a GATT-consistent fashion. The United States also supported the formation of the European Community for strategic political reasons. But prior to the 1980s, it had not entered any preferential trading arrangements of its own. Thus its entry into preferential arrangements, first with Israel, then with Canada (through CUSTFA), Mexico (through NAFTA), and Caribbean countries (through the Caribbean Basin Initiative) represented a significant change in position.

The second wave of PTAs saw the inclusion of non-tariff barriers and other non-traditional areas, such as dispute resolution and competition policy. However, the sectoral focus remained on goods markets.

Rules of origin also became important. This was because the second wave agreements were predominantly *free trade agreements*, where members retained their own external tariffs against non-members, in contrast to the EEC, which as a *customs union* adopted a common external tariff. In free trade areas, rules of origin were needed, because otherwise there would be 'trade deflection' — imports would enter through the country with the lowest external tariff and then be re-exported duty-free to other members. For example, one common type of rule specified that a product must have a given portion of its value added originating in the PTA before it qualified for duty-free movement to other member countries. Other types required a product to undergo substantial transformation, or a change in tariff chapter heading, before being allowed duty-free into another member country.

Rules of origin can vary by product category, and so can greatly complicate the administration of free trade areas. As such, they can also become an instrument to tailor-make PTAs, in order to limit trade creation (which hurts domestic import-competing producers) or to encourage trade diversion (which hurts third-country producers). For example, NAFTA contains over 11,000 separate rules of origin, the most notorious of which is the 'triple transformation' rule for apparel — only if each step of the transformation from raw material to finished garment has been undertaken within NAFTA will preferential treatment be given.

Box 1.1 **GATT provisions governing PTAs**

Under Article XXIV, any two or more members of the WTO can form a *free trade area* or *customs union*. Under both, a key requirement is that the exchange of preferences should not be partial, but 'duties and other restrictive regulations of commerce' should be eliminated on 'substantially all trade' between PTA members. In a free trade area, members eliminate tariffs among themselves but keep their original tariffs against the rest of the world — these must not be raised. In a customs union, members eliminate tariffs among themselves and adopt a common external tariff against the rest of the world —the common external tariff must not exceed the members' average pre-union tariff. The EEC is a customs union and NAFTA is a free trade area. These two PTAs were concluded under GATT Article XXIV.

There are two other provisions allowing trade preferences within the GATT/WTO system. Developed countries can give developing countries one way trade preferences under the generalised system of preferences (GSP), designed to promote exports from developing to developed countries. Examples include the CARIBCAN agreement, where Canada offers duty free non-reciprocal access to most Caribbean countries; the US-Andean Trade Preference Act; the EU's preferences with many Latin American, Caribbean and Mediterranean countries; and Australia's and New Zealand's preferences with many developing South Pacific island countries under SPARTECA.

Under the Enabling Clause, developing countries can exchange virtually any trade preferences to which they agree. This provision is intended to promote trade among developing countries themselves. Under this clause, partial preferences across a subset of goods are permitted. The ASEAN-FTA and MERCOSUR agreements were established under this Clause.

Article XXIV and the Enabling Clause apply only to trade in goods. There are PTA provisions relating to services within the General Agreement on Trade in Services, which largely mirror the Article XXIV provisions for goods. There are no WTO provisions governing international movements of capital and labour within PTAs.

Within the GATT/WTO, the experience with PTAs has been beset by contradictory views on a series of systemic issues and lack of information on provisions. There has been ongoing debate about the meaning of the key terms, such as 'substantially all trade' and 'other restrictive regulations of commerce', which are not defined in the GATT documents. And of all the PTAs notified to the WTO, only the Czech-Slovak agreement has been endorsed as being GATT-consistent. In an effort to address these concerns, the General Council of the WTO established the Committee on Regional Trade Agreements (CRTA) in 1996, to oversee all PTAs and to consider the implications of such agreements for the multilateral trading system. So far, the CRTA has achieved limited success — while processes have been streamlined, no PTAs have been endorsed by the Committee, and little progress has been made on systemic issues. In July 2001, the Chair reported to the General Committee on the persistently deadlocked situation in the Committee; the General Council urged the Committee to continue to make efforts to make progress in its work.

There will be an overall review of the WTO rules as part of the Doha Round, including a review of those governing PTAs. It is not clear that the divergences of views over systemic issues can be resolved in negotiations. A critical factor will be how inconsistencies between existing agreements and any new set of rules are handled — whether by grandfathering or by extended adjustment periods.

*Source:* Laird (1999), Panagariya (1999) and WTO (2002).

With the second wave, the focus of theoretical work shifted to the dynamic question of whether preferential trading arrangements were 'building blocks' or 'stumbling blocks' to multilateral trade liberalisation. Bhagwati, Krishna and Panagariya (1999) identified two distinct approaches.

- Suppose a PTA expands its membership. Will that reduce or increase welfare? If expansion increases welfare, then PTAs are seen as building blocks.

- Will a PTA expand its membership? And if so, is there an incentive for expansion to eventually cover the entire world, with non-discriminatory free trade for all, or will it stop short?

The theoretical answers to these questions to date are summarised in chapter 2. Some of the empirical evidence is summarised in chapter 3.

## 1.3    Third wave

During the 1990s, the number of PTAs expanded dramatically. By the end of 2000, there were 191 PTAs in force that had been notified to the WTO, compared with 40 such agreements in 1990. Many of the new PTAs were bilateral arrangements between the European Union and the various newly emergent Central and Eastern European States, often initiated as a precursor to full EU membership. The EU's membership of multiple, overlapping PTAs fully deserves Bhagwati's (1995) characterisation of a 'spaghetti bowl', although it is not the only economy to be so involved. The United States has tailored its successive PTAs along 'hub and spoke' lines, under which existing partners can be adversely affected by different provisions granted to new partners. Crawford and Laird (2001) reported that at the time of writing, all but four WTO members were participants in at least one PTA.

But until 2001 Japan was among the exceptions (although as noted, it is a member of non-discriminatory APEC). Despite the United States embracing regionalism in the 1980s, Japan remained committed to multilateralism as the best route to trade liberalisation. Its more recent interest in preferential trade arrangements has been attributed in part to a breakdown of Japan's monolithic policy consensus, once centralised in the Ministry of International Trade and Industry (MITI), and new thinking even within MITI circles in response to US actions and Japan's waning economic performance (Drysdale 2002).

Japan's recent acceptance of regionalism is of great potential significance to Australia, because both Japan and its main bilateral trade partners (currently Singapore, potentially ASEAN, South Korea and China) are, or are becoming, significant trading partners for Australia. There is clear potential for Australia, as an excluded party, to be harmed by any resulting geographical shift in trade patterns.

And yet some have argued that, because third wave PTAs are not primarily about merchandise trade, conventional concerns about trade diversion are outmoded, and such PTAs have the potential to be highly beneficial for members, without disadvantaging bystanders.

The scant theoretical literature on the economic effects of third wave agreements, in which non-trade measures predominate, is summarised in chapter 2. The limited empirical evidence is reported in chapter 3.

## 1.4  Outline of this paper

The main aim of this paper is to provide additional information about the characteristics and potential economic effects of 'third wave' PTAs of the type that Japan has begun negotiating. An important contribution of the paper is that it looks at their effects on investment as well as trade flows.

Traditionally, there have been two ways of evaluating the effects of PTAs empirically.

- Ex post econometric approaches. These cannot measure the effects of PTAs on the economic welfare of member and or non-member countries directly, since this is unobservable. But they can examine the effects of actual PTAs as written, complete with non-trade provisions, on actual trade and investment flows.

- Ex ante computable general equilibrium analysis. These generally have enough economic structure to be able to draw inferences about the economic welfare of member and non-member countries. But they typically have a very idealised and tariff-oriented treatment of PTA provisions.

Since the purpose of this paper is to shed light on the effects of the non-trade provisions of PTAs, it uses econometric techniques to look at the effects of actual PTAs, particularly those containing significant non-trade provisions, on the actual trade and investment flows of member and non-member countries.

The paper is therefore limited to looking at existing PTAs, not those in prospect. In particular, the paper does not examine the merits or otherwise of the PTA that Australia has just negotiated with Singapore, nor those it is currently seeking to negotiate with Thailand and the United States.

In addition, because it uses econometric techniques, it is limited to examining the effects of PTAs on trade and investment flows — it cannot draw strong direct inferences about the consequences for economic welfare. The trade and investment effects are not always good indicators of the likely welfare effects, as elaborated in

the next chapter. But trade and investment effects are still of interest in their own right.

First, in chapter 4, the paper considers the potential of third wave PTAs to cause trade diversion. It does this by examining the effects on merchandise trade patterns of a range of PTAs using a dataset that includes most of the 1990s, and therefore covers trade patterns after the introduction of some more recent, third wave PTAs. The analysis finds that recent, and even past, PTAs are not as beneficial as some recent assessments have suggested. One reason is that those studies were not particularly careful about characterising PTAs, either in terms of their product (and other) coverage, extent of tariff preference, or timing of establishment/expansion. In addition, many unnecessarily restricted the number of countries in the sample. A systematic comparison of methodologies shows that it is the more careful consideration of these features, in particular the more rigorous test of whether trade outcomes are significantly different after PTA establishment/expansion than before, and the larger sample size, that accounts for the less favourable findings of this study.

Second, the paper considers one additional feature of third wave PTAs — their inclusion of non-merchandise trade provisions, including those that liberalise investment and services trade. The paper uses available data on bilateral flows of foreign direct investment to examine whether recent PTA formation has had any impact on the size and geographic source of FDI flows.

There are two competing theories. One, suggested by work in Pomfret (1997), is that investment flows respond to the liberalisation of *investment* provisions, in a parallel fashion to merchandise trade, with the possibility of investment creation and investment diversion. The welfare implications of these outcomes depend on whether the investment barriers liberalised were of the sort to generate rents, or whether they instead raised the real resource costs of doing business. The second theory, developed in a series of papers by Ethier (1998a, b, 1999, 2001) is that investment flows respond in 'beachhead' fashion to the *trade* liberalisation provisions of PTAs, as multinational enterprises establish facilities in one PTA partner in order to gain preferential trade access to the other. This is consistent with statements sometimes made by officials that the trade provisions in PTAs are really about attracting investment. Nevertheless, the trade carried out by the newly established multinationals can in turn constitute traditional trade diversion.

The empirical work in chapter 5 devises a test to distinguish the alternative motivations for changes in FDI flows in response to PTA establishment. The analysis finds that in most cases, investment *has* responded to the liberalisation of non-merchandise trade provisions, rather than to liberalisation of merchandise trade.

Only in the case of SPARTECA and the US-Israel agreement is there weak evidence of beachhead investment responding to the trade provisions.

The concluding chapter summarises the findings of this paper.

# 2    A review of the theory of PTAs

Each wave of PTAs has brought a particular focus to theoretical work.

- In response to the first wave, the theoretical focus was on the static effects of PTAs on trade flows, and whether they would bring benefits to individual member countries, the membership at large, or to excluded countries.

- In response to the second wave, concern was on whether PTAs were 'building blocks' or 'stumbling blocks' to multilateral trade liberalisation.

- With the recognition of a third wave of PTAs, concern has begun to shift to the effects of the non-trade provisions of PTAs on members individually and collectively, and on excluded parties.

One of the most comprehensive theoretical surveys of the first and second wave issues is the book edited by Bhagwati, Krishna and Panagariya (1999). The next two sections of this chapter draw extensively on that book, along with several shorter surveys along similar lines by Panagariya (1999, 2000), and the survey material in Pomfret (1997). Another comprehensive theoretical review is by Baldwin and Venables (1995), and policy-oriented reviews are by Schiff and Winters (2003), the World Bank (2000) and the WTO (1995).

## 2.1    The static welfare effects of PTAs

### Simple case

PTAs that require the preferential reduction of tariffs among members may or may not be beneficial for individual members, or for the world as a whole.[1] PTAs reduce one source of economic distortion, by reducing the average tariff on imports from all sources. But they exacerbate another distortion, by increasing the geographic disparity in tariffs. They can therefore improve economic welfare for individual members by shifting production from a higher-cost domestic source to a lower-cost PTA partner — trade creation. But they can also reduce welfare by shifting

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[1] Not all regional trading arrangements involve preferential tariff reductions. APEC is an important exception and as such, is excluded from this study.

production from a low-cost non-member to a higher-cost PTA partner — trade diversion. The net effect is ambiguous — it is unclear which effect will predominate — for the member granting the tariff concession, as it is for the PTA and the world as a whole.

These effects are shown in figure 2.1, a diagrammatic exposition similar to that first developed by Johnson (1960). $S_a$ and $D_a$ are the domestic supply and demand curves in country A. $S_b$ is the supply curve of imports from the PTA partner country, showing that any quantity can be supplied from there at the price $P_b$. $S_w$ is the supply curve of imports from the rest of the world, showing that any quantity can be supplied from there at price $P_w$. $P_a^*$ is the initial, tariff-inflated price in country A, with the tariff $t$ equal to $P_a^*–P_w$. Initially all imports $Q_c–Q_p$ come from the rest of the world, since with the same tariff $t$ placed on imports from B, the local price in country A would exceed $P_a^*$. The tariff revenue on the imports from the rest of the world is *AEJF*. The quantity produced domestically is $Q_p$, and domestic consumption is $Q_c$.

Now suppose that country A eliminates its tariff on imports from B, but retains it on imports from the rest of the world. With imports now available from B at $P_b$, the import quantity expands to $Q_c'–Q_p'$, with country B rather than the rest of the world becoming the source. Tariff revenue shrinks to zero. Domestic production shrinks to $Q_p'$, and domestic consumption expands to $Q_c'$.

**Figure 2.1    An illustration of trade creation and diversion effects of a PTA**
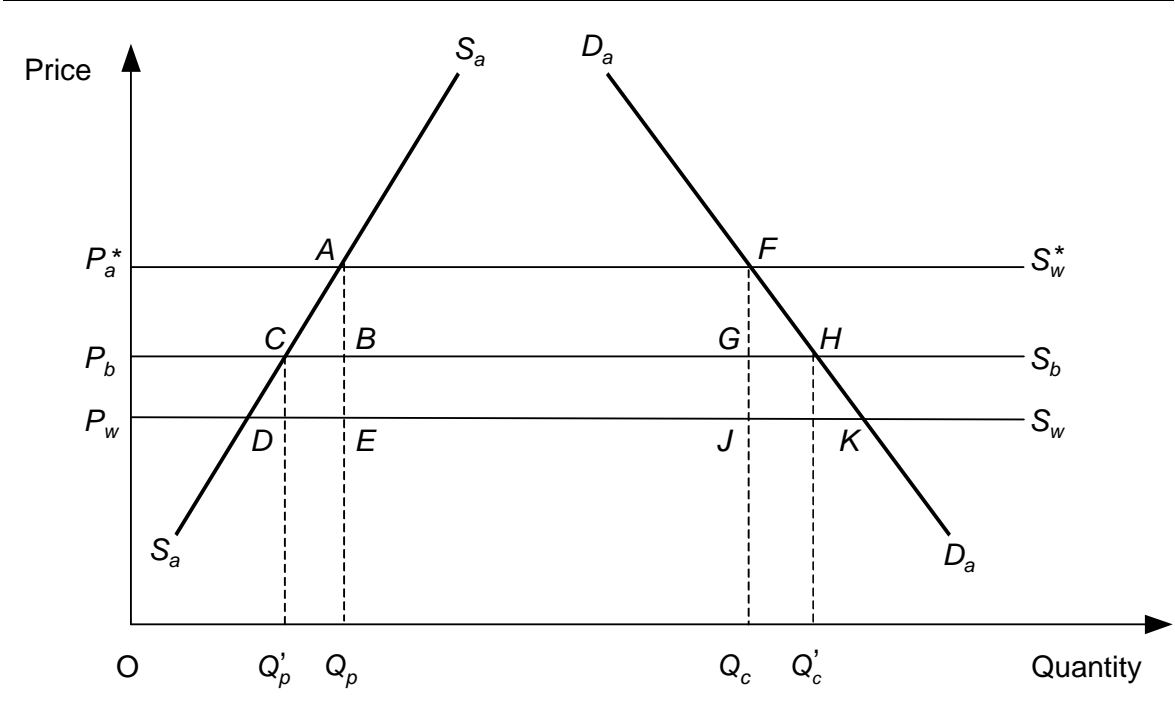
The net effect of PTA formation on economic wellbeing in country A is given by *ABC + FGH – BEJG*. The first effect, the gain of *ABC + FGH*, is the net benefit to consumers and the net resource saving in production from having domestic production shrink from $Q_p$ to $Q_p$' and consumption expand from $Q_c$ to $Q_c$'. This is the trade creation gain from shifting high-cost domestic production to a lower-cost partner.[2] The second effect, the loss of *BEJG*, is that portion of the tariff revenue lost by shifting imports from the rest of the world to the higher-cost partner that is not recouped in lower domestic prices to consumers. It is the welfare loss from trade diversion, and arises essentially because forgone domestic tariff revenue accrues instead as profit to producers in the partner country.

The effect on country A is ambiguous a priori. If country A choses to form a PTA with a partner that has a cost structure close to the world best, then $P_b$ will be close to $P_w$, and the height of the area *BEJG* will be small. But even then, if volumes of trade are initially large relative to the net changes induced by formation of the PTA, then the width of *BEJG* will greatly exceed the width of *ABC* and *FGH*, and the result could still be a net welfare loss from trade diversion. Alternatively, if trade is initially small relative to consumption and production, then $Q_p$ and $Q_c$ will be close together and the width of *BEJG* will be small (similar to Lipsey 1958). Strictly speaking, only if the partner country is already at world-best production cost is a welfare gain to country A assured. But then A's economic motive for preferential rather than non-discriminatory trade liberalisation is unclear.

What about the welfare effects on the country receiving the preferential tariff concession, and the effects on the rest of the world? If the simplifying assumptions are taken seriously that both of these countries supply any quantity at a fixed price (completely elastic supply), then in the absence of other economic distortions in these economies, the effect on their economic wellbeing is zero. Both face a change in demand for their product from country A, but because of the assumption of constant costs, there is no induced change in unit costs that can flow on to benefit domestic consumers or drive an improvement in resource allocation in those countries.[3] Thus, the effect on country A, the country granting the tariff preference, is the same as the welfare effect on the PTA and the world as a whole.

This highlights one of the key weaknesses of the simple analysis — its assumption of constant costs of production in the partner country and in the rest of the world. The effects of relaxing these assumptions are examined shortly.

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[2] Viner's (1950) original analysis omitted the consumption gain *FGH*. Johnson (1960) was the first to include it as part of the gains from trade creation, thereby ending unproductive debates about the possibility of welfare-increasing trade diversion (Gehrels 1957, Lipsey 1957, Michaely 1976).

[3] If there is a preexisting distortion in the exporting sector of the exporting country, then an expansion of that sector could worsen the allocation of resources.

The simple analysis is nevertheless useful for outlining the nature of the empirical tests for trade creation and trade diversion that are surveyed in the next chapter. Typically, these tests measure the amount by which the volume (or more often, the value) of trade increases with partner countries — $Q_c'–Q_p'$ in the above example — and compare it with the amount by which trade with the rest of the world is reduced — $Q_c–Q_p$ in the above example. If the net effect is positive, it is still only a weak test of whether the gains from trade creation outweigh the costs of trade diversion. It establishes that there is some positive width to the triangles *ABC* and *FGH*, but it does not establish that their areas exceed that of *BEJG*. This also depends on the reduction in costs per unit of newly created trade, and the increase in costs per unit of diverted trade. What can be concluded in this model is that if the empirical tests establish net trade creation in a volume or value sense, then the PTA may still have generated welfare losses, but if the empirical tests establish net trade diversion, then the PTA cannot have created welfare gains.

## Relaxing the assumption of constant costs

The assumption of constant costs in the partner country and in the rest of the world is consistent with perfect competition in those two markets. There has been a great deal of analysis examining the welfare effects of instead allowing unit production costs to vary in those two markets, although it has not always been explicit about the nature or source of the less-than-perfect competition there. More recent models have used product differentiation as the explicit source of market power and non-constant production costs, and are perhaps more convincing. In either case, however, the overall welfare conclusions defy simple generalisation as much as they do in the simple case.

### Terms of trade changes

Allowing unit production costs to vary and competition to be less than perfect in the partner country and/or in the rest of the world introduces one additional source of complication — the possibility of terms of trade changes for PTA partners and for third parties, which contribute welfare effects in addition to those outlined above. Importantly, this leads to a breakdown in the one-to-one correspondence between the welfare effects on the country granting the tariff preference and the welfare effects on the PTA as a whole. Thus a PTA such as NAFTA can be beneficial as a whole, but still produce economic welfare losses for a small partner such as Mexico, as Panagariya (1999, 2000) has argued.

The easiest way to see the dramatic effects that less-than-perfect competition can have is to imagine in figure 2.1 that the producers in country B form a cartel and

'price up' to the world price plus external tariff after they are granted the tariff preference. Their price would remain at $P_a*$, the losses to country A from trade diversion would expand to *AEJF* and the gains to A from trade creation would disappear completely! On the other hand, country B would now have a net gain in rent of *ABGF* that was previously tariff revenue accruing to A. The net loss to the PTA and the world as a whole would be *BEGJ*. Thus, less-than-perfect competition can preserve the losses from trade diversion but destroy the gains from trade creation.

But even this conclusion is not completely robust. Panagariya (2000) shows how the analysis of the previous paragraph assumed implicitly that after the formation of the PTA, country B maintained an external tariff equal to the pre-union tariff of A. This situation, where each country adopts a common external tariff, is known as a customs union. If instead, each country retains its initial tariff, the PTA is a free trade area. Panagariya (2000) shows that with less-than-perfect competition, the welfare effects of a free trade area on country A and the PTA as a whole can sometimes (depending on initial production and trade shares) be ambiguous rather than negative, although the effect on B remains positive.

Panagariya (2000) also analyses several other special cases at length, some involving less-than-perfect competition in the rest of the world as well as in the partner country. He also discusses the case where product differentiation is the source of market power and less-than-perfect competition. While none of these cases can claim full generality, the analysis that comes closest is that of Mundell (1964). Riezman (1979) is another early contribution. Panagariya (2000) argues that even the later, differentiated products analysis is a special case of Mundell's earlier work.

Mundell (1964, p. 8) draws the following more general conclusions on the effects of a customs union, assuming that all goods are gross substitutes and initial tariffs are low:

> (1) The discriminatory tariff reduction by a member country improves the terms of trade of the partner country with respect to both the tariff reducing country and the rest of the world, but the terms of trade of the tariff-reducing country might rise or fall with respect to third countries.

> (2) The degree of improvement in the terms of trade of the partner country is likely to be larger the greater is the member's tariff reduction; this establishes the presumption that a member's gain from a free-trade area will be larger the higher are initial tariffs of partner countries.

A key to this result is the revenue transfer effect that can arise with less-than-perfect competition. It is also the basis for Panagariya's conclusion that the United States is

likely to gain, but that Mexico could lose, from NAFTA. Existing empirical tests of the effects of NAFTA are discussed in the next chapter.

*Economies of scale*

A final theme in the policy arena has been the possibility of gains to PTA formation arising from economies of scale. This was part of the rationale for the PTAs proposed among developing countries in the 1960s, and the argument has appeared frequently in policy circles since. Corden (1972) showed that economies of scale did not establish a stronger presumption in favour of PTAs being welfare improving than was the case under constant or increasing costs. While economies of scale provide an additional source of gain — a cost reduction effect as existing firms expand and unit production costs are lowered — they also provide an additional source of loss — a trade suppression effect as more expensive (but now viable) domestic production replaces cheaper imports from third countries. It is also true in Corden's model that the PTA members could do better by liberalising unilaterally or on non-discriminatory basis, as was the case under constant costs.

Baldwin and Venables (1995) explore further the pro-competitive cost reducing effects of PTAs under imperfect competition and increasing returns to scale. They conclude that *if* PTA formation changes firm behaviour so that markets become less segmented and more integrated, there could be substantial pro-competitive gains.

The World Bank (2000) notes, however, that most of the efficiency gains from openness come from reductions in production inefficiencies, rather than from scale effects. They also note that estimates from the EU found that pro-competitive effects were largest, not in markets where there was a high level of intra-EU trade, but instead in markets where there was a high degree of competition from firms outside the union. They conclude that while there is potential for gains from competition and scale effects in industrial sectors of the economy, achieving them might require 'deep integration' policies — removing not just tariff barriers, but also 'trade chilling' contingent protection, and other frontier frictions such as frontier red tape and differences in national product standards. They also note that these gains may also be achievable through unilateral trade liberalisation.

## Intermediate goods and rules of origin

The above analysis also simplifies by ignoring production and trade in intermediate goods, and the effects that rules of origin can have on this trade. The literature on rules of origin is sparse, but the following points have been made.[4]

- In the absence of traded intermediate inputs, rules of origin have an unambiguously harmful effect. Without them, a free trade area would operate like a customs union, with the lowest tariff among members being the external tariff. Rules of origin generate additional trade diversion.

- With traded intermediate inputs, rules of origin could reduce trade diversion. This can happen if rules of origin require a producer to purchase inputs from a more expensive member source in order to qualify for a tariff concession on output. This can reduce the amount of trade diversion in the final product.

- But for the same reason, rules of origin can also counteract trade creation.

- In intermediate goods production, rules of origin are likely to encourage trade diversion and thus be harmful.

Thus rules of origin can transmit the trade diversion associated with preferential liberalisation back up the production chain.

## General conclusions from static analysis?

The above analysis shows that some of the generalisations that are sometimes made about the static effects of PTAs should be viewed with caution.

For example, it is sometimes claimed that the static gains will be greater, the larger the trade barriers being reduced (Laird 1999). As the above analysis shows, however, it cannot be presumed that the gains will flow to the country with those high tariffs initially (as would be the case with non-preferential trade liberalisation). Instead, the analysis using less-than-perfect competition suggests the opposite.

Similarly, it is sometimes claimed that the gains will be higher, the higher the share of pre-existing trade between partners. This is one basis for the claim that there will be gains to PTAs among 'natural trading partners', a claim originating with Wonnacott and Lutz (1989). The reasoning is that there is not much trade with the rest of the world that can be diverted. Bhagwati and Panagariya (1999) give a detailed critique of this proposition. Among the points they make are the following:

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[4] For analyses of the welfare effects of rules of origin, see Duttagupta and Panagariya (2002), Ju and Krishna (1998), Krishna and Krueger (1994) and Krueger (1999b). The following summary is drawn from Panagariya (1999).

- the proposition is neither symmetric nor transitive — the United States is Mexico's largest trading partner, but the reverse is not true, and while the United States is also Canada's largest trading partner, Mexico and Canada have little trade with each other;

- the welfare effects of PTAs depend on the volumes of trade *actually* diverted, which need not be proportional to initial trade shares;

- in this respect, Lipsey's (1958) observation about the importance of imports from either source relative to domestic consumption may have more force, but even here, the relative cross-price elasticities of each import with the home good also matter.

A second variant of the 'natural trading partner' hypothesis is that PTAs are more likely to be beneficial when they are among geographic neighbours, again because intra-bloc trade is likely to be large initially. Bhagwati and Panagariya (1999) point out that although gravity equations (used in empirical tests of the gains from PTAs, and discussed more fully in subsequent chapters) show that there is an inverse relationship between distance and trade volumes, *once other factors such as size and relative income levels are controlled for*, there is no *simple* correlation between distance and trade volumes that would support this natural trading partner hypothesis.

A final variant of the 'natural trading partner' hypothesis is that PTAs are more likely to be beneficial when they are among geographic neighbours, because transport costs will be lower. Bhagwati and Panagariya (1999) construct a counterexample showing that the efficient policy choice of a preferential trading partner among countries with basically the same supply characteristics can be paradoxically the more distant. This is because transport costs can make the supply from the distant partner more price responsive (elastic), and efficient price discrimination requires a lower tax (via the PTA) on the more elastic supply.

It is also claimed that trade creation and welfare gains will be larger, the larger the partner country, the more diversified the partner country's economy and the closer its prices resemble world prices (Laird 1999). The first two of these criteria appear to be proxies for the third, but as the above analysis under both perfect and less-than-perfect competition shows, having a partner's price 'close to' the world best price may not be enough to prevent large losses from trade diversion, especially if producers in the partner country 'price up' to the external tariff.

Pomfret (1997, p. 174) claims:

> Within the mainstream theory there is little scope for expecting the welfare impact on outsiders to be non-negative, although the order of magnitude is an empirical matter.

Non-participants will be affected primarily by terms of trade effects. The quote from Mundell above shows that from the outsider's perspective, its terms of trade may rise against the tariff-reducing country, although they will fall against its partner country, so even net losses to outsiders are not a sure thing in an asymmetric PTA (where only one partner lowers tariffs). They are much more likely in a symmetric PTA.

Pomfret (1997) also points out that in the simple case of constant costs, there was a clear policy prescription — avoid introducing the second policy distortion and liberalise on a non-discriminatory basis. It was this observation that led some analysts (Johnson 1965, Cooper and Massell 1965) to conclude that preferential trading arrangements could be explained only by non-economic motives. But with non-constant costs and less-than-perfect competition, even this presumption disappears:

> Mundell (1964) identified realistic situations where all GDA [geographically discriminatory arrangement] member countries could improve their terms of trade with the rest of the world, with all participants benefiting in a manner that would not be replicated by MFN tariff reductions, although clearly this is at the expense of countries outside the GDA and is possibly welfare-reducing for the world as a whole. (Pomfret 1997, p. 204)

The one general conclusion that can be drawn from the static analysis is that it has proved extremely difficult for analysts to come up with robust 'rules of thumb' to characterise situations where the gains from trade creation will exceed the losses from trade diversion, so that PTAs will deliver gains to members and to the world as a whole. This suggests that it will be equally difficult for governments to identify real-world PTA opportunities that meet this criterion. It also means that it will be difficult, at least on static grounds, for WTO member countries to identify robust new WTO disciplines on PTA formation that will minimise the possibility of losses to either PTA members or third parties.[5] The scope for designing such rules is examined on political economy grounds briefly in the next section.

## Other static arguments in favour of PTAs

The Kemp-Wan (1976) theorem offers the tantalising prospect of designing an PTA that can benefit at least one member, without harming other members or outside parties.

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[5] Pomfret (1997) and Panagariya (2000) note how volume-based rules of the sort proposed by McMillan (1993) can be confounded by terms of trade effects.

The key insight is that a second policy instrument is required to undo the damage done by increasing the geographic dispersion in tariffs. That instrument is the external tariff. Instead of setting a common external tariff equal to members' average initial tariff, members of a customs union should reduce that external tariff by enough to ensure no change in the net trade of members with the rest of the world. This ensures no harm to the rest of the world. To ensure that no union member is harmed, there also need to be appropriate compensation payments among members.[6]

But therein lies the problem — by how much should the external tariff fall, and what are the compensation payments required? The theorem is an existence proposition, rather than a policy prescription.

What is worse, several papers (Grossman and Helpmann 1995, Panagariya and Findlay 1996) show that, once political economy considerations are recognised, the political incentives are for PTAs to be formed precisely when they are most trade diverting, and for external tariffs to be raised rather than lowered. Clearly, political economy considerations have a role to play in assessing PTAs.

## 2.2 The dynamic effects of PTAs on multilateral liberalisation

### Building blocks or stumbling blocks?

A convincing answer to the question of whether PTAs are building blocks or stumbling blocks to multilateral trade liberalisation requires a political economy focus. What are the incentives for countries to want to enter an existing PTA? What are the incentives for existing members to allow new entry? And what are the incentives for new or existing members to continue to seek multilateral trade liberalisation?

Several papers have avoided these questions by simply assuming that a PTA expands its membership. They then assess whether that will increase or reduce welfare. The most famous was the paper by Krugman (1993), which outlined a set of circumstances in which world welfare would first fall, and then rise, as the world was divided into fewer, larger trading blocks. World welfare was at its lowest when the number of trading blocks was three!

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[6] Panagariya and Krishna (2002) prove a similar result for free trade areas.

Krugman's analysis has been shown to be sensitive to his model's assumptions (Srinivasan 1993, Deardorff and Stern 1994). For example, Deardorff and Stern show instead that when trade is motivated by differences in factor endowments, as in many conventional trade models, world welfare rises monotonically with the size of the blocks.

Four key papers have examined the incentives for PTA membership to expand. Two argue that PTAs will be stumbling blocks, by reducing the incentives of members to seek multilateral trade liberalisation. A third paper argues that there are incentives for non-members to seek entry into PTAs in domino fashion, until the whole world is covered. A fourth paper shows that there are incentives for existing members to prevent such an outcome.

In Krishna (1998), governments respond to lobbying by firms. In this oligopolistic competition model, the bilateral PTA reduces the incentives of members to liberalise tariffs reciprocally with non-member countries, and with sufficient trade diversion, this incentive could be reduced enough to make impossible an initially feasible multilateral trade liberalisation.

In Levy (1997), governments instead respond to the will of the median voter. In a richer model with scale economies and product variety, bilateral PTAs can undermine political support for multilateral free trade. What is worse, a benign impact is impossible — if a multilateral free trade proposal is not feasible in the absence of a PTA, it will not become feasible with the PTA.

In the third paper, Baldwin (1996) considers only the incentive of non-members to join a PTA, and argues that there will be a positive 'domino' effect. The PTA implies a loss of cost competitiveness by imperfectly competitive non-member firms, whose profits in the PTA market decline because of the tariffs they still face. These firms lobby for entry, tipping the political balance towards entry in the non-member countries closest to the margin. This new entry sets up its own cycle of new cost pressures and further lobbying for entry.

Baldwin (1996) does not consider the incentives for existing members to allow new entrants into the PTA. Zissimos and Vines (2000) acknowledge that joining a PTA is the best safe-haven strategy when other countries are doing so. But they argue that the same terms of trade changes that encourage non-members to seek entry are the factors that will eventually discourage existing members from allowing it — terms of trade gains to members require there to continue to be some non-members

to exploit in this fashion.[7] PTA block formation will fall short of multilateral free trade.[8] They show how the provisions in Article XXIV that prevent an increase in external tariffs are not sufficiently strong to prevent terms of trade changes induced by internal tariff reduction à la Mundell, the key to their result. For the same reason, block members would not be induced to accept 'open regionalism' as an alterative multilateral discipline, whereby any trade block must be open to the membership of any country that wants to join.

Thus the bulk of the existing literature seems to point to PTAs being stumbling blocks rather than building blocks to multilateral liberalisation. That said, the paper of Zissimos and Vines (2000) shows that for plausible parameters, world equilibrium could involve one block being large — about 90 per cent of the world economy.[9] Perhaps this is not too dissimilar to the current WTO membership. But they also note that any attempt to tighten the WTO rules on PTA formation will need to recognise that at least some current PTA members are better off than they would be under global free trade. This dynamic makes the prospects for successful redesign of the rules difficult.[10]

## Other dynamic arguments in favour of PTAs

Bhagwati (1999) evaluates the arguments heard in policy circles that regionalism is a quicker, more efficient or more certain route to free trade than multilateral negotiation.

On the question of speed, he notes that even now, the European Union has still not fully achieved its pledge to eliminate internal trade barriers, as required by Article XXIV. He also notes that PTAs have been no more successful than multilateral forums at tackling the hard cases such as agriculture and textiles. Indeed, Hoekman and Leidy (1993) find that the holes (areas left out) and loopholes (areas where the disciplines of free trade are avoided) are virtually identical in either case.

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[7] Zissimos and Vines (2000) is a further development of the arguments about negative externalities from terms of trade changes developed by Bond and Syropoulos (1996) and Bagwell and Staiger (1998, 1999), among others.

[8] Freund (2000) shows that this argument may not be robust to the presence of sunk costs, because then 'first movers' gain a permanent advantage from PTA formation that persists in a subsequent move to free trade, albeit at the expense of non-members.

[9] Andriamananjara (1999) has a similar theoretical finding, but finds that the larger block would be about two-thirds of the world economy.

[10] Lloyd (2002) argues that bilateral 'hub and spoke' arrangements can be beneficial because they circumvent the unanimity rule presumed by Zissimos and Vines (2000). But this presupposes that preexisting spoke partners will stand silent as new bilateral spoke arrangements are negotiated, even ones that disadvantage preexisting spokes.

On the question of efficiency, or the ability to 'deliver the goods', Bhagwati notes that the concessions that hegemons may be able to extract from smaller trading partners in a regional forum may not exactly be in the best interests of those smaller partners or the world as a whole, and may distort multilateral negotiations.

> As is now widely conceded among economists, the case for TRIPS [the agreement on protection of trade-related intellectual property rights under the WTO] for instance is *not* similar to the case for free trade: there is no presumption of mutual gain, world welfare itself may be reduced by any or more IP protection, and there is little empirical support for the view that 'inadequate' IP protection impedes the creation of new technical knowledge significantly. Yet the use of US muscle, unilaterally through 'Special 301' actions, and the playing of the regional card through the NAFTA carrot for Mexico, have put TRIPS squarely and effectively into the MTN. (Bhagwati 1999, p. 24)

On the question of certainty, and the ability of PTAs to lock in a reform commitment, Bhagwati notes that multilateral forums also create commitments — tariffs are bound, and the WTO sanctions retaliatory action against members who raise their tariffs above bound levels. He also notes that WTO disciplines on PTAs are lax, creating incentives to negotiate 'second best' PTAs. PTAs have also been known to fail or stagnate.

## 2.3    The effects of non-trade provisions of PTAs

So far, the discussion has been about the tariff provisions of PTAs, and the effects of those provisions on merchandise trade. Despite the evolution of third wave or new age agreements, there has been little literature dealing with the effects of preferential non-tariff provisions.

One exception is Pomfret (1997, chapter 10). He discusses three types of non-border measures — foreign direct investment policy, competition policy and monetary integration. He notes that PTAs may contain preferential provisions in these areas designed to be discriminatory, or PTAs may simply present regional forums for negotiating geographically limited harmonisation when global regimes are unattainable.

- On investment, he concludes that investment provisions can be used as discriminatory protective devices, so that a preferential agreement that balanced the interests of like-minded countries may not be in the interests of the rest of the world — if a global investment code is desired, it should be designed by a global rather than regional body.

- On competition policy, he concludes that the case for preferential or discriminatory competition policy is weak, but there are arguments for

harmonising competition policies to reduce sources of international tension, and it may be easier to do this in a regional setting.

- On monetary integration, he concludes that the relationship between monetary integration and regional integration is weak, and at the level of most PTAs, monetary union is relatively unimportant.[11]

## The welfare effects of preferential investment provisions

Pomfret (1997) does not discuss in detail the economic welfare effects of discriminatory provisions governing foreign direct investment, but his discussion of the welfare effects of preferential non-tariff barriers to trade is suggestive. The reason is that work at the Productivity Commission has shown how barriers to the establishment and operation of foreign multinationals can be modelled as non-tariff barriers on the flow of capital, and the output of FDI firms once established, respectively (Dee and Hanslow 2001, Dee, Hanslow and Phamduc 2003).

Pomfret (1997) notes that the critical distinction is whether non-tariff barriers are rent-generating — allowing a markup of price over cost — or whether they are cost-escalating — increasing the real resource costs of doing business.[12]

If they are rent-generating, then they operate much like tariffs, except that the rents stay in the hands of importers or exporters rather than accruing to government in the form of tariff revenue. If non-tariff barriers are of this form, then preferential liberalisation will have similar effects to preferential tariff liberalisation. There will be welfare gains from trade creation where rents are reduced, and there will be welfare losses from trade diversion on that trade where rents still accrue.[13]

If instead non-tariff barriers are cost-escalating, then liberalisation unambiguously saves real resources. As Baldwin (1994) has shown, in this situation preferential liberalisation is always welfare-increasing, whether or not the trade partner is the least-cost supplier.[14]

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[11] Frankel (1997) and Rose (2000), summarised in the next chapter, reach a different conclusion.

[12] Dee (2001) shows that the same distinction is critical for the welfare effects of barriers to services trade.

[13] Pomfret (1997) acknowledges that there are situations (eg imperfect competition, uncertainty) where this equivalence between tariffs and rent-generating non-tariff barriers breaks down.

[14] The unambiguous gains from removing cost-escalating non-tariff barriers (eg undertaking trade facilitation) have also been stressed in studies of the effects of deep integration, such as Emerson et al. (1988) and Lawrence (1997).

The analogy with preferential liberalisation of investment provisions can now be drawn.

- If investment barriers are of the sort to generate rents, then preferential liberalisation will generate gains from investment creation, as production is moved from a high-cost domestically-owned producer to a lower-cost member's affiliate. But it will also generate losses from investment diversion, as production is moved from a low-cost non-member affiliate (located somewhere in the world) to a higher-cost member affiliate.

- If investment barriers are of the sort to escalate costs, then preferential liberalisation will unambiguously save real resources and increase welfare.

Thus the welfare implications are more positive than with preferential tariff liberalisation, because of the possibility of saving real resources. But the potential for losses from investment diversion also remains.

## The welfare effects of investment responding to preferential trade provisions

In a series of papers, Ethier (1998a, b, 1999, 2001) develops variants of a model in which investment responds in 'beachhead' fashion to the preferential trade provisions of PTAs.

This model is an explicit attempt to capture some of the salient features of third wave PTAs. He observes that many third wave agreements are between small, 'outside' countries that are not yet members of the world trading system,[15] and larger, 'inside' countries that are. The small, outside countries want to reform their internal economies so that they can be accepted as members of the global trading system. Ethier asserts that the sign of successful reform is whether these countries attract foreign direct investment.[16] Their problem is how to signal a credible commitment to reform in advance.

The outside country's solution is to sign an PTA with an inside country involving enough trade concessions to the inside country so that it in turn will have an incentive to act as an enforcer and retaliate if the outside country deviates from its reform commitment. But the aim is not necessarily to receive enormous concessions

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[15] Ethier (2001) identifies these as countries that until recently adopted basically-autarkic, antimarket policies. The issue is not membership of the WTO per se.

[16] Blustein's (2001) account of how the 'electronic herd' responded to IMF reform programs in the Asian crisis countries suggests that while there may be some truth to Ethier's assertion, the relationship between reform programs and investment behaviour is more complex than Ethier suggests.

from the inside country in return. All that is required is a small trade concession, so that multinationals have an incentive to locate in the outside country and to use it as a beachhead for trade to the inside country. Thus Ethier also explains the recent phenomenon of some third wave agreements being asymmetric:

> What matters here is what the small reforming country *gives*, in terms of trade concessions, not what it *gets*, because it is the former which influences the likelihood of retaliation by the partner in the event of backsliding. The external commitment in turn makes the country more attractive for direct investment, relative to similar countries without such external commitments. (Ethier 1998b, p. 1157)

Note too that there is no presumption that the investment comes from the large PTA partner.

> The goal is to compete with other *similar* countries for direct investment, not to expand greatly exports to their partners or to attract from them investments that would otherwise not be made at all. Such 'investment creation' will be modest at best. (Ethier 1998b, p. 1158)

Ethier (2001) also examines in detail the incentives of the large inside country to accede to such an arrangement, even in preference to pursuing further multilateral reform.

Finally, he shows that a world equilibrium in which small countries compete for investment in this fashion is beneficial, because it internalises an externality. The global interest calls for successful reform to be as widespread as possible, but if there are agglomeration economies, then multinationals will want to cluster their foreign investments together. A global web of bilateral PTAs, initiated by outside countries' competition for investment, internalises the externality.

Ethier's positive outlook on PTA formation comes from this benign view of competition for investment, rather than from the characteristics of PTAs per se. As he acknowledges, his model of PTA formation is consistent with massive amounts of investment diversion to take advantage of trade beachheads, and subsequent trade diversion from those beachhead positions. But in his model, there is sufficient symmetry between countries for this trade and investment diversion to have no adverse welfare consequences — every country is the 'lowest cost' source of imports and the 'best' host for FDI. With more diversity, this massive diversion is no longer benign.

Ethier's positive view also depends on the competition for investment occurring through reform, which is seen as a 'good thing'. If it were to occur through the competitive granting of investment incentives, or if 'reform' involved inappropriate concessions forced by a larger hegemon (as Bhagwati fears), the competition for investment may itself be less benign.

## 2.4    Summary

The first wave of PTAs coincided with a theoretical examination of the static effects on trade flows and economic well-being in member and non-member countries. The simple analysis with constant costs led to the conclusion that because PTAs ease one economic distortion, but exacerbate another, gains to PTA members are not assured. The more recent analysis with non-constant costs confirms this finding. It also suggests that because of the redistributive effects of less-than-perfect competition, individual PTA members need not gain, even when the PTA is good for the membership as a whole. And the losers will tend to be those members with high tariffs initially.

The second wave of PTAs spurred an examination of whether PTA formation was a building block or a stumbling block to multilateral trade liberalisation. The most convincing analyses were those that examined the incentives for non-members to join a PTA, and for existing members to allow that expansion. The most recent, comprehensive analysis finds that since PTA membership confers a terms of trade gain to members at the expense of non-members, at least some members will be better off limiting PTA membership than allowing expansion to cover the world as a whole. Any redesign of the WTO rules disciplining the formation of PTAs would need to recognise that reality.

The third wave of PTAs has begun to spur analyses of the non-tariff provisions of PTAs. At first sight, the focus of third wave agreements on non-tariff issues may suggest that traditional concerns about trade diversion are outmoded. But a closer look suggests otherwise. Investment barriers can be used as a protective device, and preferential liberalisation of investment provisions can generate investment diversion, with adverse consequences, as well as beneficial investment creation. Even where investment is attracted in 'beachhead' fashion in response to trade liberalisation provisions, both the investment and subsequent trade from the beachhead position may be diversionary. Thus the non-tariff focus of third wave agreements cannot shake the first wave concerns about the adverse second-best effects of preferential liberalisation.

# 3    Review of the existing empirical evidence

Each wave of PTAs has brought a specific focus to empirical analysis.

- In response to the first wave, the empirical focus was to estimate the static gross trade creation and trade diversion effects of PTAs. Empirical studies used either *ex ante* or *ex post* techniques.

- In response to the second wave, PTAs were assessed as building or stumbling blocks according to their net trade creation or diversion effects. These studies increasingly used analytical and *ex ante* techniques.

- The empirical analysis of third wave issues is still in its infancy. A few studies have provided analytical insights into the effects of trade provisions on investment. Little attention has yet been paid to non-trade provisions.

This chapter assesses the empirical evidence on static trade creation and trade diversion — the issue that drove the first wave. It has remained a preoccupation of empirical research even with the second and third waves.

The different approaches used to estimate trade creation and diversion effects are discussed in the next section, followed by more in-depth discussion of the gravity model, the key econometric method used. The chapter then reviews the findings on the trade creation and diversion effects of PTAs. A brief summary is also given of the evidence on second and third wave issues.

## 3.1    Approaches to assessing PTAs

The key empirical task is to disentangle the effects of a PTA from other changes in an economy. There are two main approaches.

First, *ex ante* studies have used counterfactual analyses based on partial or general equilibrium models. These models assume a certain model structure, with specific functional forms and parameter values to represent the countries in a base year prior to the formation of the PTA. Those models with a sufficiently tight theoretical structure are also able to be used to draw direct inferences about welfare. The model is then subjected to the preferential removal of tariffs alone, and the welfare effects

are calculated. Surveys of assessments of PTAs using general equilibrium models can be found in De Rosa (1998) and Robinson and Thierfelder (2002). Scollay and Gilbert (2000) survey CGE assessments of APEC. Most of these studies find that PTAs create additional trade for both members and non-members. Most also find that PTAs improve welfare, at least among member countries.

However, these CGE analyses suffer from a number of theoretical and practical difficulties. Some (in particular, many of those covered by the Robinson and Thierfelder survey) assume fixed terms of trade. As noted by Panagariya and Duttagupta (2002), this is inconsistent with one of their other key assumptions, namely, product differentiation at the national level. Deardorff and Stern (1994) note how the assumption of national product differentiation can itself leave an 'idiosyncratic stamp' on examinations of PTAs, in particular helping to explain Krugman's (1993) finding of welfare losses in a world of three trading blocs, a result that does not appear to carry over to empirical CGE analyses. But in addition, the assumption of fixed terms of trade rules out one of the key effects of PTAs, namely, terms of trade changes.

Further, the CGE studies typically use a very simple characterisation of PTAs. Most assume comprehensive across-the-board elimination of tariffs (and sometimes non-tariff barriers) among members, although most real-world PTAs have complex patterns of exemptions. In addition, the studies typically ignore many of the potentially trade-restrictive non-tariff measures, such as rules of origin or local content requirements, that typically accompany the merchandise trade measures. Finally, they typically ignore provisions affecting non-merchandise trade (although a notable exception is Hertel, Walmsley and Itakura 2001).

This is not to deny that particular CGE models, when used with appropriate assumptions (such as variable terms of trade), can give valuable insights into the possible effects of important tariff provisions of PTAs. But conclusions drawn from *surveys* of CGE studies should be treated cautiously. And the results from CGE studies should not be generalised to draw conclusions about the effects of non-merchandise trade provisions of PTAs.

By contrast, *ex post* studies of PTAs measure their trade creation and trade diversion effects by using econometric methods to establish a link between actual PTA formation and actual trade outcomes, controlling for the effects of all other influences. Since welfare is unobservable, these econometric studies cannot establish welfare effects directly. And as noted in the previous chapter (p. 14), the link between trade outcomes and welfare is weak. But the studies do examine *actual* PTAs, in all their complexity, including non-merchandise trade provisions.

The present study focuses on these *ex post* evaluations of the effects of PTAs. The e*x ante* studies typically look only at the tariff provisions of PTAs (and then only imperfectly), so they do not evaluate the third wave aspects discussed in chapters 1 and 2. By contrast, the *ex post* studies of actual PTAs include the actual responses to any third wave provisions embodied in them. The remainder of this chapter looks at the existing evidence, while the following two chapters present new evidence on the *ex post* effects of tariff and non-tariff provisions, respectively.

## Gravity model

The gravity model is the key *ex post* econometric technique used to examine the determinants of bilateral trade flows. It is a model of trade flows based on an analogy with the law of gravity in physics. Trade between two countries is positively related to their size, and inversely related to the distance between them. A number of other explanatory variables are added to this model to analyse various bilateral trade policy issues. In the augmented gravity model, trade between two countries is determined by supply conditions at the origin, demand conditions at the destination, and various stimulating or restraining forces. This specification has recently been shown to be consistent with a number of theoretical models of international trade.[1]

The standard way of assessing the impact of PTAs is to add PTA-specific binary dummy variables to the augmented gravity model to capture effects not captured through normal bilateral trade determinants.

## PTA specific dummy variables

Studies adding PTA-specific dummy variables to capture the trade creation and diversion effects of PTAs date back to the 1970s. Aitken (1973) initially added one dummy variable to his gravity model to capture the intra-bloc effect of a PTA — the 'gross trade effect' of Balassa (1967).

Bayoumi and Eichengreen (1995) and Frankel (1997) added two dummy variables for each PTA to capture the separate effects on intra-bloc and extra-bloc trade. The 'net trade effect' of Viner (1950) can be obtained by combining these two dummy

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[1] The gravity model is derived theoretically as a reduced form from a general equilibrium model of international trade in goods. Baier and Bergstrand (2001) derived it from a model of monopolistic competition. Feenstra, Markusen and Rose (2001) derived it from a reciprocal dumping model of trade with homogeneous goods. Deardorff (1998) derived it from a model with perfectly competitive markets. Evenett and Keller (1998) showed empirically that the monopolistic-competition based theory of trade fits the trade flows among industrialised countries well.

variables to assess whether an increase in intra bloc trade has come at the expense of lower extra bloc trade. The size, sign and the significance of the PTA-specific dummy coefficients has also been used to indicate whether a PTA is a building or stumbling block to multilateral trade liberalisation — the second wave issue.

The first dummy variable takes a value of one when the two countries are members of the same PTA. The second dummy variable is one if either country in a particular pair belongs to the PTA. A positive coefficient on the first dummy variable indicates that members of a PTA trade more with each other than would be predicted by their normal bilateral trade determinants and the average behaviour of countries in the sample. In other words, a positive coefficient on the first dummy variable indicates that the formation of a PTA enhances intra-bloc trade. The second dummy variable measures the extent of additional trade between an PTA member and a non-member, relative to what the gravity model predicts for a random pair of countries that do not belong to that particular PTA. A negative and significant coefficient for the second dummy variable suggests that the PTA leads to trade diversion.

If a positive coefficient on the first dummy exceeds a negative coefficient on the second, then trade creation may be said to outweigh trade diversion. But as noted in chapter 2, the effects of the PTA on welfare do not follow immediately. These also depend on the reduction in costs per unit of newly created trade, and the increase in costs per unit of diverted trade. They also depend on terms of trade effects, which are not captured at all in this type of analysis (although their direction at least can often be inferred from the changes in directions of trade).

Soloaga and Winters (2001) added three dummy variables for each PTA, to distinguish an intra-bloc effect, an extra-bloc effect on imports and an extra-bloc effect on exports (see figure 3.1). The second and third dummy variables in their study measure the extent of import diversion and export diversion, respectively. They argued that both are needed because bloc members' imports and exports could follow different patterns after the formation of a PTA.

As noted, the 'net trade effect' of a PTA has been used as a tentative indicator to assess the second wave issue — whether a PTA is a building or stumbling block to free trade. Frankel (1997) used the sum of the significant intra-bloc and extra-bloc effects obtained from his gravity model to infer the second wave issue. This criterion will be discussed further in section 3.3.

Figure 3.1    **Use of PTA-specific dummy variables[a] in a gravity model — the example of NAFTA**
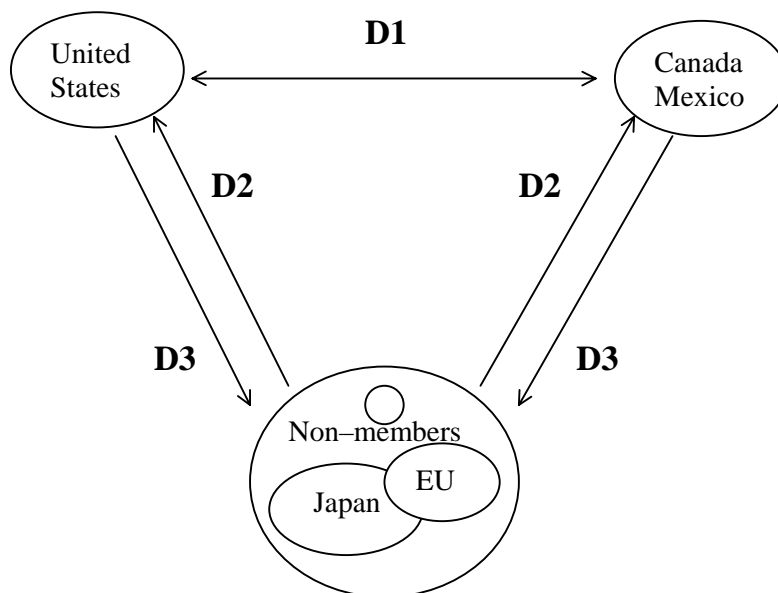


**a**  D1 captures the effects of NAFTA on intra-bloc trade. D2 captures the effects of NAFTA on members' imports from non-members — import diversion if the coefficient is negative. D3 captures the effects of NAFTA on members' exports to non-members — export diversion if the coefficient is negative.

### Normal bilateral trade determinants

The gravity model includes a number of variables that determine the normal pattern of trade between a pair of countries. If an important determinant is omitted, but is correlated with the PTA-specific dummy variable, the estimated PTA dummy coefficient will be biased, because it will pick up the effects of the omitted variables. Thus, it is important to take into account as many normal bilateral trade determinants as reasonably possible. A list of bilateral trade determinants included in previous gravity model studies, and their expected relationship with trade, is reported in table 3.1. Previous summaries of these variables can be found in Frankel (1997), and Oguledo and MacPhee (1994).

## Table 3.1 Normal bilateral trade determinants included in past gravity model studies

| Name of explanatory variable | Study | Expected relation with trade |
|---|---|---|
| **Size variables** | | |
| • Income of exporting country and importing country | Frankel (1997), Krueger (1999a), Soloaga and Winters (2001), Freund (2000) | • Positive |
| • Population of exporting and importing country | Aitken (1973), Bayoumi and Eichengreen (1995), Boisso and Ferrantino (1997), Frankel (1997), Fink and Primo Braga (1999) | • Positive/Negative |
| • Arable land of exporting and importing country | Soloaga and Winters (2001) | • Negative |
| • Product of incomes in exporting and importing countries | Frankel, Stein and Wei (1995), Frankel (1997) Bayoumi and Eichengreen (1995) | • Positive |
| • Sum of incomes in exporting and importing countries | Egger (2000), Di Mauro (2000), Baier and Bergstrand (2001) | • Positive |
| • Similarity in incomes in exporting and importing countries[a] | Egger (2000), Di Mauro (2000) | • Positive |
| • Income per person in exporting country and importing country | Bergstrand (1989), Frankel (1997), Krueger (1999a), Soloaga and Winters (2001) | • Positive/negative |
| • Product of income per person in exporting and importing countries | Frankel, Stein and Wei (1995), Frankel (1997) Bayoumi and Eichengreen (1995) | • Positive |
| • Absolute differences in income per person in exporting and importing countries | Egger (2000), Di Mauro (2000), Freund (2000), Gilbert, Scollay and Bora (2001) | • Positive/negative |
| **Geographical variables** | | |
| • Distance | Bayoumi and Eichengreen (1995), Fink and Primo Braga (1999), Freund (2000), Gilbert, Scollay and Bora (2001) | • Negative |
| • Island | Krueger (1999a), Soloaga and Winters (2001) | • Negative |
| • Landlocked | Soloaga and Winters (2001) | • Negative |
| • Adjacency | Li (2000), Soloaga and Winters (2001), Clark and Tavares (2000), Freund (2000), Gilbert, Scollay and Bora (2001) | • Positive |
| • Language | Boisso and Ferrantino (1997), Frankel (1997), Fink and Primo Braga (1999), Krueger (1999a), Soloaga and Winters (2001), Clark and Tavares (2000) | • Positive |
| • Remoteness | Polak (1996), Frankel (1997), Krueger (1999a), Soloaga and Winters (2001) | • Negative |
| • Transport costs (Cif/fob prices) | Geraci and Prewo (1977) | • Negative |

(Continued on next page)

## Table 3.1    (Continued)

| Name of explanatory variable | Study | Expected relation with trade |
|---|---|---|
| **Monetary and price variables** | | |
| • Common currency | Rose (2000)[b] | • Positive |
| • Exchange rate variability | Thursby and Thursby (1987), Frankel and Wei (1993), Eichengreen and Irwin (1995) | • Negative |
| • Prices in exporting and importing countries: (wholesale prices, unit export and import prices, PPP rates, real exchange rates) | Bergstrand (1985, 1989), Oguledo and MacPhee (1994), Bayoumi and Eichengreen (1995), Boisso and Ferrantino (1997), Matyas (1997), Di Mauro (2000), Egger (2000), Winters and Chang (2000) | • Positive/negative |
| **Policy and institutional variables** | | |
| • Tariffs, non tariff barriers and export taxes | Geraci and Prewo (1977), Oguledo and MacPhee (1994), Boisso and Ferrantino (1997), Di Mauro (2000), Baier and Bergstrand (2001) | • Negative |
| • Lagged trade flows | Irwin and Eichengreen (1998) | • Positive |
| • Colonial relations | Frankel (1997), Soloaga and Winters (2001), Freund (2000) | • Positive |
| • Intellectual property rights/patent protection | Fink and Primo Braga (1999) | • Positive/negative |
| • Corruption | Anderson and Marcouiller (1999) and Di Mauro (2000) | • Negative |

[a] $Ln[1 - \left(\frac{GDP_{it}}{GDP_{it} + GDP_{jt}}\right)^2 - \left(\frac{GDP_{jt}}{GDP_{it} + GDP_{jt}}\right)^2]$ which lies between $\infty$ and $Ln(0.5)$, and takes its maximum when two economies are identical in size. [b] Studies have used exchange rate variability as a proxy for monetary integration. However, Rose argued that the effect, if any, is difficult to estimate as a very stable exchange rate may not be the same as membership of a common currency area. He estimated the effect of common currency on trade directly and found that it was positive and significant and somewhat more important than the effect of being in a common PTA.

### Size variables

The size of economies, measured either in terms of income (mainly GDP), population or land area, is the main explanatory variable of a gravity model. Size variables act as a proxy measure for the level of demand in the importing country and the level of supply in the exporting country. In general, trade is expected to increase with size (attraction due to gravity), since large countries should trade more than small ones, and with per capita incomes, since rich countries should trade more than poor ones.[2]

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[2] Mathematically, it is equivalent to include either income and per capita income, or income and population, as shown empirically by Frankel (1997, p. 58).

Often, more than one size variable is included in the gravity model to find their separate effects. Consequently, the expected relationship of size variables with trade depends on the form of the dependent variable (whether it is exports or total bilateral trade — sum of imports and exports)[3] and other included size variables. For example, when controlling for size measured by GDP, the coefficient on population is generally negative. This captures the well-known phenomenon that larger countries tend to be relatively less open to trade as a percentage of GDP.

Bergstrand (1989) offered a way of understanding this specification that is consistent with the traditional and modern trade theories of inter- and intra-industry trade. Exporter income ($GDP_i$) and per capita income ($GDPC_i$) could be interpreted as national output per unit of capital, and the country's capital-labour endowment ratio, respectively. Changes in importer income ($GDP_j$) and per capita income ($GDPC_j$) could be interpreted as changes in expenditure capabilities and taste preferences, respectively. If the exporting country per capita income is estimated to have a positive effect on trade, the products traded between countries are revealed as capital-intensive in production, while a negative effect indicates labour intensive production. On the other hand, if the importing country per capita income has a positive effect on trade, imports are revealed as luxuries in consumption. A negative effect indicates the imported goods are necessities.

*Geographical variables*

Distance is a second pillar of the gravity model. Linnemann (1966) concluded that distance affects trade in the following ways:

- by raising transportation costs;

- by increasing the time involved, with associated concerns of perishability, adaptability to market conditions, irregularities in supply and interest costs; and

- by increasing 'psychic' distance, involving familiarity with laws, institutions and culture.

The last effect is sometimes captured separately in gravity models through a measure of linguistic similarity. Specific features of a country, such as being an island, being land-locked or being remote (distant from all trading partners) also affect bilateral trade flows. A variant of the natural trading partner hypothesis suggests that countries sharing a border may trade more with each other than with other countries. This is sometimes captured in gravity models through an adjacency variable.

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[3] If the dependent variable is a total bilateral trade, the gravity variables enter in product form, and if exports are specified as the dependent variable, the gravity variables enter in additive form.

Every so often transport costs are measured directly, usually by the ratio of cif (cost insurance and freight) to fob (free on board) valuations. Transportation costs raise the price of a good in the importing country and would have a negative effect on trade.

*Monetary and price variables*

In addition to joining PTAs, countries sometimes seek to promote macroeconomic stability by linking their currencies. Having a common currency reduces foreign exchange risk and the transaction costs of doing business with the partner country. There is expected to be a positive relationship between currency links and trade or investment flows between pairs of countries (though currency links would also have wider macroeconomic effects). Rose (2000) finds the common currency effect to be sizeable. Sometimes currency risk is measured directly, through a measure of exchange rate variability.

Until recently the gravity model was viewed as a reduced form equation for trade in which prices did not appear because they were endogenous. The underlying assumption behind this was that the products were perfectly substitutable in production and consumption. However, beginning with Armington (1969), trade theorists have recognised that trade flows can be differentiated by place of origin. Thus, exclusion of price variables leads to misspecification of the gravity model. Studies that included price variables in a gravity model found a significant effect on trade flows. Price variables have been proxied by unit value indexes, export and import prices, wholesale price indexes or the exchange rate. The coefficient of the price variables cannot be signed a priori since it depends on:

- the elasticities of substitution among importables;
- the elasticity of transformation among exportables; and
- the elasticity of transformation between production for the domestic market and for the foreign market.

*Policy and institutional variables*

The PTA-specific dummy variables capture the existence of a PTA, but not the size of the tariff preferences thereby created. This requires some explicit measure of tariff levels. Only a few studies have included the bilateral average tariff level as a control variable in their cross sectional gravity models. They found that the tariff in the importing country had a statistically significant negative effect on imports, as expected. But since a bilateral tariff variable may include preferential tariffs, the

overall measured effect of PTAs on trade would be split between the tariff variable and the PTA-specific dummy variables in specifications where both occurred.

The question of intellectual property rights has received increasing attention in recent years. Fink and Primo Braga (1999) employed a gravity model to assess the effects of intellectual property rights protection on trade flows and found that high protection had a significant positive impact on non-fuel trade and an insignificant impact on trade in high technology goods. Nevertheless, the effects of intellectual property rights protection on bilateral trade flows and investment are theoretically ambiguous, because of the complex static and dynamic considerations related to a policy of tighter protection (Chin and Grossman 1988, Deardorff 1992, Ferrantino 1993, and Helpman 1993).

The level of corruption in the host country could also affect its attraction of trade or investment. Di Mauro (2000) found that corruption had a negative effect both on exports and investment. She found that inadequate institutions constrain trade far more than tariffs do. This effect may be even more serious for investment. On the one hand, corruption makes local bureaucracy less transparent and increases the value of using a local partner to cut through the bureaucratic maze. On the other hand, corruption decreases the effective protection of investor's intangible assets.

## 3.2 Evidence on trade creation and diversion effects of PTAs — assessment of first wave issues

The static trade creation and trade diversion estimates from previous gravity model studies are presented in this section. All of these studies suffer from deficiencies.

Few of the studies included all of the control variables outlined in the previous section (table 3.1 shows which studies included which variables). Most early studies omitted the tariff and price variables; some studies omitted a great deal more. In addition, only one controlled for differences in the breadth of coverage of the different PTAs considered. And only one controlled for unobservable or non-measurable country-specific factors affecting bilateral trade flows. Thus all of the studies surveyed in the remainder of this chapter suffer from omitted variable bias to various degrees. Haveman and Hummels (1998) note how serious this omitted variable bias can be — it can lead researchers to conclude there is trade diversion when none exists, and to dismiss it when it does.

Some studies analysed a single year, after the formation of a PTA, and drew inferences based on whether the coefficients of the PTA-specific dummy variables were positive or negative in that year. Other studies analysed a range of years, and

drew inferences based on whether the point estimates of the coefficients were bigger or smaller after PTA formation than before. But none of the studies conducted a formal test for whether there was a significant difference in the coefficients before or after PTA formation.

Nevertheless, the studies constitute the available body of literature from which policy conclusions have been drawn. This chapter reviews them, and the next chapter compares their results with those from the current study, in which many of these deficiencies are addressed.

## PTAs in America

### Andean Pact / Community

Gravity model estimates for the Andean Pact, established in the late 1960s, are reported in table 3.2. The past estimates provide mixed evidence for the effect of the Pact on intra-Andean trade. The estimated intra-bloc coefficient was found to be insignificant by Boisso and Ferrantino (1997) and Frankel (1997). By contrast, Frankel, Stein and Wei (1995) found a positive and significant intra-Andean effect in 1990.

Li (2000) calculated an institutional variation index for major PTAs based on:

- their coverage (tariff and non tariff elimination, free trade in services, free movement of labour and capital);

- implementation (whether a timetable was specified for liberalisation); and

- dispute resolution (whether dispute settlement procedures were institutionalised).

Li included an institutional variation index in place of an intra-bloc dummy variable in Frankel's (1997) gravity model. Li found that the intra-bloc effect was positive and significant for the Andean Pact, implying that the members of this PTA trade more among themselves than predicted by normal bilateral trade determinants. Li (2000) concluded that:

> The conventional bloc dummy variable approach that is widely used in econometric analysis is good for showing the inter bloc differences, but falls short in delineating the commonality in and impact of their institutional rules and arrangements. Integrating the institutional analysis provides a richer story about why the blocs may differ in their performance. (Li 2000, p. 99)

Table 3.2    **Past estimates of trade creation and diversion effects of Andean Pact / Community**

| | | Static estimates | | | |
|---|---|---|---|---|---|
| *Author* | *Year* | *Dummy 1* | *Dummy 2* | *Dummy 3* | *2$^{nd}$ wave*[a] |
| Frankel, Stein and Wei (1995) | 1965 | -0.51 | | | |
| | 1990 | 0.90*** | | | |
| Boisso and Ferrantino (1997) | 1969–80 | -0.82 | | | |
| | 1981–85 | -0.09 | | | |
| Frankel (1997) | 1970–92 | 0.259 | 0.065 | | |
| Li (2000) | 1970–92 | 0.819*** | -0.011 | | BB |
| Clark and Tavares (2000) | 1970–95 | 1.753*** | -0.074 | | BB |
| Gilbert, Scollay and Bora (2001) | 1984–98 (merch) | 1.82*** | -0.41*** | | BB |
| | 1984–98 (manf) | 1.93*** | -0.43*** | | BB |
| | 1984–98 (agric) | -0.18 | 0.32*** | | BB |
| | 1997 (services) | -0.61** | -0.49*** | | SB |
| Soloaga and Winters (2001) | 1986–88 | 2.03*** | -0.76*** | 0.80*** | BB |
| | 1989–94 | 1.77*** | -0.72*** | 1.08*** | BB |
| | 1995-96 | 2.36*** | -0.55*** | -0.79*** | BB |

**a** Denotes whether a PTA is building block (BB) or stumbling block (SB) — the second wave issue — based on 'net trade effects' of a PTA, that is, the sum of intra-bloc and extra-bloc effects.

*** denotes the significance at the 1% level; ** denotes the significance at the 5% level; and * denotes the significance at 10% level.

*Sources:* Boisso and Ferrantino (1997), Frankel (1997), Li (2000), Clark and Tavares (2000), Gilbert, Scollay and Bora (2001), and Soloaga and Winters (2001).

Similarly, Soloaga and Winters (2001) and Clark and Tavares (2000) found a significant and positive intra-bloc effect for the Andean Pact. However, Soloaga and Winters (2001) also noted significant import and export diversion effects.

In reviewing the developments in the PTA literature, Panagariya (2000) argued that:

> …aggregate trade creation and trade diversion are insufficient to infer the welfare effects of PTAs. We need to know trade creation and trade diversion by sector… (Panagariya 2000, p. 326)

A recent study by Gilbert, Scollay and Bora (2001)[4] disgaggregated merchandise trade and estimated the impact of various PTAs on trade in manufacturing and

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[4] The normality defined in this study has limited scope, as only 35 countries were included.

agricultural products, separately. They also estimated creation and diversion effects of trade in services. They found a positive intra-bloc effect and a negative extra-bloc effect for manufactured products, suggesting that though the overall bloc effect of Andean Pact/Community was positive, it had significantly diverted trade in manufactured products from non-member countries. However, it had created additional trade in agricultural products with non-member countries. The estimates were significant and negative for services, suggesting that trade in services was below the expected levels for member and non-member countries of the Andean Pact/Community.

These various estimates reflect the changes made to the Andean Pact since its inception. The pact was signed in 1969 and changed to the Andean Community in 1996. It has included Bolivia, Colombia, Ecuador, Chile (left in 1976), Peru (left in 1992) and Venezuela (joined in 1973). Initially, the agreement was ineffective. All members, except Colombia, maintained significant barriers and there were production-sharing arrangements between the countries during the first phase of its operation.

The agreement was revised in the mid 1980s in an effort to link individual country reforms into a closer economic integration among the member countries. The result was free trade in some sectors, less bureaucracy, and an approach that was half free trade area and half customs union. Trade among the members has grown considerably as the countries have liberalised their trade regimes and the Andean Community has been reformed. However, trade is free from tariffs among only four of the five member countries (Peru apart). Three countries share a common external tariff, although there are exceptions even among these three. Meanwhile, Bolivia and Peru are outside the common external tariff.

Despite all this, the Andean Community seems to be moving forward with its integration goals, under the influence of a prospective Free Trade Area of the Americas, and is expanding trade relations with other countries. These latter changes were found effective, as suggested by the later gravity model estimates reported in table 3.2.

This was a typical south-south agreement, with initial tariffs being reasonably high. Therefore, significant preferential trade liberalisation among members can be expected to have increased intra-bloc trade significantly. Until recently, member countries focused on border barriers related to merchandise trade. However, negotiations within the Andean Community have started on the harmonisation of macroeconomic and agricultural policies, and to develop and establish free trade in services.

The last column of table 3.2 reports the estimated 'net trade effects' of the Andean Pact/Community to assess the second wave issue. These results will be discussed in detail in section 3.3.

*LAFTA/LAIA*

Studies that have estimated the trade effects of LAFTA/LAIA are reported in table 3.3. Boisso and Ferrantino (1997) included a number of bilateral trade determinants and found that the intra-bloc effect of LAFTA/LAIA was negative in the initial years, although it was positive and significant in later years. Other studies (Fink and Primo Braga 1999, Li 2000 and Soloaga and Winters 2001) found a significant and positive intra-bloc trade effect for members of LAFTA/LAIA. The study of Soloaga and Winters (2001) found that the LAIA produced significant import diversion, and export diversion particularly in the early 1990s.

LAFTA was established early in the 1960s, and it eventually embraced all the South American countries plus Mexico. In the LAFTA, high barriers to external trade were maintained despite the Kennedy and Tokyo Rounds of multilateral liberalisation. Incoming investment was licensed. Within LAFTA, the reduction of tariffs and other barriers were negotiated based on product lists, which limited the extent of cross sector trade-offs. Other issues were likewise addressed in a piecemeal manner rather than on a comprehensive basis. Countries were initially enthusiastic about exchanging preferences within LAFTA, but once all the easy items were liberalized, the process stalled when difficult sectors — autos, other consumer durables, agriculture, and textiles — came up for discussion. By 1980, the less ambitious Latin American Integration Association (LAIA) had replaced LAFTA. The LAIA was largely structured around bilateral trade preferences of the members and a framework agreement for members of Andean and MERCOSUR. These changes have been partly reflected in the gravity model estimates, with the intra-bloc effect becoming positive, but the extra-bloc effect being increasingly negative in the latter years.

Table 3.3    **Past estimates of trade creation and diversion effects of LAFTA / LAIA**

|  |  | Static estimates | | | |
| --- | --- | --- | --- | --- | --- |
| *Author* | *Year* | *Dummy 1* | *Dummy 2* | *Dummy 3* | *2nd wave*[a] |
| Boisso and Ferrantino (1997) | 1960–70 | -0.48*** | | | |
| | 1971–80 | 0.31** | | | |
| | 1981–85 | 0.17** | | | |
| Fink and Primo Braga (1999) | 1989 | 0.951*** | | | |
| Li (2000) | 1970–92 | 0.530*** | -0.045 | | BB |
| Soloaga and Winters (2001) | 1986–88 | 1.42*** | -1.83*** | 1.38*** | BB |
| | 1989–94 | 1.50*** | -1.86*** | -1.10*** | SB |
| | 1995–96 | 1.38*** | -0.67** | -0.06 | BB |

**a**  Denotes whether a PTA is building block (BB) or stumbling block (SB) — the second wave issue — based on 'net trade effects' of a PTA, that is, the sum of intra-bloc and extra-bloc effects.

*** denotes the significance at the 1% level; ** denotes the significance at the 5% level; and * denotes the significance at 10% level.

*Sources*: Boisso and Ferrantino (1997), Fink and Primo Braga (1999), Li (2000) and Soloaga and Winters (2001).

### MERCOSUR

MERCOSUR has repeatedly been characterised as a fundamentally new approach to regional integration in Latin America. While two previous agreements (Andean and LAIA) were based on the concept of import substitution and tried to apply interventionist and inward looking policies to regionalism, the new approach of MERCOSUR emphasises the concept of 'open regionalism'.[5] It was formed under the enabling clause of the GATT.

The evidence of the effect of MERCOSUR on trade flows has been mixed, as reported in table 3.4. Frankel's (1997) estimates were the most optimistic of all gravity models that analysed the trade effects of MERCOSUR. He found a positive and significant intra-bloc and extra-bloc effect for MERCOSUR. Soloaga and Winters (2001) found a positive and significant intra-bloc effect. However, they also found evidence of import diversion. Gilbert, Scollay and Bora (2001) found that MERCOSUR created additional trade for both the member and non-member countries in agricultural products. However, there was evidence of trade diversion away from non-member's manufactured products. The effect of the agreement on

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[5] MERCOSUR's open regionalism aims at a non-discriminatory set of economic incentives within the region and a relatively low margin of preference against outsiders.

services trade was negative, with trade being below the expected level with both member and non-member countries.

Yeats (1998) undertook a study that has generated a great deal of interest and debate about the effects of MERCOSUR. Rather than assessing trade creation and diversion using a gravity model, Yeats investigated whether commodity patterns of exports by MERCOSUR countries to different destinations conformed to the past revealed comparative advantage of MERCOSUR countries in natural resource and labour intensive products. He found that the fastest growing products in intra–MERCOSUR trade were capital intensive goods, in which MERCOSUR countries had not previously displayed strong export performance.

Thus the Yeats study suggested that the new patterns of trade by MERCOSUR countries were different from what their historical patterns would predict. Therefore, it was indicative of possible trade diversion effects of MERCOSUR on its member countries and the world at large.

Table 3.4    **Past estimates of trade creation and diversion effects of MERCOSUR**

| | | Static estimates | | | |
|---|---|---|---|---|---|
| *Author* | *Year* | *Dummy 1* | *Dummy 2* | *Dummy 3* | *2nd wave[a]* |
| Frankel, Stein and Wei (1995) | 1965 | -0.18 | | | |
| | 1990 | 2.09*** | | | |
| Frankel (1997) | 1970–92 | 0.707*** | 0.259*** | | BB |
| Krueger (1999a) | 1986–96 | -0.13 | -1.05* | | SB |
| Clark and Tavares (2000) | 1995 | 1.060 | 0.077 | | |
| Gilbert, Scollay and Bora (2001) | 1984–98 (merch) | 0.42 | -0.16*** | | SB |
| | 1984–98 (manf) | 0.41 | -0.28*** | | SB |
| | 1984–98 (agric) | 1.25*** | 0.90*** | | BB |
| | 1997 (services) | -2.5*** | -1.12*** | | SB |
| Soloaga and Winters (2001) | 1986–88 | 2.28*** | -1.06*** | 0.27* | BB |
| | 1989–94 | 2.49*** | -1.32*** | -0.03 | BB |
| | 1995-96 | 2.15*** | -0.71*** | -0.06 | BB |

**a**  Denotes whether a PTA is building block (BB) or stumbling block (SB) — the second wave issue — based on 'net trade effects' of a PTA, that is, the sum of intra-bloc and extra-bloc effects.

*** denotes the significance at the 1% level; ** denotes the significance at the 5% level; and * denotes the significance at 10% level.

*Sources:* Frankel, Stein and Wei (1995), Frankel (1997), Krueger (1999a), Clark and Tavares (2000), Gilbert, Scollay and Bora (2001) and Soloaga and Winters (2001).

However, Yeats study did not consider the imports into MERCOSUR countries, particularly from non-members, nor the trade and investment linkages among members of MERCOSUR and with its non-members. Nagarajan (1998) argued instead that intra-regional trade should be compared with extra-regional imports, not extra-regional exports, and that by focusing on the latter, Yeats may have exaggerated the effects of MERCOSUR.

Chang and Winters (2000) conducted a study that assessed the welfare effects of MERCOSUR by looking at changes in import and export prices of commodities traded between Brazil, Argentina and the rest of the world. They assumed that non-member countries exported to two segmented markets, Brazil and the rest of the world. In an imperfectly competitive setting with differentiated products, the changes in Brazil's general tariff rates led to price changes by non-member firms exporting to Brazil, and tariff preferences offered to member Argentina led to additional strategic price responses within the Brazilian market. They identified both such responses in commodity-level import data from Brazil and export data from Brazil's major trading partners — including United States, Germany, Italy, and Japan. They found that general tariff changes and preferential tariffs both affected Brazil's import prices significantly, and that MERCOSUR's preferential tariffs caused a significant decline, *ceteris paribus*, in the prices of non-members' exports to Brazil. They concluded that:

> Even if a PTA aims only to facilitate trade between the constituent territories and not to raise barriers to the trade of other contracting parties with such territories and indeed, even if, as with MERCOSUR, it simultaneously undertakes a general trade liberalisation, other contracting parties may still be affected adversely, because they are compelled to reduce their prices to meet competition from suppliers within the PTA … Of course this is only one part of the overall welfare calculus for non-members. One needs also to consider the prices of their imports from the bloc and any volume effects on trade, which could tip the balance and generate overall gains. Nonetheless, the effects identified here are large enough to warrant serious consideration. (Chang and Winters 2000, p. 32-3)

Based on casual evidence, MERCOSUR appears successful at stimulating trade and investment. Intra-MERCOSUR exports grew by an average of 30 per cent a year in its first five years of existence. MERCOSUR has not visibly restricted its trade and investment with the rest of the world, and both EU and US exports to these countries have grown at reasonable rates (WTF 2000, UNCTAD 1994).[6]

Like the original EC, MERCOSUR served an important political purpose, namely defusing tensions between Argentina and Brazil. Unlike earlier Latin American

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[6] Exports from the United States to MERCOSUR grew at 1.1 per cent a year between 1991 and 1997. Exports from the EU to MERCOSUR grew at 6.7 per cent a year over the same period, or at 2.8 per cent a year if exports from Austria, Finland and Sweden are excluded.

regional agreements, the MERCOSUR countries reduced their external barriers, liberalised investment, and tackled a range of sectors.[7]

However, many challenges remain to be tackled within MERCOSUR. Brazil named 200 tariff lines in the exceptions list, mainly sensitive industries such as computers, electronics, chemical, agriculture, textiles, capital goods and the automotive industry. A combination of unilateral liberalisation and MERCOSUR negotiated changes reduced members tariffs substantially from an average of 50 per cent in 1988 to a common external tariff average of 12 per cent in 1995. However, it has remained the case that trade policy in Brazil has been subject to frequent changes to meet short-term political objectives. For example, tariffs on textiles, toys and motor vehicles were increased to 70 per cent for non-members in 1995. Although it is too early for these later changes to be reflected in gravity model estimates, nonetheless they raise a serious concern for the welfare of both members and non-members of this agreement. Preusse (2001) reviewed the progress of the MERCOSUR agreement and argued that during 1991–1995, the integration process was successful, but that after 1995, the integration process had virtually come to a standstill because of the inconsistency of the 'open regionalism' concept with the escape strategy on key sensitive sectors.

*NAFTA*

In table 3.5, the coefficient for the intra-bloc trade effect of NAFTA was found to be positive and significant only in Frankel's (1997) study. Gilbert, Scollay and Bora (2001) found a significant but negative NAFTA effect on its members' manufacturing trade. All other studies (Krueger 1999a, Clark and Tavares 2000, Soloaga and Winters 2001) found an insignificant effect for NAFTA on members' trade flows. There was clear evidence that NAFTA diverted trade from non-members, as indicated by the negative sign on the second and third dummy coefficients.

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[7] The auto industry is an important growth industry in MERCOSUR. Since Brazil had been a low cost producer, it was economically efficient for foreign firms to establish their plants in Brazil in order to serve a large MERCOSUR market. Argentina was worried that low cost Brazil would attract all of the foreign investment and dominate the market. Therefore, it was necessary to ensure that some of the foreign investment was directed to Argentina in the absence of a direct compensation mechanism in the agreement. To convince Argentina to agree to the PTA, the auto sectoral agreement was enacted. It is called the Compensated Trade Clause, which requires each firm to balance its trade between Brazil and Argentina. This mitigates the diversion problem by forcing firms to produce some models in Argentina and it enticed the governments to sign the PTA.

Table 3.5 **Past estimates of trade creation and diversion effects of NAFTA**

| | | Static estimates | | | |
|---|---|---|---|---|---|
| *Author* | *Year* | *Dummy 1* | *Dummy 2* | *Dummy 3* | *2nd wave[a]* |
| Frankel, Stein and Wei (1995) | 1965 | -0.12 | | | |
| | 1990 | 0.05 | | | |
| Frankel (1997) | 1970–92 | 0.359*** | -0.195*** | | BB |
| Krueger (1999a) | 1986–96 | -0.33 | -0.036* | | SB |
| Li (2000) CUSFTA | 1970–92 | -0.229 | -0.203*** | | SB |
| Clark and Tavares (2000) | 1995 | 0.561 | -0.033 | | |
| Gilbert, Scollay and Bora (2001) | 1984–98 (merch) | -0.50*** | -0.89*** | | SB |
| | 1984–98 (manf) | -0.53*** | -0.91*** | | SB |
| | 1984–98 (agric) | 0.18 | -0.32*** | | SB |
| | 1997 (services) | -0.55 | -0.36*** | | SB |
| Soloaga and Winters (2001) | 1986–88 | 0.43 | 0.91*** | 0.49** | BB |
| | 1989–94 | 0.72 | 0.65*** | -0.58** | BB |
| | 1995-96 | 1.17 | 0.48* | -0.73*** | SB |

**a** Denotes whether a PTA is building block (BB) or stumbling block (SB) — the second wave issue — based on 'net trade effects' of a PTA, that is, the sum of intra-bloc and extra-bloc effects.

*** denotes the significance at the 1% level; ** denotes the significance at the 5% level; and * denotes the significance at 10% level.

*Sources:* Frankel, Stein and Wei (1995), Frankel (1997), Krueger (1999a), Li (2000), Clark and Tavares (2000), Gilbert, Scollay and Bora (2001) and Soloaga and Winters (2001).

It was of course still early days for assessing the effects of NAFTA in some of these studies. Tariffs are not yet entirely eliminated on trade with Mexico and trade disputes still occur between Canada and the United States. Other events, especially affecting Mexican trade via the change in the real exchange rate, had dominated whatever effects NAFTA may have had on the pattern of intra-NAFTA trade. Mexico's currency appreciation before 1994 because of its 'nominal anchor' exchange rate policy[8] and its depreciation after 1994 because of its loss of foreign exchange reserves would have affected Mexico's trade patterns with the United States much more than the formation of NAFTA.

In combination with the above policy changes, the Mexican government imposed a surcharge on all 'outside' imports in late 1994 and early 1995, which was raised again in 1998, because of the drop in the oil price. These measures were clearly discriminatory and could have resulted in trade diversion and raised some grounds

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[8] Under this policy, the peso was permitted to depreciate according to a preset schedule in a proportion less than the inflation differential between the United States and Mexico.

for concern about the NAFTA's extra-bloc effects. Krueger (1999a) reported some evidence about shifts of location in production that were induced by NAFTA.[9]

## PTAs in Asia – Pacific

*ANZCERTA (CER)*

The empirical estimates reported in table 3.6 show almost uniform results for CER. Frankel (1997) used a binary dummy and Li (2000) used an institutional variation index. Both found a positive and significant intra-bloc effect of a similar magnitude for the CER.

The later study by Gilbert, Scollay and Bora (2001) estimated a positive and significant intra-bloc effect, but of lower magnitude than the previous two studies. It also found significant diversion of trade in manufactured products and in services. However, it found positive and significant additional trade in agricultural products by both the member and non-member countries of CER. The services trade result needs to be heavily qualified, because the study used bilateral services trade data from the GTAP model (Hertel 1997), and the bilateral dimension to that data had been imputed using RAS techniques.[10] The manufacturing result may be surprising, but is consistent with the casual observation that the average annual growth of bilateral merchandise trade in both directions has been slower after CER than before.[11]

The CER agreement was built on a series of preferential trade agreements between Australia and New Zealand that had resulted in removal of tariffs and quantitative restrictions on 80 per cent of trans-Tasman trade.

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[9] 'It was reported that $600 million of textile investment was planned in Mexico and that Mexico had already displaced China as the largest supplier of textiles to the United States. The manager of a Taiwanese owned textile company in Mexico reported that his company's choice of a Mexican location was based on NAFTA and the advantage it incurred' (Krueger 1999a, p. 19).

[10] Independent data on bilateral services trade between Australia and New Zealand indicates significantly faster growth over the period 1994 to 2000 (ABS 2002).

[11] The average annual growth of merchandise exports from Australia to New Zealand was 1.0 per cent from 1970 to 1982 and 0.7 per cent from 1983 to 1997 (WTF 1997, 2000). The average annual growth of merchandise exports from New Zealand to Australia was 1.4 per cent from 1970 to 1982 and 0.7 per cent from 1983 to 1997.

Table 3.6    **Past estimates of trade creation and diversion effects of CER**

|  |  | Static estimates | | |
| --- | --- | --- | --- | --- |
| *Author* | *Year* | *Dummy 1* | *Dummy 2* | *2<sup>nd</sup> wave*[a] |
| Frankel (1997) | 1970–92 | 1.554*** | 0.021 | BB |
| Li (2000) | 1970–92 | 1.872*** | -0.090 | BB |
| Gilbert, Scollay and Bora (2001) | 1984–98 (merch) | 0.81*** | -0.50*** | BB |
|  | 1984–98 (manf) | 0.90*** | -0.62*** | BB |
|  | 1984–98 (agric) | 0.69*** | 0.68*** | BB |
|  | 1997 (services) | -0.45 | -0.35*** | SB |

**a** Denotes whether a PTA is building block (BB) or stumbling block (SB) — the second wave issue — based on 'net trade effects' of a PTA, that is, the sum of intra-bloc and extra-bloc effects.

*** denotes the significance at the 1% level; ** denotes the significance at the 5% level; and * denotes the significance at 10% level.

*Sources:* Frankel (1997), Li (2000) and Gilbert, Scollay and Bora (2001).

It came into effect in January 1983. It provided for the establishment of free trade in those goods meeting CER rules of origin between Australia and New Zealand. The first general review of CER in 1988 resulted in the signing of three protocols which in turn:

- accelerated the process of tariff liberalisation in goods trade;

- established best practice quarantine procedures; and

- brought trade in services under the agreement.

In 1992, the CER agreement expanded its services coverage by reducing the list of services exempt from the protocol on trade in services, and clarified the CER rules of origin. The 1995 review focused on advancing trade facilitation issues, including removal of all remaining regulatory impediments to trade.

The CER agreement is widely considered as one of the most comprehensive and WTO compatible bilateral PTAs in existence today and the first to include free trade in services. The gravity model estimate of the effect of CER on trade in services by Gilbert, Scollay and Bora (2001) finds evidence of services trade diversion. But the result is qualified because it is based on services trade data in which the bilateral dimension has been imputed.

*ASEAN-FTA (AFTA)*

Past estimates for AFTA are reported in table 3.7. They indicate that AFTA has created additional trade for member and non-member countries. Soloaga and Winters (2001) found that the AFTA intra-bloc effect was significant and negative only in 1995-96. Frankel (1997) argued that the positive intra-AFTA effect might be

partly due to Singapore's entrepot trade. To examine this, he included a Singapore-specific dummy variable in the gravity model and found that

> The Singapore dummy does indeed have a positive and very significant coefficient (1.51). The coefficient on the ASEAN dummy is reduced to 1.40 but remains quantitatively large and statistically significant. This suggests that Singapore's extreme openness does not explain all of the apparent inward bias among the ASEAN countries (Frankel 1997, p. 98)

The ASEAN countries negotiated a PTA in 1977, but it had a limited implementation, because of administrative protection and opposition by industrial and agricultural interests.

In 1989, the fraction of goods eligible for preferences was only 3 per cent (Frankel 1997). It was not until 1992 that that ASEAN Free Trade Area (AFTA) was formed, which would be implemented by reducing tariffs and non-tariff barriers in phases from 1993 to 2008. AFTA was formed under the Enabling Clause of the GATT (see Box 1.1).

Table 3.7    **Past estimates of trade creation and diversion effects of ASEAN–FTA**

| Author | Year | Static estimates | | | |
|--------|------|---------|---------|---------|---------|
| | | Dummy 1 | Dummy 2 | Dummy 3 | 2$^{nd}$ wave[a] |
| Frankel (1997) | 1970–92 | 1.318*** | 0.767*** | | BB |
| Fink and Primo Braga (1999) | 1989 | 2.476*** | | | |
| Krueger (1999a) | 1986–96 | 0.78* | 0.16* | | BB |
| Li (2000) | 1970–92 | 1.311*** | 0.653*** | | BB |
| Clark and Tavares (2000) | 1995 | 1.673* | 0.489* | | BB |
| Gilbert, Scollay and Bora (2001) | 1984–98 (merch) | 0.65*** | 0.54*** | | BB |
| | 1984–98 (manf) | 0.63*** | 0.54*** | | BB |
| | 1984–98 (agric) | 0.32*** | 0.45*** | | BB |
| | 1997 (services) | 1.08*** | 1.01*** | | BB |
| Soloaga and Winters (1999) | 1986–88 | 0.18 | 0.15 | 0.70*** | BB |
| | 1989–94 | 0.09 | 0.30** | 0.67*** | BB |
| | 1995-96 | -1.06*** | 0.82*** | 0.99*** | BB |

**a** Denotes whether a PTA is building block (BB) or stumbling block (SB) — the second wave issue — based on 'net trade effects' of a PTA, that is, the sum of intra-bloc and extra-bloc effects.

*** denotes the significance at the 1% level; ** denotes the significance at the 5% level; and * denotes the significance at 10% level.

*Sources*: Frankel, Stein and Wei (1995), Frankel (1997), Krueger (1999a), Li (2000), Clark and Tavares (2000), Gilbert, Scollay and Bora (2001), Soloaga and Winters (1999).

AFTA is politically and economically a diverse group and intra-AFTA trade accounted for only 15 per cent of AFTA exports in 1997, about half of which was entrepot trade with Singapore that was basically duty-free already. AFTA members vary greatly in the composition of their exports (industrial and agricultural) and their levels of protection. Consequently, going to zero tariffs on substantially all goods will entail a very asymmetric impact on AFTA countries.

Singapore and Malaysia have significantly increased their bilateral trade with all other AFTA and non-AFTA members between 1986 and 1998. These two are relatively high-income countries and relatively open, compared with other AFTA members. Theory suggests that such economies would receive only limited benefit from the formation of a PTA under the assumption of constant production costs. But with less-than-perfect competition, both countries might have benefited from the diversion of trade by other AFTA countries (De Rosa 1998). These two countries supply the largest proportion of the increased intra-regional demand for manufactures previously supplied by non-members of AFTA. Besides, Singapore might have also benefited from its real exchange rate appreciation with the other members of AFTA. This could be the possible reason for the positive and consistent intra- and extra-AFTA effects found by previous studies.

## PTAs in Europe

### EC/EU

Of all the PTAs, EC/EU is the one with the most far-reaching implications. It is the most long-lived and it:

- started life as a customs union;

- created a regional mechanism for limiting exchange rate flexibility among members in the 1970s;

- established an integrated internal market in which goods, services, capital and labour could flow in the 1990s;

- expanded its membership four times and plans to integrate eastern European countries; and

- started monetary integration of members in 1995 and the currency union came into existence in January 2002.

Reflecting these changes, the empirical estimates reported in table 3.8 for EC/EU are not consistent across the studies.

## Table 3.8    **Past estimates of trade creation and diversion effects of EC/EU**

|  | | Static estimates | | | |
| --- | --- | --- | --- | --- | --- |
| *Author* | *Year* | *Dummy 1* | *Dummy 2* | *Dummy 3* | *2nd wave[a]* |
| Aitken (1973) | EEC6 (1958) | -0.01 | | | |
| | EEC6 (1961) | 1.68** | | | |
| Bayoumi and | EEC6 (1956–73) | 3.2*** | -1.7** | | BB |
| Eichengreen (1995) | EEC9 (1972–80) | 5.9*** | 2.6** | | BB |
| | EEC10 (1975–92) | 2.0*** | -1.7* | | BB |
| | EEC12 (1975–92) | 2.9*** | -0.4* | | BB |
| Bergstrand (1985) | EEC (1965) | 0.32** | | | |
| | EEC (1975) | 0.18 | | | |
| Bergstrand (1989) | EEC–SITC 0[b] (1965) | 0.43 | | | |
| | EEC–SITC 1 (1965) | -0.01 | | | |
| | EEC–SITC 2 (1965) | 0.22 | | | |
| | EEC–SITC 3 (1965) | 0.13 | | | |
| | EEC–SITC 4 (1965) | 0.12 | | | |
| | EEC–SITC 5 (1965) | 0.32** | | | |
| | EEC–SITC 6 (1965) | 0.57*** | | | |
| | EEC–SITC 7 (1965) | 0.69*** | | | |
| | EEC–SITC 8 (1965) | 0.62*** | | | |
| Frankel, Stein and Wei (1995) | 1965 | 0.24 | | | |
| | 1990 | 0.49*** | | | |
| Boisso and Ferrantino (1997) | 1960–70 | -1.91*** | | | |
| | 1971–80 | -1.48*** | | | |
| | 1981–85 | -0.88*** | | | |
| Frankel (1997) | 1970–92 | -0.145** | 0.180*** | | BB |
| Fink and Primo Braga (1999) | 1989 | -0.305 | | | |
| Krueger (1999a) | 1986–96 | 0.05 | -0.15 | | |
| Li (2000) | 1970–92 | -0.238*** | 0.183*** | | SB |
| Clark and Tavares (2000) | 1995 | 0.079 | 0.738* | | BB |
| Freund (2000) | EEC6 (1954) | 0.10 | | | |
| | EEC6 (1962) | 0.39 | | | |
| | EEC6 (1970) | 0.82*** | | | |
| | EEC6 (1980) | 0.44*** | | | |
| | EEC6 (1990) | 0.42*** | | | |
| | EEC12 (1954) | -0.91*** | | | |
| | EEC12 (1962) | -0.63** | | | |
| | EEC12 (1970) | -0.62** | | | |
| | EEC12 (1980) | -0.91*** | | | |
| | EEC12 (1990) | -0.56*** | | | |
| Gilbert, Scollay and Bora (2001) | 1984–98 (merch) | -0.08** | -0.02 | | SB |
| | 1984–98 (manf) | -0.09** | 0.00 | | SB |
| | 1984–98 (agric) | 0.33*** | 0.18*** | | BB |
| | 1997 (services) | 0.24*** | 0.29*** | | BB |

(Continued on next page)

Table 3.8   (Continued)

| Author | Year | Static estimates | | | |
|--------|------|---------|---------|---------|----------------------|
| | | Dummy 1 | Dummy 2 | Dummy 3 | 2nd wave[a] |
| Soloaga and Winters (2001) | 1986–88 | -1.45*** | 1.25*** | 0.49*** | BB |
| | 1989–94 | -1.17*** | 0.89*** | 0.07 | SB |
| | 1995–96 | -0.88*** | 0.72*** | -0.15* | SB |

[a] Denotes whether a PTA is building block (BB) or stumbling block (SB) — the second wave issue —based on 'net trade effects' of a PTA, that is, the sum of intra-bloc and extra-bloc effects. [b] SITC 0 denotes food and live animals; SITC 1 denotes beverages and tobacco; SITC 2 denotes raw materials; SITC 3 denotes fuels; SITC 4 denotes animal and vegetable oils and fats; SITC 5 denotes chemicals; SITC 6 denotes manufactures chiefly by material; SITC 7 denotes machinery and transport euipment; and SITC 8 denotes miscellaneous manufactures.

*** denotes the significance at the 1% level; ** denotes the significance at the 5% level; and * denotes the significance at 10% level.

*Sources:* Aitken (1973), Bergstrand (1985, 1989), Bayoumi and Eichengreen (1995), Frankel, Stein and Wei (1995), Boisso and Ferrantino (1997), Frankel (1997), Fink and Primo Braga (1999), Krueger (1999a), Li (2000), Clark and Tavares (2000), Freund (2000), Gilbert, Scollay and Bora (2001) and Soloaga and Winters (2001).

The initial study by Aitken (1973) found that the EC experienced more growth in trade during the post-integration period than during pre-integration period. He applied only an intra-bloc dummy to assess EC's impact collectively on the bloc — a gross trade creation effect. According to his estimates, by 1961, intra-EC trade was *ceteris paribus*, 1.68 times larger than 'normal' European trade.

Bergstrand's (1985, 1989) focus was on investigating the microeconomic foundations behind the gravity model and related bilateral trade determinants. He included the exchange rate and unit export and import price indices in his 1985 gravity model and found that the EC's intra-bloc effect in 1965 was positive and significant, but it turned out to be insignificant by the year 1975. In his later study, in addition to the above variables, he included per capita income as a proxy for factor endowments. He disaggregated the merchandise trade into SITC one digit industries and found that the intra-bloc effect for high SITC code manufactured products (generally more highly processed) was more positive and significant than for lower SITC categories (including agriculture) in 1965.

Bayoumi and Eichengreen (1995) found that the creation and expansion of the EC was responsible for increased trade volumes. For the founding members of EC6, the trade creating effects were greater in the early years, consistent with the previous gravity model estimates for the same period by Aitken (1973) and Bergstrand (1985, 1989). One concern raised in the literature at that time was the impact of unobserved variables biasing the PTA dummy coefficient. Bayoumi and Eichengreen (1995) addressed this issue by simply differencing the variables. They argued that:

We estimate our equation in differences rather than levels; thus unobserved heterogeneity across countries that is constant over time will not contaminate our results. (Bayoumi and Eichengreen 1995, p. ii)

The above four studies used data on trade among European countries excluding trade among most non-European countries. So their standard of comparison had limited scope. These studies also did not include a number of bilateral trade determinants. Therefore, it is possible that the PTA dummies would have picked up some of their effects. After controlling for common language and a common border, Frankel, Stein and Wei (1995) found an insignificant intra-bloc effect for the EC in 1965, in contrast to the Bergstrand (1985) result for the same year.

Later studies reported in table 3.8 found that intra-bloc trade can be mostly explained by the various bilateral trade determinants. Boisso and Ferrantino (1997) found that trade among EC members was significantly less than would be predicted by the normal bilateral trade determinants. The negative effect steadily eroded through to the mid-1980s. Similar results for the intra-bloc effects of EC/EU were obtained by Frankel (1997), Fink and Primo Braga (1999) and Li (2000). For disaggregated trade, Gilbert, Scollay and Bora (2001) found that the intra-bloc effect of EC/EU was positive and significant for agricultural products (despite EU agricultural measures being primarily about domestic support, not trade) and services, but not for manufactured products.

The effect of EC/EU on non-member countries was mixed. Bayoumi and Eichengreen (1995) found that each expansion of the EC had a different effect on non-member countries. The first expansion in 1973, which added Denmark, Ireland and United Kingdom, created additional trade for members and non-members. The subsequent expansions, including Greece in 1981 and Spain and Portugal in 1986, created additional trade for members and diverted trade from non-member countries. Frankel (1997) found a positive intra-bloc and negative extra-bloc effect for the EU. He regarded this evidence in a very positive light:

…[the] net political effect of the removal of regional barriers can be to support liberalization with respect to non-members as well. The effect of further liberalization has in many cases been more than enough to offset any trade diversion resulting directly from the original arrangements themselves. (Frankel 1997, p. 227)

Frankel's conclusion appears to be optimistic. In a later study, Soloaga and Winters (2001) found that the propensity to export and import from non-members of the EU falls over time, suggesting trade diversion. They found

evidence of export diversion in EU and EFTA, which would be consistent with their imposing a welfare cost on the [rest of the world]. (Soloaga and Winters 2001, p.)

Freund (2000) argued that in the presence of sunk costs, the trade diversion effects of PTAs could be permanent. She used the EC to test the evidence of first mover advantages among its six founding members. Her hypothesis was that trade between the original members would be larger than otherwise predicted by the gravity model, even after other countries had joined the union. Her gravity model results were consistent with her hypothesis that early entry into the union allowed countries to establish trade links that persisted over time. The intra-bloc effect on early members was positive and significant, while the intra-bloc effect on later members was significant but negative.

*EFTA*

Some studies that analysed the EC also analysed EFTA during the 1960s and 1970s, though EC is a customs union and EFTA is a free trade area. The gravity model estimates were similar for both PTAs in the initial periods of their implementation. Aitken (1973) found a significant intra-bloc trade effect for EFTA, although substantially less in proportional terms than the effect for the EC.

Bayoumi and Eichengreen (1995) reached a similar conclusion that the trade effects were concentrated in the earlier years of EFTA formation. However, they found that, for the later years, the intra-bloc trade effect was negative because of the loss of two key countries, the United Kingdom and Denmark, to the EC.

Studies by Frankel, Stein and Wei (1995), Boisso and Ferrantino (1997), and Fink and Primo Braga (1999) found an insignificant effect of EFTA on members' trade flows. These studies applied only an intra-bloc dummy to assess the PTAs.

Frankel (1997), Li (2000) and Clark and Tavares (2000) used both intra-bloc and extra-bloc dummy variables and found a positive and significant effect of EFTA on members' trade. However, its effect on non-member countries was negative. Soloaga and Winters (2001) found similar results for EFTA as for EC/EU and concluded that the propensity for EFTA members to export and import from non-members fell over time, suggesting trade diversion.

As noted, a major limitation of the gravity model studies reviewed here is that few have controlled for all of the bilateral trade determinants listed in table 3.1, and few have controlled for additional but unobservable country- or time-specific influences on bilateral trade. As a result, the influence of the omitted variables could be wrongly attributed to the PTA dummy variables, although it is difficult to evaluate by how much.

In addition, the technique of making one or several cross-sectional estimates has several drawbacks. It risks attributing trade effects to PTAs 'before the event', and

it does not allow a rigorous test of whether the trade effects attributed to the PTA dummy variables are any stronger after PTA formation than before. These deficiencies are addressed in the following chapters, which provide new evidence.

Table 3.9    **Past estimates of trade creation and diversion effects of EFTA**

| | | Static estimates | | | |
|---|---|---|---|---|---|
| Author | Year | Dummy 1 | Dummy 2 | Dummy 3 | 2nd wave[a] |
| Aitken (1973) | EFTA7 (1958) | -0.16 | | | |
| | EFTA7 (1961) | 0.21*** | | | |
| Bayoumi and Eichengreen (1995) | EFTA7 (1956–73) | 2.3*** | -0.8 | | |
| | EFTA5 (1972–80) | -1.3 | 0.0 | | |
| | EFTA5 (1975–92) | -1.9** | 1.3* | | |
| Bergstrand (1985) | EFTA (1965) | 0.67*** | | | |
| | EFTA (1975) | 0.62*** | | | |
| Bergstrand (1989) | EFTA–SITC 0[b] (1965) | 0.33 | | | |
| | EFTA–SITC 1 (1965) | 0.96*** | | | |
| | EFTA–SITC 2 (1965) | 0.14 | | | |
| | EFTA–SITC 3 (1965) | 1.20** | | | |
| | EFTA–SITC 4 (1965) | 0.56 | | | |
| | EFTA–SITC 5 (1965) | 0.73*** | | | |
| | EFTA–SITC 6 (1965) | 0.82*** | | | |
| | EFTA–SITC 7 (1965) | 0.42** | | | |
| | EFTA–SITC 8 (1965) | 1.05*** | | | |
| Frankel, Stein and Wei (1995) | 1965 | 0.04 | | | |
| | 1990 | -0.05 | | | |
| Boisso and Ferrantino (1997) | 1960–70 | 0.074 | | | |
| | 1971–80 | 0.11 | | | |
| | 1981–85 | -0.28 | | | |
| Frankel (1997) | 1970–92 | 0.222** | -0.382*** | | SB |
| Fink and Primo Braga (1999) | 1989 | -0.415 | | | |
| Li (2000) | 1970–92 | 0.512*** | -0.298*** | | BB |
| Clark and Tavares (2000) | 1970–95 | 0.909* | -0.408* | | BB |
| Soloaga and Winters (1999) | 1986–88 | -0.46 | 1.02*** | 0.62 | BB |
| | 1989–94 | -0.60 | 0.63*** | 0.15 | BB |
| | 1995-96 | -0.27 | 0.26 | -0.03* | SB |

**a** Denotes whether a PTA is building block (BB) or stumbling block (SB) — the second wave issue —based on 'net trade effects' of a PTA, that is, the sum of intra-bloc and extra-bloc effects.   **b** SITC 0 denotes food and live animals; SITC 1 denotes beverages and tobacco; SITC 2 denotes raw materials; SITC 3 denotes fuels; SITC 4 denotes animal and vegetable oils and fats; SITC 5 denotes chemicals; SITC 6 denotes manufactures chiefly by material; SITC 7 denotes machinery and transport euipment; and SITC 8 denotes miscellaneous manufactures.

*** denotes the significance at the 1% level; ** denotes the significance at the 5% level; and * denotes the significance at 10% level.

*Sources:* Aitken (1973), Bergstrand (1985, 1989), Bayoumi and Eichengreen (1995), Frankel, Stein and Wei (1995), Boisso and Ferrantino (1997), Frankel (1997), Fink and Primo Braga (1999), Li (2000), Clark and Tavares (2000), and Soloaga and Winters (2001).

## 3.3 Evidence on stumbling or building blocks — assessment of second wave issues

Despite their drawbacks, the static estimates of the trade creation and diversion discussed in the previous section have been used to conclude that PTAs are relatively benign. But often this is because analysts are talking about positive 'gross trade creation'. In this section, the 'net trade effect' criterion is used to assess the second wave issue.

The empirical assessment of the second wave issue differs from the theoretical considerations discussed in chapter 2. Those looked at the incentives for non-members to join a PTA or for members to allow such expansion. Empirical assessment has been based on the 'net trade effect' of a PTA, as suggested by Frankel (1997). The 'net trade effect' measure is only a very partial measure of the incentives to join a PTA. In a static sense, individual members need not gain from a PTA, even if it is beneficial for the membership as a whole. And in strategic terms, joining a PTA may be the best-safe haven strategy when others are doing so, even if all countries would gain more from multilateral liberalisation.

Sapir (2000) applied year by year estimates of the standard gravity equation to test the 'domino effect' in Europe. The question was whether increased integration in the EC/EU had a negative impact on non-members, especially EFTA countries, thereby prompting their application to join the EC. When the United Kingdom, Denmark and Ireland joined in the EC in 1973, Sapir found that from 1974 to 1985, EFTA exports did not suffer greatly. From mid 1980s, however, he found that non-membership negatively affected EFTA's exports to the EC. He therefore found that deepening of integration in the late 1980s created a 'domino effect' on EFTA countries. Such effects may be partly responsible for the successive enlargement of the EC from its original six to its present fifteen members. In this case the building block or stumbling block issue would arise at each step, and different patterns of expansion or amalgamation might have different implications.

The gravity model estimates of 'net trade effects' are provided in last column of tables 3.2 to 3.9. A broad summary is presented in table 3.10. It is based on a tentative assessment of findings from a majority of the recent studies.

Table 3.10 **Building blocks or stumbling blocks to free trade**
Based on 'net trade effect' criterion

| Building blocks | Stumbling blocks | Inconclusive |
|---|---|---|
| Andean Community | NAFTA | LAIA |
| CER | | MERCOSUR |
| AFTA | | |
| EEC/EU? | | |
| EFTA? | | |

*Sources*: Tables 3.2 to 3.9.

Based on the past gravity model studies, Andean, CER, AFTA, and possibly EEC/EU and EFTA have liberalised more internally than they have diverted trade from the rest of the world, as indicated by their positive 'net trade effect'. Conversely, NAFTA has created negative net effects. The majority findings for LAIA and MERCOSUR are inconclusive.

For trade in agricultural products, based on the one available study, NAFTA was assessed as net trade diverting (see table 3.5) and surprisingly, EU was found to be net trade creating (Gilbert, Scollay and Bora 2001). Agriculture is characterised by massive intervention and numerous exceptions from general WTO rules. The treatment of agriculture in PTAs varies widely and in most cases, countries participating in PTAs carefully craft their agreements so that they do not interfere with the autonomy of domestic farm programs and national food policies. In some cases, agriculture has been totally excluded because it was deemed too difficult to negotiate.

EU has a number of bilateral agreements with the Eastern European and Mediterranean countries and it has a generalised system of preferences (GSP) with many developing countries. This could partly explain the positive and significant effects of EU's agricultural trade with the non-member countries. A number of EU bilateral agreements will be empirically assessed in chapter 4. In addition, EU's export subsidies may have enhanced trade in agricultural products with the developing non-member countries. However, this does not take into account the domestic inefficiencies caused by the Common Agricultural Policy (CAP).

For NAFTA, the agricultural provisions consist of three bilateral agreements. The United States exports highly subsidised agricultural raw materials, particularly cotton and cereals, to Mexico. The rules of origin allow Mexico to re-export its imports after processing. This could have created high trade diversion on the agricultural exports of non-member countries to the United States. The effects of rules of origin on members' and non-members' trade flows are discussed further in chapter 4.

The majority of studies find almost all PTAs to be net trade creating rather than diverting — a relatively benign finding. Further, a comparison of gravity model estimates of first and second wave issues can lead to different policy conclusions. For example, when Spain and Portugal joined the EC, it led to trade diversion from non-members (Bayoumi and Eichengreen 1995). But it could be considered desirable on 'dynamic path' grounds because it signified expanding membership and hence progress towards the goal of achieving multilateral trade liberalisation.

The net trade effect test is only a weak test of whether the gains from trade creation outweigh the costs of trade diversion. It provides some positive evidence for combined consumer and producer surplus (the triangles *ABC* and *FGH* in figure 2.1), but it does not indicate whether their combined area exceeds that of lost tariff revenue (the trapezoid *BEJG* in figure 2.1).

## 3.4 Evidence on investment creation and diversion effects of PTAs — assessment of third wave issues

Empirical work on PTAs has mostly focused on static trade creation and trade diversion — the first wave issue.

However, countries participating in PTAs are equally concerned about the impact on investment flows and the potential for investment creation and diversion — a third wave issue. It was believed that the creation of NAFTA would attract foreign direct investment (FDI) into Mexico. There was a surge in investment prior to the formation of NAFTA in the early 1990s. Spain and Portugal also experienced similar investment booms once their accession to the EC became certain during mid 1980s. Ethier (2001) argued that the attraction of FDI is one of the major motivations underlying new age agreements, given the importance of FDI in driving institutional change, new technology, increased competitiveness and exports.

There have been few empirical studies on this subject. One prominent *ex ante* study was by Baldwin, Forslid and Haaland (1995). They assessed the 'domino effect' of EC/EU on investment by analysing the effect of tariff provisions on investment in the EC92 single market program. They showed that EC92 caused capital diversion from the EFTA countries to the EU and argued that the EC92 initiative caused investment diversion, which led several EFTA countries to join in EU.

Blomstrom and Kokko (1997) suggested that while the Canada-US Free Trade Area had little effect on investment, MERCOSUR and NAFTA increased inflows of investment. They focused on inter-regional inflows using aggregate investment data. Given the inadequate data and methodological difficulties involved, their

study did not go far enough to establish a direct causal relationship between regional integration and FDI. They found an increase in inter-regional inflows after the PTAs were set up, but they could not isolate the integration effects from other major contemporaneous macroeconomic and institutional changes.

Another *ex ante* study was by Francois and Rombout (2000). They modified the Heckscher-Ohlin model to include intertemporal optimisation. Apart from static reallocation in production and consumption, a price change in their model also causes an additional adjustment in the capital stock. They assessed PTAs by linking terms of trade shifts with the adjustment in capital stocks. A positive 'terms of trade effect' (cheaper imports from non-members) will attract additional investment into the PTA and raise the rate of return on capital. However, the impact is asymmetric — not the same for all countries in a PTA. It depends on country size and the level of technology in each country. They found that PTAs that link industrial countries with small, often less developed regional partners offer important potential dynamic effects for small partners related to growth and investment. Because of this, the strongest investment response after accession to the EU occurred in Ireland, Spain and Portugal, in response to lower wages in those countries. There was a similar dynamic response in Uruguay — a small country in MERCOSUR. The NAFTA agreement showed an investment boom in Mexico. However, unlike in Uruguay it started before the formation of NAFTA. They also observed a positive terms of trade effect at the year of accession for all countries except Mexico (the exception being because of other events happening in Mexico at the same time).

The investment effects were concentrated in the smaller PTA partner country, as Ethier (2001) also suggested. The larger PTA country did not experience comparable induced investment or associated long-term income effects. Moreover, the larger PTA country experienced a loss in tariff revenue. This loss was magnified over time as the small country expanded under the PTA.

There are few gravity model studies assessing the impact of PTAs on investment. In a related study, Stone and Jeon (2000) investigated the relationship between FDI and trade in Asia-Pacific economies. They found that ASEAN increased its intra-bloc trade flows. However, the intra-bloc effect on investment was insignificant. Stein and Daude (2001) used a gravity model to test the impact of institutional variables and PTAs on FDI flows and found that the impact of PTAs was positive but insignificant.

These studies could not answer the key question raised in chapter 2, namely, whether PTAs cause net investment creation or diversion. As Winters (1997) argued in his policy paper,

> … as parallels to trade creation and trade diversion, and especially their welfare implications, these terms [investment creation and diversion] are dangerous … Moreover, new FDI from any source could go into the production of goods for trade diversion and thus worsen the PTA's welfare overall. (Winters 1997, p. 35)

Considering whether these fears are well substantiated is vital to an overall assessment of PTAs. The question can only be properly answered with an empirical investigation at the PTA level. This is undertaken in chapter 5.

## 3.5  Summary

The past evidence on PTAs has been subject to different interpretations. Many studies have argued that the gross trade effects of PTAs are generally positive. But this evidence looks only at the effects on trade with partner countries, and ignores the effects on non-members.

The evidence on the 'net trade effects' considers whether PTAs have created more trade internally than they have diverted from non-member countries. It has been used as partial evidence of whether PTAs are building blocks or stumbling blocks to multilateral free trade. Again, the evidence has been interpreted as generally positive. The majority of studies find almost all PTAs to be building blocks rather than stumbling blocks, as indicated by their positive 'net trade effect' (although this is weak indicator of their effects on economic welfare).

The empirical evidence on the investment side of PTAs is limited. The few analytical studies available focused on trade provisions and associated impacts on capital, rather than explicit investment provisions of PTAs per se.

But there remain many unanswered questions on the impact of PTAs on both merchandise trade and investment. There were a number of methodological deficiencies in the studies reviewed here, which suggest that their conclusions may be premature. These deficiencies are addressed in the new evidence on trade creation and diversion provided in the next chapter.

# 4  New evidence on trade creation and diversion

The empirical studies reviewed in the previous chapter tend to support the common view that PTAs are a 'step in the right direction' by showing relatively benign effects of PTAs on trade. However, many past gravity model studies were misspecified in a number of respects, which contributed to this finding.

- Most studies used cross sectional econometric analysis to evaluate PTAs on merchandise trade. Thus, they could not correct for the effects of relevant but unobservable or non-measurable country-specific influences on bilateral trade flows. The study by Bayoumi and Eichengreen (1995) was an exception in this regard. Their study estimated the impact of EEC and EFTA on European trade flows by using a first differenced equation rather than the level of trade to correct for country-specific effects.

- As noted, many studies omitted at least some of the other determinants of bilateral trade flows, particularly tariff preferences and price changes.

- With the exception of Li (2000), all the studies reviewed in the last chapter used simple binary dummy variables for all PTAs, irrespective of either the extent or sectoral coverage of the trade or the non-trade provisions included in the agreements.

- None of the gravity model studies to date accounted specifically for the timing of establishment and expansion of membership in a PTA. They could potentially conclude that PTAs expanded trade even before they were implemented.

- Few studies examined the effects of PTAs on investment.

This study provides new evidence on the effects of PTAs on trade (this chapter) and on investment (next chapter) by addressing these analytical issues.

In addition, this chapter considers some new policy issues. It distinguishes the tariff and other provisions affecting merchandise trade from those provisions affecting investment and services trade. It examines whether these latter, third wave provisions of PTAs have had any impact on merchandise trade flows. In the light of the recent interest in bilateral arrangements, it also considers whether bilateral

agreements have been more successful than plurilateral agreements in promoting net trade creation.

The analytical issues are discussed in the next section, followed by the model specification and econometric issues. Data sources and limitations are provided in the appendix B. Subsequent sections examine the results obtained from various versions of the gravity model to answer the key policy questions and the final section summarises the results.

# 4.1    Analytical issues

## Traditional and 'new age' provisions

Whether and how a PTA affects trade flows depends on the strength of its provisions, particularly regarding coverage, implementation and dispute resolution. The broader and more transparent the coverage, the lower the transaction costs of trade among the members and the greater the incentive to engage in intra-PTA trade.

A member liberalisation index (MLI) has been calculated to capture the degree of liberalisation of intra-PTA trade and investment. It captures the sectoral coverage and timing of tariff provisions, as well as the extent of new age provisions of PTAs, including those on investment (see appendix A). The higher the index, the more liberal the PTA provisions for member countries.

Coverage varies from one PTA to another. Some involve only a few products or sectors, while others stretch well beyond the traditional tariff elimination to areas such as technical barriers to trade, services, intellectual property rights and competition policy, government procurement and investment.

The index outlined in appendix A (table A.2) recognises:

- general measures covering all trade;

- provisions covering agricultural products;

- provisions covering industrial products; and

- provisions covering services trade and movement of people.

These are classified into two sub-indexes for quantitative analysis. The merchandise Member Liberalisation Index includes the provisions covering agriculture and industrial products — an index of traditional provisions. The non-merchandise member liberalisation index, covering third wave or 'new age' issues, includes the

provisions covering services trade, plus general measures covering all trade — national treatment, investment rules, domestic competition policy, government procurement, intellectual property rights, and the temporary and permanent movement of people.

Preferential agreements vary in their coverage of traditional and 'new age' provisions. For example, the merchandise MLI for the Singapore-New Zealand agreement takes the highest value of 0.47, followed by EU with 0.44. The LAIA is the least liberalised for members, with the merchandise MLI of only 0.09, followed by EU-Egypt with an index of 0.12. Note that these scores are based on how the language of the agreements is written, not on whether or how the provisions are used.

This variation in PTA coverage of trade provisions is factored into the quantitative analysis in this chapter by replacing the conventional binary dummy variables in the gravity model for each individual PTA by the merchandise MLI.[1] The index related to third wave provisions is also included to control for new age issues when analysing the trade effects of various PTAs' trade provisions.

Provisions covering agriculture and industrial products, along with their weights in the merchandise MLI (reflecting a judgement about their relative importance), are listed in the table 4.1 (see appendix A for more details).

Among measures affecting agricultural trade, domestic support measures and tariff quotas received the highest weight, followed by sanitary and phytosanitary measures. Among domestic support measures, green box, amber box and blue box measures were scored as being successively less liberal.[2] For tariff quota measures, complete prohibition was scored as most liberal, while agreements that did not permit the expansion of tariff quotas were scored as least liberal.

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[1] It would be particularly important to capture the relative strength of PTA provisions in the MLI if it were used in a gravity model specification that imputed the same trade effects to all PTAs (ie assumed the same slope coefficient for all PTAs). The specification used here allows each PTA to have its own trade effects, so the slope coefficients, as well as the MLI index scores, capture the ultimate differences across PTAs.

[2] In order to qualify for the 'green box', a subsidy must not distort trade or at most cause minimal distortion. These subsidies have to be government funded and must not involve price support. All domestic support measures considered to distort agricultural production and trade fall in to the 'amber box' — the total value of these measures must be reduced. The 'blue box' is an exemption from the general rule that all subsidies linked to production must be reduced or kept within defined minimal levels. It covers payments directly linked to acreage or animal numbers.

## Table 4.1 Provisions covering agriculture and industrial products and their weights in the merchandise MLI

| Category of provision | Agriculture | Industrials |
|---|---|---|
| Years remaining until tariff reductions completed | 0.004 | 0.050 |
| Tariff quotas | 0.017 | |
| Tariff exceptions | 0.010 | 0.040 |
| Safeguards – time limit and type of measure | 0.006 | 0.080 |
| Antidumping and countervailing measures | 0.006 | 0.080 |
| Export incentives | 0.006 | 0.060 |
| Domestic support | 0.018 | |
| Number of different types of rules of origin (ROO) | 0.002 | 0.030 |
| Coverage of ROO | 0.003 | 0.030 |
| Restrictiveness of ROO | 0.010 | 0.120 |
| Technical barriers to trade | 0.003 | 0.060 |
| Sanitary and phytosanitary measures | 0.015 | |

*Source:* Table A.1.

If the sanitary and phytosanitary (SPS) provisions required the adoption of international standards, the PTAs received a high liberalisation score (CER, EU-Poland and Chile-Mexico). Successively less liberal provisions were those that required the adoption of international standards but permitted the implementation of more stringent science-based measures (NAFTA), and those that allowed mutual recognition of SPS measures (Singapore-NZ), respectively. The logic here was that international standards were likely to be more liberal than individual country standards.

Among measures affecting industrial products, rules of origin, safeguards and antidumping received most weight. The coverage, number and types of rules of origin, and restrictiveness of rules of origin were scored individually in the index. Agreements that applied the same rules of origin to all products were scored as more liberal than those that applied different rules to different products. But among agreements that applied the same rules to all products, those that allowed products to meet one of several possible criteria (typically based on value added, change in tariff heading, stage of processing or substantial transformation) were scored as more liberal than those that offered only one criterion. Agreements that set a low value added (or equivalent) hurdle were scored as more liberal than those that set a high hurdle. The way that rules of origin can restrict trade is explained in more detail later in the chapter.

Provisions governing emergency safeguards (GATT Article XIX type actions) are found in practically all agreements analysed in this study. They involve the imposition of quantitative restrictions on imports where serious injury occurs. PTAs vary in how they set the time limit and specify the type of safeguard measure

applied. In the case of a serious injury, members may suspend preferences for a period of one year (LAIA, Chile-Mexico) or two years (MERCOSUR, Andean). In the case of a serious injury, some PTAs even have provisions to suspend the preferences until such time as the threat is no longer perceived (SPARTECA, PATCRA). However, safeguard measures are prohibited in some recent bilateral agreements — Singapore-NZ and Chile-MERCOSUR. These PTAs received a high liberalisation score for safeguard provisions. If safeguards imposed are less than one year and the type of measure is specified (ie transparent) — typically a quota or suspension of preferences — then those PTAs received a higher score. If the safeguard provisions are not transparent they received a low score. Note that this scoring reflects how the safeguard provisions are written, not whether they are used.

Most of the PTAs analysed in this study contain provisions permitting the application of antidumping duties and countervailing measures in intra-PTA trade, though these are more common in free trade areas than customs unions. These provisions are scored as highly liberal if they completely prohibit antidumping as an instrument to protect member industries. Provisions requiring consistency with the WTO rules, consultation with other members, or no restrictions on the use of antidumping and countervailing duties were scored as progressively less liberal. Those PTAs making specific reference to the GATT/WTO definition of dumping include Chile-MERCOSUR and Singapore-New Zealand. Those calling for consultations between parties prior to the adoption of protective measures include EU and NAFTA.

Other provisions affecting both agricultural and industrial products were those governing technical barriers to trade, export incentives and tariff exceptions. Under technical barriers to trade, initiatives to promote harmonisation of standards were scored as less liberal than national treatment of standards, voluntary recognition of test results or full harmonisation of standards.[3] Provisions to prohibit export incentives were scored as more liberal than provisions to review them. Agreements with fewer tariff exceptions were scored as more liberal than those with more. Provisions governing other types of subsidies on industrial goods were not included in the index because they did not feature in most of the PTAs examined.

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[3] Provisions governing mutual recognition of labour market qualifications were not included in the index because they did not feature in most of the PTAs examined (and hence, their effects would not be identified precisely in the econometrics). Dispute resolution was not included, because it was not clear what constituted a more liberal rather than a less liberal regime. This aspect of PTAs, more than most, depends on how the facility is used, rather than how it is specified on paper (the basis for scoring in the MLI). Tax harmonisation was not included because it did not feature in the particular PTAs examined, although it has been the subject of separate double taxation agreements.

Finally, recognition was given to the prospective nature of the tariff provisions in some more recent agreements, and hence the likelihood of them having a limited effect on current (though not necessarily future) trade flows. This was done by scoring the more prospective agreements as being less liberal *currently* than those whose tariff provisions were fully implemented.

The provisions indexed in the MLI are treated as additive to, and independent of each other. In reality some provisions might interact to strengthen or weaken other provisions. For example, the time schedule for preferential tariff liberalisation is closely related to the restrictiveness of rules of origin. The impact of interaction effects among the provisions in various PTAs is potentially an empirical question, but interaction effects have not been allowed for specifically in the construction of this index. For this reason, the econometrics may understate (where interaction effects reinforce) or overstate (where interaction effects cancel) the overall effects of PTAs. This possibility is discussed later in the chapter

The estimated relationship between provisions related to trade and the level of trade provide an indication of whether trade provisions included in PTAs have any effect collectively on trade flows with member or non-member countries. Since PTAs are by definition exclusive and discriminatory against non-members, trade and non-trade provisions that are favourable to the intra-PTA trade may become barriers to non-member countries. This effect is tested for separately.

## PTA specific variables

There are two ways the merchandise MLI has been introduced into the gravity model. Firstly, *dynamic* PTA-specific indexes are defined to take a non-zero value only for the years in which a PTA between the two countries is in force, and to take a value of zero otherwise. These indexes capture the effect of the formation, expansion and contraction of a PTA on trade and investment only after it occurs. The membership status of the countries in each PTA is reported in the table 4.2.

## Table 4.2   **Membership dynamics in major PTAs**

| *Name of an PTA* | *Country membership* |
| --- | --- |
| Andean Pact (signed in 1969 and changed to Andean Community in 1996) | Bolivia, Colombia, Ecuador, Chile (left in 1976), Peru (left in 1992), Venezuela (joined in 1973) |
| ANZCERTA (signed in 1983) | Australia<br>New Zealand |
| ASEAN FTA (signed in 1992) | Indonesia, Malaysia, Singapore, Philippines, Thailand Lao PDR (joined in 1997), Myanmar (joined in 1997), Vietnam (joined in 1997) |
| CUSFTA/NAFTA (Canada/US signed in 1988, with Mexico signed in 1994) | Canada, United States and Mexico |
| EU (originally EEC, signed in 1958) | Belgium, Luxembourg[b], France, Germany, Italy, Netherlands, United Kingdom (joined in 1973), Denmark (joined in 1973), Ireland (joined in 1973), Greece (joined in 1981), Spain (joined in 1986), Portugal (joined in 1986), Austria (joined in 1995), Finland (joined in 1995), Sweden (joined in 1995) |
| EFTA (signed in 1960) | Norway, Switzerland, Iceland (joined in 1970), Liechtenstein[a] (joined in 1991), Austria (left in 1995), Denmark (left in 1972), Portugal (left in 1985), Sweden (left in 1985), United Kingdom (left in 1972), Finland (associated in 1961, full membership in 1986 and left in 1995) |
| LAIA (effective since 1980 though signed in 1960) | Argentina, Brazil, Chile, Ecuador, Mexico, Peru, Uruguay, Bolivia, Colombia, Paraguay, Venezuela |
| MERCOSUR (signed in 1991, CET since 1995) | Argentina, Brazil Uruguay and Paraguay |
| SPARTECA (signed in 1981) | Australia, Cook Islands[a], Micronesia[a], Fiji, Kiribati[a], Marshall Islands[a], Nauru[a], New Zealand, Niue[a], Papua New Guinea, Solomon Islands, Tonga[a], Tuvalu[a], Vanuatu[a], Western Samoa[a] |

## Table 4.2 (Continued)

| Name of an PTA | Country membership |
|---|---|
| US – Israel FTA (signed in 1985) | United States and Israel |
| PATCRA (signed in 1977) | Australia and Papua New Guinea |
| Chile – Colombia (signed in 1993) | Chile and Colombia |
| Chile – MERCOSUR (signed in 1996) | Chile with Argentina, Brazil, Uruguay and Paraguay |
| Chile – Mexico (signed in 1999) | Chile and Mexico |
| EU – Egypt (signed in 1978) | Egypt and EU members over the time |
| EU – Poland (signed in 1994) | Poland and EU members over the time |
| EU – Switzerland – Liechtenstein (signed in 1973) | Switzerland, Liechtenstein[a] and EU members over the time |
| Singapore – New Zealand (signed in 2000) | Singapore and New Zealand |
| APEC[c] (signed in 1989) | Australia, Brunei[a], Canada, Japan, Korea Republic, Malaysia, New Zealand, Philippines, Singapore, Thailand, United States, Indonesia, China (joined in 1991), Taiwan (joined in 1991)[a], Hong Kong (joined in 1991), Mexico (joined in 1993), Papua New Guinea (joined in 1993), Chile (joined in 1994), Peru (joined in 1998), Russia (joined in 1998), Vietnam (joined in 1998) |
| Gulf Cooperative Council (GCC)[c] (signed in 1983) | Bahrain, Kuwait, Oman[a], Qatar[a], Saudi Arabia, United Arab Emirates |

[a] Because of lack of time series trade and other related data, these countries were not included in the present study. [b] Belgium and Luxembourg are included as one country. The selection of countries and PTAs is discussed in appendix A. [c] While a Member Liberalisation Index has not been calculated for APEC (a non-preferential arrangement) or for the Gulf Cooperative Council (a preferential one), their possible effects on the trade flows of their members have been controlled for through a set of three conventional zero-one dummy variables.

In contrast, the second type is called an *antimonde* PTA-specific index, and it takes a non-zero value for all the years in the sample, irrespective of when the PTA was formed. The antimonde index is used as a panel data analogue to the non-dynamic indexes of the cross sectional studies reported in chapter 3. It has the same disadvantage of allowing the formation, expansion, contraction of a PTA to affect trade and investment 'before the event'.

To some extent, the choice of a starting date for PTAs is arbitrary. In some PTAs, such as EU–Poland, provisions are to be phased in slowly after implementation. In others, such as the EC, the generosity of the provisions has varied substantially over time. Both issues are discussed in more detail in appendix A. Some PTAs, such as CUSTFA and CER, merely strengthened and broadened preferential access arrangements that were already in place.

It is also possible for PTAs to affect trade and investment flows before implementation, especially if the PTA formation is expected or announced well in advance. The investment booms that occurred in Spain and Portugal prior to their accession to the EU are a good example of this phenomenon.

Despite this arbitrariness, the use of dynamic dummies allows a formal statistical test of whether the strength of trade effects associated with PTAs has been significantly different, on average, in the years following implementation (when the dynamic PTA dummies take zero values), compared with the effects, on average, in the years prior to implementation (when the dynamic PTA dummies take non-zero values). This remains a relevant policy question.

Three PTA-specific variables for each PTA have been introduced in this study, as in Soloaga and Winters (2001), to capture the separate effects on intra-PTA trade, on imports from non-members, and on exports to non-members.

## Cross sectional and panel analysis

There are two distinct advantages that a panel data model offers over the traditional cross sectional analysis. First, a panel data model is able to capture both cross section and time series variation in the dependent variable under investigation. Second, a panel data model is able to measure not only the effects that observable variables have on the dependent variable, but can also control for the effects of relevant but unobservable or non-measurable heterogeneity across countries or over time.

The observable variables are the bilateral trade determinants normally included in the gravity model. The means by which the unobservable variables are controlled for depends upon whether a fixed effects or random effects model is used.

A fixed effects model is chosen here over a random effects model. In a random effects model, the unobservable effects are assumed to be uncorrelated with the observed explanatory variables, and this is highly unlikely to be the case in practice.[4] In a fixed effects model, unobservable specific effects are assumed to be fixed parameters (akin to constant terms). They can be estimated directly, so only weak prior assumptions are needed about their relationship with the explanatory variables, in contrast to the random effects specification.

Harris and Matyas (2001), Egger (2000) and Matyas (1997, 1998) have showed that without controlling for unobserved heterogeneity, the parameter estimates of interest — the PTA effects — in the gravity model might be inflated or deflated artificially by this misspecification. This is a type of omitted variable bias.

## 4.2    Model specification

Many gravity model analysts have previously excluded data on potential trading partners when the value of trade was zero. The bias created from such exclusion is likely to cast doubt on the validity of the findings, particularly the normality of the behaviour of countries defined in the gravity model. This exclusion over-emphasises the effect of those countries that have positive trade flows.

This study has included information on all potential trading partners of 116 countries (see appendix B for countries in the full sample), even when the country under investigation has no exports to the potential trading partners in some years. Since the nature of trade relations in many countries in the World Trade Flows (1997, 2000) database is such that each country trades with a relatively small number of partners, the dependent variable contains a significant number of zero observations as well as many positive observations. For the full sample, the number of observations is 116 countries x 115 partners x 28 years = 373520, with about 44 per cent having zero values. As a result, a Tobit estimation procedure is used to appropriately account for the censored nature of the dependent variable — the natural log of exports between country $i$ and country $j$ in year $t$.[5] Tobit estimation

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[4] In addition, a Hausman test rejected the random effects specification. See appendix C for details, and for additional discussion about the econometric issues associated with including fixed effects.

[5] There are a variety of alternate approaches to this problem. The zero values can be simply omitted as in the case of Frankel (1997), which leads to the possibility of selectivity bias.

recognises that if the dependent variable is censored, then the distribution of the error terms will be truncated, and the estimator is constructed accordingly (see appendix C for more details).

The gravity model equation (4.1) estimated here allows for *product differentiation* at the country level. Much of the recent literature on PTAs has focused on imperfectly competitive behaviour, as discussed in chapter 2. Recognising this is important for two reasons:

- some economic integration has occurred among economies with almost similar structures and large volumes of intra-industry trade; and

- there is a positive interaction between market structure and the gains from integration, often called the pro-competitive effects of PTAs, which the new age agreements aim to capture.

The product differentiation model of Helpman and Krugman (1985) and Helpman (1987) is integrated into this gravity model specification (4.1). In their models, one of the two goods is differentiated and the other is homogenous. The bilateral trade of each country is the sum of inter- and intra-industry trade flows, with the latter being trade in the differentiated product. These product differentiation specifications also provide a rationale for applying the gravity model to investment flows (Egger 2001), as is done in the next chapter.

The corresponding reduced form of gravity model for trade is:

$$
\begin{aligned}
LnY_{ijt}^{*} = {}& a + \alpha_i + \gamma_j + \lambda_t + \beta_1 LnSGDP_{ijt} + \beta_2 LnRLFA_{ijt} + \beta_3 LnSimilar_{ijt} \\
& + \beta_4 LnDis_{ij} + \beta_5 LnRER_{ijt} + \beta_6 LnTar_{ijt} + \beta_7 Lin_{ij} + \beta_8 Bor_{ij} \\
& + \beta_9 Col_{ij} + \beta_{10} Cur_{ij} + \beta_{11} Is_i + \beta_{12} Is_j + \beta_{13} lock_i + \beta_{14} lock_j \\
& + \beta_{15} 3wave_{ij} + \sum{}_{ij} MRTA_{ij} + \sum{}_{-j} MRTA_{i-j} + \sum{}_{-i} MRTA_{j-i} \\
& + Ln\varepsilon_{ijt}
\end{aligned}
\tag{4.1}
$$

where

$Ln$            is natural logarithmic transformation;

---

Arbitrarily small numbers can be used in place of zeros. Eichengreen and Irwin (1995) expressed the dependent variable as $Ln(1 + Y_{ij})$. Clark and Tavres (2000) and Soloaga and Winters (2001) used a Tobit specification for their cross sectional gravity model.

$Y^*_{ijt}$ is the value of exports from country $i$ to $j$ in year $t$; using exports as a dependent variable rather than total bilateral trade allows the identification of export and import diversion separately;

$\alpha_i$ is unobserved specific effects in exporting country $i$;

$\gamma_j$ is unobserved specific effects in importing country $j$;

$\lambda_t$ is unobserved specific effects in time period $t$;

$SGDP_{ijt}$ is the sum of bilateral GDPs of $i$ and $j$ in year $t$;

$RLFA_{ijt}$ is the absolute differences in GDP per capita of $i$ and $j$ in year $t$;

$Similar_{ijt}$ is similarity in country size between $i$ and $j$ in year $t$ in terms of aggregate GDP;

$Dis_{ij}$ is distance between the two largest or capital cities of countries $i$ and $j$;

$RER_{ijt}$ is the bilateral real exchange rate between $i$ and $j$ in year $t$;

$Tar_{ijt}$ is an average tariff rate between $i$ and $j$ in year $t$;

$Lin_{ij}$ is a measure of linguistic similarity between $i$ and $j$;

$Bor_{ij}$ is a dummy that takes a value 1 if $i$ and $j$ share a land border and 0 otherwise;

$Col_{ij}$ is a dummy that takes a value 1 if $i$ and $j$ have colonial linkages and 0 otherwise;

$Cur_{ij}$ is a dummy that takes a value 1 if $i$ and $j$ have the same currency and 0 otherwise;

$Is_i$ is a dummy that takes a value 1 when $i$ is island nations and 0 otherwise;

$Lock_i$ is a dummy that takes a value 1 when $i$ is a landlocked nation and 0 otherwise;

$3wave_{ij}$     is an index capturing the third wave provisions of a PTA, that takes a value of the non-merchandise MLI index if the $i$ and $j$ are participants of a specific PTA in the sample and 0 otherwise;[6] it also has a time dimension when defined in dynamic rather than antimonde form;

$MRTA_{ij}$     is an index capturing the merchandise trade provisions of a PTA, that takes the value of the merchandise MLI if both countries $i$ and $j$ belong to the same PTA and 0 otherwise; it also has a time dimension when defined in dynamic rather than antimonde form;

$MRTA_{i-j}$     is an index that takes the value of the merchandise MLI when the importing country $j$ belongs to that particular PTA and 0 otherwise; it also has a time dimension when defined in dynamic rather than antimonde form;

$MRTA_{j-i}$     is an index that takes the value of the merchandise MLI when the exporting country $i$ belongs to that particular PTA; and 0 otherwise it also has time dimension when defined in dynamic rather than antimonde form;

$\varepsilon_{ijt}$     is an error term.

From an econometric point of view, the $\alpha_i$, $\gamma_j$ and $\lambda_t$ specific effects are treated as fixed unknown parameters. The use of three separate fixed effects is advocated by Matyas (1997, 1998) and avoids the omitted variable bias identified by Haveman and Hummels (1998).

The expected relationship of the observed explanatory variables with bilateral exports was discussed briefly in the previous chapter.

In a model of product differentiation, countries similar in size will trade more, and the trade will be of an intra-industry nature. The index of size similarity (*Similar)* captures this effect.

By contrast, traditional trade theory says that countries with dissimilar levels of per capita *GDP* will trade more than the countries with similar levels, where this reflects dissimilar factor endowments. The absolute difference in the per capita *GDP* between exporting and importing countries (*RLFA)* is included as an

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6 Because of model convergence problems, the effects of new age provisions on exports to non-members and imports from non-members could not be analysed separately.

explanatory variable in the gravity model as a way of distinguishing the traditional from the differentiated product approaches.[7]

The above gravity model specification includes the real exchange rate as a relevant price variable in order to control for fluctuations in relative prices among trading partners. This variable is defined as the value of a unit of the exporter's currency relative to the importer's currency in purchasing power parity terms. A depreciation of exporting country currency is expected to show positive relationship with exports and negative relationship with outward foreign direct investment.

The average bilateral tariff rate (*Tar*) is expected to show a negative relationship with trade. The PTA-specific indexes capture the extent of traditional and 'new age' provisions of a PTA, but not the size of the tariff preferences thereby created. Because the bilateral tariff variable includes preferential tariffs,[8] the overall measured effect of PTAs on trade will be split between the tariff variable and the PTA-specific indexes in specifications where both occur. To test whether the coefficients of the PTA-specific indexes are sensitive to the inclusion of the tariff variable, the gravity model is estimated initially without the tariff variable. It is then re-estimated with the tariff variable for that subset of countries and time periods for which bilateral tariff data are available.

## 4.3    Main results

The equation 4.1 is estimated in a Tobit form with fixed effects. The detailed results are reported in table D.1. The observable effects — trade provisions of PTAs and other bilateral trade determinants — and unobservable country and time specific effects all significantly influence the bilateral trade flows. The coefficients on the observable effects are generally as expected. Interestingly, they support both traditional and product differentiation theories of trade, because similarity in size and differences in income per head are both associated with higher bilateral exports.

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[7] The specification based on product differentiation above also differs from traditional gravity model specifications by including the sum of importing and exporting country GDPs, rather than including each separately. This small loss of generality means that the product differentiation version does not encompass the traditional model fully.

[8] The bilateral tariff data are applied rates obtained from UNCTAD's TRAINS database. As such, they incorporate tariff preferences.

## Comparison with past estimates

The new estimates of trade creation and diversion tend to be different from past estimates for most PTAs.

Past estimates showed most PTAs to be trade creating in net terms. By contrast, the results here suggest most of the PTAs examined did not create additional trade, either for members or for non-members of the agreement.

The 'net trade effects' of preferential agreements found in this study are compared with past estimates in table 4.3, which shows whether the net effects are positive or negative.[9] The relationship between these net trade effects and welfare effects is weak (despite the 'building block' and 'stumbling block' terminology sometimes used). It was found in chapter 2 that abstracting from terms of trade effects, if empirical tests established net trade creation, then a PTA may still have generated welfare losses, while if the empirical tests established net trade diversion, then the PTA cannot have created welfare gains. However, terms of trade effects could possibly reverse this latter conclusion for at least some PTA members.

The new estimates of net trade effects reverse most of the past findings. Nearly all PTAs are found to have caused net trade diversion in the new assessment. The PTAs found to have inconclusive effects in past analysis drifted either way in the new assessment, but MERCOSUR was found here to have caused net trade diversion.

Overall, the main PTAs — NAFTA, EC/EU, MERCOSUR, and CER — as well as many bilateral agreements not considered previously, are found here to have created negative net trade effects. However, there is a qualification to this finding. In agreements with a small number of members, the intra-PTA effect is estimated imprecisely, with a large standard error, while the extra-PTA effect can be estimated more accurately.[10] Thus, the findings for those PTAs, such as CER, with a small number of members are less robust than those for larger PTAs. In addition, the measures of distance used in this study are unlikely to capture fully the ways in which changes in trading patterns and reductions in transport costs have raised the attractiveness of extra-bloc as opposed to intra-bloc trade for CER members over time.

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[9] The assessment of net trade effects is based on the marginal effects of PTAs reported in table C.1, rather than the raw maximum likelihood Tobit estimates in table D.1, for the preferred specification with dynamic PTA variables and fixed effects. Although the marginal effects and raw Tobit estimates are not equal (as explained in appendix C), in practice the assessment of the direction of net trade effects is the same, whichever is used.

[10] For example, the intra-CER dummy has positive values only for 14 x 15 = 210 observations and zero for remaining observations.

Table 4.3    **New evidence on PTAs as causing net trade creation or diversion**

| | Past estimates | | New estimates | |
|---|---|---|---|---|
| Net trade creation | Inconclusive | Net trade diversion | Net trade creation | Net trade diversion |
| Andean | LAIA | NAFTA | Andean | AFTA |
| CER | MERCOSUR | | LAFTA/LAIA | EFTA |
| AFTA | | | US-Israel | EC/EU |
| EEC/EU? | | | SPARTECA | MERCOSUR |
| EFTA? | | | | NAFTA |
| | | | | CER |
| | | | | EU-Switzerland |
| | | | | Chile-Colombia |
| | | | | Australia-PNG |
| | | | | Chile-MERCOSUR |
| | | | | EU-Egypt |
| | | | | EU-Poland |

*Sources:* Table 3.10 and table C.1.

As noted, the net trade effect criterion has limitations in assessing the effects on economic welfare. Nonetheless the new evidence suggests negative net trade effects for many PTAs, controlling for other factors.

A number of factors have contributed to the more negative findings in this study. These are now considered in turn.

## Comparison of estimates with dynamic and antimonde PTA dummies

All the past gravity model studies estimated the PTA effects using PTA dummies defined in antimonde form. The comparable dynamic and antimonde estimates in this analysis are reported in table D.1.

They show that when PTA dummies are defined in antimonde form, the net trade effects are mainly positive, in contrast to the negative effects obtained for dynamic PTA variables.

In essence, when dummies are defined in dynamic form, the test for significance of their coefficients is a statistical test for whether the trade effects they capture are stronger after the formation/expansion of the PTA than before. In the past, this question has been assessed, at best, only by reference to the point estimates from various cross sections. By contrast, the test for significance of the antimonde dummies tests whether the PTA has had a significant effect on trade flows throughout the whole period under study — 1970 to 1997 (see data appendix B). It

does not distinguish whether the trade effects were any stronger after the PTA formation than before. This is similar to most of the (cross sectional) tests in the literature to date.

Defining PTA dummies in dynamic form provides a more stringent statistical test of whether it was PTA formation, rather than some other set of factors specific to the bilateral country pair, accounting for the observed trade effects. The power of the test is further strengthened by the fact that individual country- and time-specific effects are controlled for separately, through the fixed effects (see also below). The more stringent test of the before/after effects of PTAs is the major factor accounting for the more negative findings of this study.

The differences are more prominent for the EC/EU and MERCOSUR agreements, where membership dynamics play an important role in their trade creation and diversion effects. For example, a significant negative intra-EU effect is found when using dynamic dummies, compared to a significant positive effect found using antimonde dummies. The dynamic dummies account for individual countries switching from EFTA to the EU.

## Comparison of estimates with and without fixed effects

Another reason for the more negative findings in this study is the use of panel analysis, which allows unobservable heterogeneity to be controlled for. As noted in appendix C, without allowing for fixed effects, the coefficients of both the PTA variables and the other explanatory variables tend to be upward biased, as are the test statistics for the significance of these variables (all reported in table D.1). A likelihood-ratio test confirms the joint significance of the fixed effects.[11]

This suggests that inferences based on past gravity model estimates without fixed effects suffer from omitted variable bias. Controlling for unobservable heterogeneity is another reason for the more negative findings in this study.

## Comparison of estimates with and without tariffs

A model with the average bilateral tariff variable as an additional determinant of trade is estimated on a restricted dataset,[12] and the results are reported in table D.2. As noted, while the PTA dummies capture the existence of tariff preferences, the

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[11] The calculated test statistic of 114775.3 clearly rejects the null hypothesis, as is expected given the individual significance of most of the country and time specific fixed effects in the model.

[12] The dataset is restricted because of the lack of bilateral tariff data for a number of countries and for a number of years.

tariff variable captures an additional effect — the height of the preferences so created.

Results from this analysis show that the average tariff rate in the importing country has a significant and negative effect on its imports, as expected. The PTA dummies also show a significant effect. This is because they capture not just the existence of tariff preferences (as also captured by the tariff variable), but also the effects of non-tariff measures affecting merchandise trade, such as rules of origin.

The coefficients on the PTA dummies are generally not sensitive to the inclusion or exclusion of the tariff variable. So the inclusion of a tariff variable makes little difference to the main findings of this study. But in some cases, negative intra bloc trade effects in the full sample become positive in the smaller sample. And perhaps not surprisingly, while the comparative advantage motivation for trade showed as significant in the full sample (with a positive and significant coefficient on the difference in per capita GDP), this is not the case in the restricted sample. These differences also show that what constitutes 'normal' trade is conditioned by how many countries and years are in the sample — those studies with restricted time and country coverage, particularly where it is restricted to high income developed countries, are likely to have results biased accordingly.

## The effect of third wave provisions

Third wave provisions mainly cover investment and trade in services. Investment flows may substitute or complement exports, depending on the reasons for the export flows (Markusen 1983).

The 'new age' provisions show a positive (complementary) relationship with intra bloc trade when PTA dummies are defined dynamically. Thus favourable investment and services trade provisions in PTAs can enhance merchandise trade between member countries once the agreement is in operation.

Unfortunately, it has not been possible to test whether the non-merchandise trade provisions of PTAs have contributed to trade diversion from non-member countries. This is because convergence problems prevented estimation when a full set of three non-merchandise trade dummies were introduced.

## The effect of bilateral versus plurilateral PTAs

A quick look at the estimated coefficients for plurilateral and bilateral agreements in table D.1 (with a dynamic specification of PTA dummies) tentatively indicates that bilateral agreements have a more negative impact on members' trade flows than the

plurilateral agreements. However, this finding has the same qualification as previously — the intra-PTA effect is estimated imprecisely, with a large standard error, in agreements with a small number of members.

Two types of bilateral agreements are analysed in this study:

- economy to economy — CER, Chile-Colombia, US-Israel, Australia-PNG; and

- economy to PTA — EU-Egypt, EU-Poland, Chile-MERCOSUR.

Of all the bilateral agreements assessed, only the US-Israel PTA has a positive impact on members' trade flows, although as explained later, this agreement is a special case. Apart from Chile-Colombia, all economy to economy PTAs have an adverse effect on non-members' trade flows.

To confirm the negative effects of bilateral agreements on members' trade flows, table D.3 reports the results of a Wald test of whether the group of coefficients on a particular PTA index for all bilateral agreements is significantly different from zero, and similarly for plurilateral agreements. Though the null hypothesis of no effect is rejected for all three PTA indexes (intra-PTA, extra-PTA imports and extra-PTA exports) across both bilateral and plurilateral agreements, the calculated statistic is consistently lower for bilateral PTAs than for plurilateral PTAs. This is only circumstantial evidence, however, and should not be considered as conclusive.

In summary, the main result is that PTAs are not as relatively benign as previous studies have indicated. After controlling for country and time specific effects, and the degree of liberalisation of merchandise trade provisions, in an unrestricted sample, and testing explicitly for whether the trade effects are significantly different after PTA formation than before, most PTAs were estimated to have negative net trade creation. Other recent empirical assessments have shown more optimistic outlook for preferential agreements by ignoring these analytical issues.

## 4.4   Puzzles on new evidence

There are two puzzles on new evidence that need careful discussion in this study.

- The intra-bloc effect is found to be positive for the least liberal PTAs — LAIA, Andean, SPARTECA and US-Israel.

- The intra-bloc effect is found to be negative for apparently more comprehensive and liberalised PTAs — EU, CER, NAFTA, MERCOSUR and some recent bilateral agreements.

On the first point, the new estimates obtained in this study suggest that the least liberal PTAs have nevertheless removed certain intra-PTA barriers or made other changes in these economies (not captured by the unobservable fixed effects and observed determinants), which may have contributed to their positive intra-bloc effect.

The two Latin American PTAs are based on import substituting policies. Because of debt crises and balance of payment problems in early 1980s, almost all countries in Latin America underwent deep recession and a severe contraction of intra-regional trade. But within a very short period of time, three to five years, countries in these PTAs revived with a mixture of unilateral reforms and a fixed margin of preference below the MFN binding rates for member countries. Though the merchandise trade provisions were not particularly liberal, this period trade effect might have dominated, giving rise to a positive intra-PTA effect for these PTAs.

The non-reciprocal agreement with Australia and New Zealand has helped the small island countries of the South Pacific to transform from subsistence to more export oriented economies. SPARTECA played an important role in stimulating exports from Fiji, Solomon Islands and other island economies to Australia and New Zealand. A tuna cannery in the Solomon Islands and Fiji's garment, footwear and food manufacturing (SaraLee cakes) industries are all dependent on generous access to these two developed country markets. This could partly explain the positive intra-PTA effect of SPARTECA observed in this study.

The bilateral agreement between the US and Israel is a special agreement that also includes military supplies along with other merchandise trade provisions. It is the only PTA that incorporates the whole of GATT/WTO article XXI — security exceptions. On average, there is high trade in SITC 951 category — arms and ammunitions for military supply — between the United States and Israel. This could be one of the possible reasons for positive intra-PTA effect observed for this bilateral agreement.

On the second point, the highly liberalised trade provisions in many PTAs apparently had a negative impact collectively on intra-bloc trade flows of members.

One possible reason is that total elimination of tariffs among members, as required by GATT Article XXIV, may not be optimal for members. For example, Frankel, Stein and Wei (1995) found that a 22 per cent reduction in tariffs below multilateral tariff levels may instead be optimal. However, this finding is driven by welfare effects, not by trade volume effects.

A more likely explanation is that, although the merchandise MLI used in this study has attempted to capture the potentially trade-restrictive effects of the non-tariff

merchandise trade provisions embodied in PTAs, it has not always captured them adequately.

For example, as noted earlier, the merchandise MLI has treated the trade restrictive effects of rules of origin as being additive to, and independent from, the other provisions of PTAs. In reality, not only are rules of origin restrictive, they are also likely to neutralise or even reverse the trade effects of other provisions that are apparently quite liberal. The sparse theoretical literature on rules of origin was summarised in chapter 2.

The way in which rules of origin can operate in practice to counter the effects of other provisions that are apparently quite liberal can be seen most clearly in the case of NAFTA. There, the rules of origin are relatively complex — the specification of requirements for minimum change in tariff heading vary product by product, and take up several hundred pages. Further, they are strictly enforced. The domestic content rules applied in the EU are also relatively complex. Even if the tariffs on each product are eliminated entirely (an apparently quite liberal provision), the complex rules of origin governing the sourcing of inputs to qualify for the tariff concession on output can undo the liberal effect of the tariff concession on output. This is not recognised in the MLI, which treats tariff provisions and rules of origin additively, not interactively. Thus the MLI may overstate the effective amount of liberalisation in agreements with complex rules of origin, explaining why it was the *apparently* more comprehensive and liberalised PTAs that were found to have a negative intra-bloc effect.

Further, the MLI does not capture two final aspects of rules of origin. The first is the way in which they can multiply distortions as overlapping PTAs begin to form. Panagariya (1999, p. 489) gives the following example:

> … if Chile, who already has an FTA [free trade agreement] with MERCOSUR, joins NAFTA, a Chilean firm will have to buy components in Brazil if it wants to take advantage of the preferential tariff in MERCOSUR and in the United States if it wants to exploit the preference in NAFTA. This is notwithstanding the fact that the most efficient supplier of the components might be in Asia.

The second is that, in a political economy context, rules of origin can become another instrument for sectional interests to add to trade diversion and frustrate trade creation. This in turn explains their prevalence and complexity in agreements such as NAFTA.

Similarly, the speed of implementation of tariff cuts has been treated as independent from the coverage of those cuts. In reality, the backsliding that has occurred in MERCOSUR is likely to make that agreement less liberal than the merchandise MLI suggests.

As already noted, the control variables used in this study are unlikely to capture fully the way that reductions in transport costs have raised the attractiveness of extra-bloc as opposed to intra-bloc trade for CER members over time.

Finally, there has been significant unilateral, non-discriminatory liberalisation throughout the world, but particularly in parts of Asia and Latin America, over the period of study. This would have been expected to boost trade with both members and non-members in absolute terms, and played an important part in defining the benchmark of 'normal trade' against which PTAs have been assessed. The PTA dummies test whether the changes in block members' trade patterns have been significantly different from those on average across the entire sample of countries. The results suggest that in may cases, this has not been the case.

## 4.5   Summary

This chapter has used recent bilateral trade data to provide new estimates of the trade effects of the merchandise trade provisions included in various PTAs.

The empirical results indicate that the merchandise trade provisions in various PTAs have generally diverted more trade than they have created. Some of the more prominent PTAs have not even succeed in creating more trade among members.

These findings are more adverse than those of other recent studies. The main reason is that this study undertakes an explicit statistical test for whether the trade effects of PTAs are different after PTA formation than before. In the past, this question has been assessed, at best, only by reference to the point estimates from various cross sections. In addition, this study controls for a broader range of observable factors affecting bilateral trade flows, as well as for unobserved differences across countries and time periods. It thus avoids the biases in the estimated effects of PTAs introduced by omitting these variables. It uses a dataset in which the sample of countries and time periods is as large as possible, thus avoiding biasing the benchmark of 'normal trade' against which PTAs are assessed. Finally, this study also recognises the varying breadth of coverage of the merchandise provisions in various PTAs. Nevertheless, some aspects, particularly the trade restricting nature of rules of origin and the importance of delayed timing of tariff reductions, have not been captured adequately.

Finally, the results suggest that the non-merchandise trade provisions of PTAs, covering such things as investment and services, have had a positive impact on merchandise trade flows among members. Unfortunately, for econometric reasons, it has not been possible to test whether these non-merchandise trade provisions have contributed to trade diversion from non-member countries. But the next chapter

examines the effects of those non- merchandise trade provisions on flows of foreign direct investment.

# 5   Investment creation and diversion

This chapter provides new evidence on the effects of PTAs on investment. In doing so, it takes account of the analytical issues described in chapter 4.

The bilateral investment data for this analysis are sourced from UNCTAD and OECD for the period between 1988 and 1997 for about 77 countries. These data allow an examination of the investment effects of ten PTAs, a more restricted set than in the previous chapter. As there are some deficiencies in the investment data (appendix B), the qualitative aspects of the analytical results rather than the precise magnitude of the estimates are of main interest.

Apart from the more limited number of years and countries analysed, the model in this chapter is similar to the one in the previous chapter. The sign and magnitude of the impact of some explanatory variables may differ, but many bilateral determinants are similar for trade and investment (see also Egger 2001).

The 'new age' provisions covered in each PTA are discussed in next section, followed by model specification. Results from the gravity model are discussed in section 5.3 and the final section summarises the key findings.

## 5.1   'New age' or third wave provisions in PTAs

PTAs vary in their coverage of various 'new age' provisions. A non-merchandise Member Liberalisation Index has been calculated, which captures this variation. A high index indicates that a PTA is more liberal to members in its services trade, investment and related provisions. These provisions, along with their weights in the index, are listed in table 5.1. The index takes a high value for Singapore-NZ,[1] followed by CER, NAFTA, EU, and MERCOSUR (see tables A.1 and A.2).

A PTA that is voluntary has been scored as less liberal than one that is binding. All preferential PTAs examined in this study received a high score for this category.

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[1] The agreement was signed in 2000.  Bilateral FDI data are available only up to 1997. Therefore, the effects of this agreement on investment are not analysed in this study.

Table 5.1 **Non-merchandise trade provisions and their weights in the MLI**

| | *General measures* | | *Measures covering trade in services* | |
|---|---|---|---|---|
| *Category of provision* | *Weight* | *Category of provision* | | *weight* |
| Binding | 0.010 | Services | | 0.100 |
| National treatment | 0.050 | | | |
| Investment rules | 0.050 | | | |
| Domestic competition policy | 0.050 | | | |
| Government procurement | 0.020 | | | |
| Intellectual property rights | 0.020 | | | |
| Permanent movement of people | 0.025 | | | |
| Temporary movement of people | 0.025 | | | |
| **Total** | **0.250** | | | **0.100** |

*Source:* Table A.1.

Very few PTAs have provisions ensuring national treatment for traded goods. Under national treatment, the products of a PTA partner are treated no less favourably than domestic products. PTAs with national treatment provisions received a high score. However, the score in this category was reduced for each sector that was exempt from national treatment in the agreement. NAFTA received a high score since it grants national treatment with few exceptions.

About half of the 18 PTAs examined in this study contain provisions governing investment (see appendix A). A PTA takes a high score if it contains provisions prohibiting restrictions on investment by member countries. PTAs that grant national treatment for investment were scored next highest. Those that contain initiatives to reduce restrictions and facilitate investment provisions were scored next, and those with no provisions were scored lowest. The EU agreement took a high score for this category, as all restrictions on the movement of capital between member countries and between member and third countries are prohibited.

There is a wide spread of provisions governing domestic competition policy in the PTAs examined in this study. Provisions that specify explicit actions to be taken to promote competition have been scored as more liberal than statements of intent to promote competition. In addition, provisions governing both the public and private sectors have been scored as being more liberal than provisions governing just one of them. The EU-Poland and Singapore-NZ agreements took high score for this category, because both were relatively specific.

One third of the PTAs reported in appendix A have government procurement provisions. Agreements with national treatment for government procurement receive a high score, followed by those with initiatives to allow fair competition in the government procurement market and initiatives to promote best practice

procurement procedures. The CER and NAFTA agreements took a high score for this category, followed by Singapore-NZ.

Many PTAs also include provisions related to intellectual property rights. Provisions for adequate and effective protection, national treatment for property rights and no provisions were scored as being successively less liberal. NAFTA has national treatment for property rights.

Very few PTAs include provisions governing the permanent and temporary movement of people. Where free movement is allowed it is scored as most liberal, with initiatives to promote movement of people and no provisions being scored successively lower. The EU and CER agreements received a high score for this category, followed by the EU-Poland and Singapore-NZ agreements.

Of the 18 PTAs reported in appendix A, 11 cover services trade. Some agreements adopt the GATS model of a 'positive list' — countries undertake national treatment and market access commitments only in scheduled sectors. Other adopt the NAFTA model of a 'negative list' — all sectors and measures are to be liberalised unless otherwise specified in annexes containing reservations, or non-confirming measures. Non-confirming measures in the annexes are then usually liberalised through consultations or periodic negotiations. The 'negative list' is more transparent because it forces governments to reveal all non-confirming measures and excluded sectors.

The 'positive list' model is adopted mainly by developing country PTAs — AFTA and MERCOSUR — to open their services markets gradually. The 'negative list' model is adopted in more recent PTAs in both developing and developed countries — CER, Singapore-NZ and Chile-Mexico. The PTAs that follow the 'positive list' model receive a lower score than those that follow the 'negative list' model.

If an agreement has provisions for market access and national treatment for services trade, it receives a high score (CER and Singapore-NZ). This was followed by agreement with provisions for market access only, provisions for national treatment only, and initiatives to promote services liberalisation.

The PTAs analysed in this study have been scored on the degree of their commitment to the above elements of the agreement. The effects of these provisions on non-member countries mainly depend on the nature and the extent of discrimination against non-member investors or goods and services providers.

The index of 'new age' provisions is included in the gravity model to study their impact on members' investment in both other member and non-member countries.

## 5.2 Model specification and estimation

The dependent variable in this gravity model is the natural logarithm of the stock of outward investment from home country to host country. The stock of outward investment is used as the dependent variable rather than outflows, for two reasons. Firstly, more outward stock than outflow data are available in the source documents. For many countries in the late 1980s and for some Latin American countries in early 1990s, the bilateral FDI flow data are not fully reported in the UNCTAD investment directories. Secondly, statistical tests suggested that a gravity model based on the stock of outward investment was preferred to a model based on outflows.

Nevertheless, the conclusions of this chapter have been tested for their sensitivity to the choice of stock or flow data. For all but two PTAs (CER and US-Israel), the results are insensitive. The sensitivity of CER and US-Israel reflects the imprecision with which intra bloc effects are estimated for PTAs with few members. This was also a qualification to the trade results found in the previous chapter.

For each PTA, three merchandise MLI indexes and three indexes of 'new age' provisions are included to test how the outward investment to other members, and to and from non-members, responds to the traditional and 'new age' provisions embedded in each PTA.

The gravity model of investment is similar to the trade model discussed in chapter 4, except that the dependent variable is the stock of outward investment.

$$
\begin{aligned}
LnY_{ijt}^* = {}& a + \alpha_i + \gamma_j + \lambda_t + \beta_1 LnSGDP_{ijt} + \beta_2 LnSimilar_{ijt} + \beta_3 LnRLFA_{ijt} + \beta_4 LnDis_{ij} \\
& + \beta_5 LnRER_{ijt} + \beta_6 LnTar_{ijt} + \beta_7 Lin_{ij} + \beta_8 Bor_{ij} + \beta_9 Col_{ij} + \beta_{10} Cur_{ij} \\
& + \beta_{11} Is_i + \beta_{12} Is_j + \beta_{13} lock_i + \beta_{14} lock_j + \beta_{15} INS_{ij} + \beta_{16} INE_{ij} \\
& + \sum{}_{ij} MRTA_{ij} + \sum{}_{-j} MRTA_{i-j} + \sum{}_{-i} MRTA_{j-i} + \sum{}_{ij} 3wave_{ij} \\
& + \sum{}_{-j} 3wave_{ij} + \sum{}_{-i} 3wave_{j-i} + Ln\varepsilon_{ijt}
\end{aligned}
\tag{5.1}
$$

where

$Ln$        is natural logarithmic transformation;

$Y_{ijt}^*$        is the underlying value of stock of outward investment from country $i$ to $j$ in year $t$; using the stock of outward investment as a dependent variable rather than total bilateral investment allows the estimation of

out-stock and in-stock diversion separately;

$\alpha_i$      is unobserved specific effects in home country $i$;

$\gamma_j$      is unobserved specific effects in host country $j$;

$\lambda_t$      is unobserved specific effects in time period $t$;

$SGDP_{ijt}$      is the sum of bilateral GDPs of $i$ and $j$ in year $t$;

$RLFA_{ijt}$      is the absolute differences in GDP per capita of $i$ and $j$ in year $t$;

$Similar_{ijt}$      is the similarity in country size between $i$ and $j$ in year $t$ in terms of aggregate GDP;

$Dis_{ij}$      is distance between the two major capital cities of countries $i$ and $j$;

$RER_{ijt}$      is bilateral real exchange rate between $i$ and $j$ in year $t$;

$Tar_{ijt}$      is a average tariff rate between $i$ and host (capital importing) country $j$ in year $t$;

$Lin_{ij}$      is a measure of linguistic similarity between $i$ and $j$;

$Bor_{ij}$      is a dummy variable that takes a value of 1 if $i$ and $j$ share a land border and 0 otherwise;

$Col_{ij}$      is a dummy variable that takes a value of 1 if $i$ and $j$ have colonial linkages and 0 otherwise;

$Cur_{ij}$      is a dummy variable that takes a value of 1 if $i$ and $j$ have same currency and 0 otherwise;

$Is_i$      is a dummy variable that takes a value of 1 when $i$ is an island country and 0 otherwise;

$Lock_i$      is a dummy variable that takes a value of 1 when $i$ is landlocked county and 0 otherwise;

$INS_{ij}$      is a dummy variable that takes a value of 1 if $i$ and $j$ have signed (but not enacted) an investment agreement, and 0 otherwise; it has no time dimension;

$INE_{ij}$ is a dummy variable that takes the value of 1 if $i$ and $j$ have enacted an investment agreement, and 0 otherwise; it has no time dimension;

$MRTA_{ij}$ is an index capturing the merchandise trade provisions of a PTA, that takes the value of the merchandise MLI if both countries $i$ and $j$ belong to the same PTA and 0 otherwise; it also has a time dimension when defined in dynamic rather than antimonde form;

$MRTA_{i-j}$ is an index that takes the value of the merchandise MLI when the host country $j$ belongs to that particular PTA and 0 otherwise; it also has a time dimension when defined in dynamic rather than antimonde form;

$MRTA_{j-i}$ is an index that takes the value of the merchandise MLI when the home country $i$ belongs to that particular PTA and 0 otherwise; it also has a time dimension when defined in dynamic rather than antimonde form;

$3wave_{ij}$ is an index capturing the 'new age' provisions of a PTA, that takes the value of the non-merchandise MLI if both countries $i$ and $j$ belong to the same PTA and 0 otherwise; it also has a time dimension when defined in dynamic rather than antimonde form;

$3wave_{i-j}$ is an index that takes the value of the non-merchandise MLI when the host country $j$ belongs to that particular PTA and 0 otherwise; it also has a time dimension when defined in dynamic rather than antimonde form;

$3wave_{j-i}$ is an index that takes the value of the non-merchandise MLI when the home country $i$ belongs to that particular PTA and 0 otherwise; it also has a time dimension when defined in dynamic rather than antimonde form; and

$\varepsilon_{ijt}$ is an error term.

Almost all explanatory variables are similar to the trade model in chapter 4. Two additional variables are added to the investment model because in addition to the investment provisions of PTAs, countries also negotiate bilateral investment treaties (BITs). About 191 PTAs were in force in 2000, with only a few covering investment provisions, while 1941 bilateral investment treaties were in place then. The specification controls for whether an investment treaty is signed (*INS*) or enacted (*INE*) between a pair of countries.

Apart from the real exchange rate, the expected relationship of the normal bilateral investment determinants with outward investment is the same as in the trade equation of the previous chapter. The real exchange rate (*RER*) is expected to show a negative effect on outward investment in the short term as depreciation of the home country currency rate reduces home country production costs relative to foreign production costs. It therefore increases labour demand and employment and raises the return on capital in the home country, increasing domestic investment at the expense of outward FDI.

The effects of traditional and 'new age' provisions on investment are less straightforward.

If trade liberalisation makes exporting from the home country relatively more attractive than FDI as a way to serve the regional market, then the trade provisions of a PTA could cause a reduction in intra-bloc investment. But the trade provisions could also enable transnational corporations (TNC) to operate vertically in a PTA area, stimulating intra-FDI flows among the relevant partners. The structure and motivation of investment will determine the net impact of trade provisions of PTAs on intra-PTA investment. So too will the structure and motivation of intra-bloc trade (Markusen 1983).

According to Ethier (1998, 2001) the inflows of FDI from non-member countries into the PTA region are likely to go up in response to the trade provisions of PTAs, as non-members establish beachhead position in one PTA member country in order to serve the market of the others. Alternatively, if multinationals are initially operating in member countries to serve the protected local market (the tariff jumping motivation for investment), then these multinationals may rationalise their network of affiliates after the formation of the PTA and as a result, some member countries could lose investment to non-member countries.

Thus, the response of investment to the merchandise trade provisions of a PTA is an empirical question. The various possibilities can be tested in the following way.

If investment responds in beachhead fashion to the trade provisions of PTAs and in turn stimulates intra-bloc trade, this can be identified by the combination of a positive and significant effect of trade provisions on intra-bloc trade and a positive and significant effect of trade provisions on investment from non-member countries (a positive coefficient on $MRTA_{i-j}$ in equation 5.1).

Alternatively, a reversal of tariff jumping investment can be identified by a positive and significant effect of trade provisions on investment to non-member countries (a positive coefficient on $MRTA_{j-i}$ in equation 5.1).

Investment may also respond to the non-trade provisions of PTAs. If, as a result, production is moved from a high-cost domestically owned producer to a lower-cost members' affiliate, this 'investment creation' is likely to benefit members of the PTA. But if production is moved from a low-cost non-member affiliate to a higher-cost member affiliate, this 'investment diversion' may not benefit members.

Measures of net investment creation or diversion can be obtained by summing the coefficients of the three separate non-merchandise MLI variables in a parallel fashion to chapter 4. One further qualification to the welfare implications is that if the initial non-trade restrictions are of the sort to raise costs rather than generate rents, then any investment relocation in response to their preferential removal will unambiguously benefit members.

## 5.3    Impact of merchandise trade and 'new age' provisions on investment

The equation 5.1 is estimated in a Tobit form with fixed effects. Results from this analysis are reported in the table D.4. The observable effects — traditional and 'new age' provisions of PTAs and other bilateral investment determinants — and unobservable country and time specific effects all significantly influence the bilateral stock of outward investment. The signs of coefficients on the normal bilateral investment determinants are generally as expected. Interestingly, whether investment treaties are signed or enacted between countries has no significant effect on outward investment. This is consistent with the observation that such agreements are often more political than economic (Binder, Papadimitriou and Monday 2001).

PTAs have been categorised in table 5.2 according to whether investment responds in either tariff jumping or beachhead fashion to the trade provisions, or whether it responds instead primarily to the non-trade provisions. A single PTA can fall into more than one category.

Table 5.2    **Main drivers of investment in PTAs**

| No effects | Tariff jumping effects of trade provisions | Beachhead effects of trade provisions | Non-trade provisions |
|---|---|---|---|
| Andean Pact | SPARTECA | SPARTECA[a] | EFTA |
|  |  | US-Israel[a] | EU |
|  |  |  | NAFTA |
|  |  |  | MERCOSUR |
|  |  |  | AFTA |
|  |  |  | CER |

[a] Only weak evidence for this characterisation.

*Source:* Table D.4 fixed effects estimates.

Only the SPARTECA agreement showed weak evidence of investment behaviour consistent with an unwinding of tariff jumping behaviour. In SPARTECA and the US-Israel agreement, investment also appears to respond in beachhead fashion to the trade provisions, although again the evidence in both cases is relatively weak. The results for the US-Israel agreement are further qualified by the imprecision of the intra bloc effects. As noted before, SPARTECA is a non-reciprocal agreement with few non-trade provisions and with trade provisions only for selected products. But the non-reciprocal tariff preferences have allowed the South Pacific island countries to attract investment, not only from Australia and New Zealand, but also from other countries, to gain preferential access to the CER market. And this effect appears stronger than the loss of investment from an unwinding of tariff jumping behaviour.

Most PTAs studied in this subsample attract investment mainly from non-member countries as a result of their 'new age' provisions. This includes all the main PTAs — NAFTA, MERCOSUR, AFTA and CER — as well as the EU, which also showed weak evidence of an unwinding of tariff jumping behaviour.

Ethier's insight is confirmed that non-members are likely to be an important source of additional investment. But the econometric results suggest this is in response to the non-trade rather than the trade provisions. Ethier's beachhead investment is not an important phenomena empirically.

Table 5.2 tentatively indicates investment responses to the traditional and 'new age' provisions of PTAs. However, it does not indicate whether PTAs cause investment creation or investment diversion per se. This is assessed from the estimated coefficients and the results are reported in table 5.3.

Table 5.3    **New evidence on investment creation and diversion**

| Trade provisions | | Third wave provisions | | |
|---|---|---|---|---|
| Intra-PTA | Extra-PTA (outward) | Intra-PTA | Extra-PTA (inward ) | Extra-PTA (outward ) |
| SPARTECA(+)[a] | SPARTECA (+) | EFTA (+) | NAFTA (+) | EFTA (+) |
| | EU (-) | NAFTA (-) | SPARTECA (+) | EU (+) |
| | US-Israel (-) | CER (-) | MERCOSUR (+) | NAFTA (+) |
| | | | EU (+) | CER (+) |
| | | | EFTA (-) | AFTA (-) |
| | | | CER (-) | |

**a** Positive (+) symbol denotes investment creation and negative (-) symbol denotes investment diversion.

*Source:* Table D.4 fixed effects estimates.

The trade provisions of PTAs did not result in an increase in investment from non-members in any PTA other than SPARTECA. Trade provisions caused a reduction in outward investment (investment diversion) in the EU, CER and US-Israel agreements. This is similar to the findings of Baldwin, Forslid and Haaland (1995), who analysed the effect of tariff provisions on investment in EC and found that EC caused diversion of third country capital from EFTA to the EU.

The 'new age' provisions in various PTAs have much more impact on investment than the trade provisions. The EFTA agreement apparently created additional investment among members because of its new age provisions, although these are minimal (see appendix A). The NAFTA and CER agreements were estimated to have reduced investment among members, although the CER result is not reliable. All other agreements considered had no significant effects on investment among members.

While most PTAs attracted investment from non-members, the new age provisions in CER and EFTA were unable to attract investment from non-members. This could be because of omitted factors (financial deregulation and the growth of the super funds) that have encouraged Australia to become a much more important capital exporter (Battellino 2002), rather than the investment provisions in the agreement *per se*. For EFTA, the loss of membership to EU has made it a less attractive place for foreign direct investment. By contrast, the NAFTA and MERCOSUR agreements had a strong impact on inflows into Mexico and Brazil, respectively.

The sum of significant coefficients on the indexes of third wave provisions for each PTA can provide an indicative measure of the impact of these 'new age' provisions on net investment creation (see table 5.4). Of the nine PTAs examined in this chapter, six showed positive net investment effects. Only AFTA caused net investment diversion. Malaysia and Singapore in particular diverted their investment from non-AFTA countries into AFTA countries during the study period, giving rise to outward investment diversion and the negative net impact.

Table 5.4     **Net impact of PTAs' third wave provisions on investment**

| Net investment creation | Net investment diversion | No impact |
|---|---|---|
| EFTA | AFTA | Andean |
| EU | | US-Israel |
| NAFTA | | |
| MERCOSUR | | |
| SPARTECA | | |
| CER | | |

**a** Because of data limitations, the net investment effect of MERCOSUR is questionable.

*Source:* Table D.4 fixed effects estimates.

NAFTA, EU, CER and to a lesser extent EFTA caused net investment creation, not because they stimulated investment among members, but because they appear to have stimulated outward investment from member to non-member countries. This is consistent with these regions being major sources of FDI, but suggests that the estimated effects may well reflect the influence of causal factors not controlled for in the analysis that make these countries net capital exporters, rather than the effects of PTA formation/expansion *per se*.

The Andean and US-Israel agreements had no significant impact on net investment creation.

Though the investment results appear to be more positive than the results reported for trade in chapter 4, there are number of qualifications that need to be considered. Winters (1997) argued that new FDI from any source could go into the production of goods for trade diversion and thus worsen the PTA's welfare overall. In a similar vein, McLaren (2002) argued that

> A regional trade regime can plausibly be interpreted as a coordination failure, in which the anticipation that the world will break into regional trade blocs induces sunk private sector investments that then lead to a demand for regionalism. Under this argument, regionalism can be Pareto-worsening even though once sunk investments have been made it is, *ex post*, a relatively efficient compromise: hence, regionalism is 'insidious', the damage it does to efficiency is hidden in the distortion of *ex ante* investments (McLaren 2002, p. 572)

The gravity model estimates provide indications of the positive net investment effects of PTAs, but do not consider whether the resulting investment contributes to trade diversion.

Further, as noted before, a finding of net investment creation is a weak indicator of whether the welfare gains from investment creation outweigh the welfare costs of investment diversion. Investment diversion may dominate creation in welfare terms, even if it does not in 'volume of investment' terms. On the other hand, if the non-trade provisions reduce restrictions that raise costs, then member countries can gain in welfare terms, despite investment diversion. But in either case, members could well gain even more from multilateral liberalisation of non-trade restrictions.

## 5.4    Summary

It is possible for PTAs to have more adverse effects on investment flows than trade flows. Investment could be diverted into a PTA to take advantage of its trade provisions, and the trade carried out from those beachheads could constitute traditional trade diversion.

However, the present analysis finds little evidence of such beachhead investment. Instead, it finds evidence of net investment creation in response to the 'new age' non-trade provisions of PTAs. Thus the finding on investment is more positive than for trade, but not without qualifications.

The welfare consequences of these findings are discussed in the next chapter.

# 6    Summing up

Previous chapters have examined, both theoretically and empirically, the likely effects of the trade and non-trade provisions of PTAs on the trade and foreign direct investment flows of members and non-members. They have also highlighted the implications for the economic welfare of members and non-members. This chapter draws on these findings to reach some tentative conclusions about the effects of preferential trade agreements.

## 6.1    Trade provisions

Contrary to popular conception, the main benefits to a country from preferential (or any) *trade* arrangements come, not from export opportunities (since these cost domestic resources), but from their ability to provide import needs at lower real resource cost. This is ultimately what can improve a country's living standards.

Both theoretical and empirical work has highlighted that PTAs can boost trade among members, but this is often at the expense of non-members. So whether it is beneficial overall to join a PTA depends on the cost structures in partner countries, compared with the cost structures in third parties. If a preferential trade arrangement diverts a country's imports from a low-cost third party to a higher-cost preferential trade partner, it can be made worse off. Thus, the best chance a country has to gain from preferential trading arrangements would be to choose a trading partner with the lowest (quality-adjusted) costs. But then the economic rationale for liberalising preferentially, rather than unilaterally across-the-board, is lost.

The theoretical literature reviewed in this paper has always noted the possibility of losses from net trade diversion, and the empirical work undertaken here suggests that this trade outcome is more common than other recent empirical analyses have suggested. The hypothetical (often computable general equilibrium) analyses of PTAs have sometimes made assumptions that have skewed the findings in favour of economically beneficial outcomes. They typically also model very pure and stylised arrangements — not the complex, selective, and overlapping arrangements that apply in practice. And the econometric exercises examining the effects of actual PTAs on actual trade flows have often not been sufficiently careful in the way they have characterised the coverage of the PTA provisions. Nor have they tested

rigorously whether the trade effects of PTAs were any stronger after PTA implementation than before.

The empirical work in chapter 4 suggests that of the 18 recent PTAs examined in detail, 12 have diverted more trade from non-members than they have created among members. What is more, some of the apparently quite liberal PTAs — including EU, NAFTA and MERCOSUR — have failed to create significant additional trade among members (relative to the average trade patterns among countries in the sample).

Part of the reason for this negative finding is the more rigorous statistical test that has been applied here to test whether intra-bloc trade is significantly greater after bloc formation (or expansion) than before. In the past, this was assessed, at best, only by reference to the point estimates from various cross sections. But the finding is also consistent with the fact that many of the provisions needed in preferential arrangements to underpin and enforce their preferential nature — such as rules of origin — are in practice quite trade restricting.

A country could nevertheless gain *individually* from a preferential trading arrangement, even if the arrangement failed to create significant net trade overall. The gain could come if the terms of trade turned in its favour as a result of the PTA. But the very same phenomenon could threaten any gains to the partner country, further inducing them to seek exclusions for sensitive high-tariff sectors.

## 6.2   Non-trade provisions

The distinguishing characteristic of recent, third-wave PTAs is that they cover much more than just merchandise trade. Investment, services, competition policy, government procurement, e-commerce, labour and environmental standards are also increasingly on the agenda.

While the increasing focus of PTAs on non-trade provisions may suggest that conventional concerns about trade diversion are outmoded, some theoretical literature suggests this conclusion is premature.

On the one hand, in an increasingly integrated world economy, even minor *trade* concessions can have a significant impact on *investment* flows. And if investment is attracted into one PTA partner in order to serve the markets of the others, then the trade from such beachhead positions can constitute traditional trade diversion.

On the other, the *non-trade* provisions of PTAs, particularly those related to investment and services, can also have a significant impact on *investment* flows. But

the preferential nature of the PTA provisions may mean that investment is diverted from a low-cost to a higher-cost host country, and such investment diversion can also be harmful.

The analysis in chapter 5 is among the first to check these propositions empirically. It finds little evidence of beachhead investment, or an unwinding of 'tariff-jumping' investment, in response to the trade provisions of PTAs. Only for SPARTECA and the US-Israel agreement, for example, is there (weak) evidence of foreign direct investment responding in beachhead fashion to trade provisions. And the result for US-Israel is further qualified by the imprecision of the intra-bloc effect with just two countries involved.

Chapter 5 does find evidence that foreign direct investment responds significantly to the non-trade provisions of PTAs. Interestingly, this is in contrast to a lack of response of FDI to bilateral investment treaties.

Further, for most of those agreements where non-trade provisions have affected FDI, the result has been net investment creation rather than diversion.

Although it is a weak test, this suggests that on balance, the non-trade provisions of these PTAs have created an efficient geographic distribution of FDI. This is consistent with the fact that at least some of the non-trade provisions (eg commitments to more strongly enforce intellectual property rights) are not strongly preferential in their nature.

Further, the theoretical literature has stressed that if the non-trade barriers are of the sort to raise the real resource costs of doing business, rather than simply to create rents that raise prices above costs, then preferential liberalisation will be beneficial, even in the absence of net investment creation.

However, the trade that may be generated from the new FDI positions may still be diverted in the 'wrong' direction in response to the trade provisions of PTAs, and may therefore contribute to the net trade diversion found in chapter 4.

Thus the results of this research suggest that there may be real economic gains from the non-trade provisions of third-wave PTAs, but they also suggest that there are still economic costs associated with the preferential nature of the trade provisions. And these costs could be magnified in a world of increasing capital mobility.

Thus the findings of this research on the effects of the non-trade provisions of PTAs are more positive than those on the trade provisions. This suggests there could be real benefits if countries could use regional negotiations to persuade trading partners to make progress in reforming such things as investment, services, competition

policy and government procurement, especially if this is done on a non-preferential basis.

# A    Member Liberalisation Index

This appendix outlines the methodology used in constructing the Member Liberalisation Index (MLI) and the results obtained from this index. The index methodology gives a measure of the breadth and depth of the coverage of PTAs. In essence, the index shows the extent to which trade and investment conditions between members have been liberalised, allowing a comparison of different arrangements and their provisions. The index was calculated for a selection of different PTAs and the results from the index are used to characterise each of these PTAs in the empirical analysis.

## A.1    Methodology

The member liberalisation index (MLI) assesses arrangements that govern trade and investment among PTA members. It does not compare this to the arrangements that govern trade between members and non-members. Hence it does not measure the margin of preference created by the PTA. Table A.1 at the end of this appendix describes the MLI in detail.

A number of agreements were assessed using the MLI. They were generally selected on the basis of whether:

- Australia is a member — CER, SPARTECA and PATCRA;

- Australia is not a member, but the agreement is likely to affect the trade flows of Australia's major trading partners — NAFTA, ASEAN and the EU; or

- they are representative of a cross-section of bilateral agreements — Chile-Mexico, EU-Poland and Singapore-New Zealand.

The texts of the agreements were obtained from a variety of sources, including the Organization of American States (OAS 2002), the European Union On-line (EU 2001) and the World Trade Organisation (WTO 2001).

### Classifying provisions in PTAs

The provisions in PTAs are first classified according to the type of trade that is covered:

- *agricultural goods*, with provisions covering such things as domestic support measures and export incentives;

- *industrial goods*, with provisions covering such things as rules of origin and tariff reduction schedules;

- *services*, with provisions covering services *generally*; and

- *all trade*, with provisions covering such things as domestic competition policy, intellectual property rights and the movement of people.

The weights given to the first three broad categories have been chosen to reflect very roughly their relative importance in total world trade.[1] Where provisions affect trade in more than one grouping, they are included twice in the index. For example, rules of origin are relevant for both agricultural and industrial goods.

*Calculating the index*

Different categories of provisions are collected under each of the four major groupings, and the overall weight assigned to the grouping is divided among the categories. Then, within each category, a set of criteria is used to judge each provision based on the extent to which it progresses liberalisation among members.

The relative weights given to each category are based on a judgement of their likely relative impact on trade. For example, the category for antidumping and countervailing is judged to have a larger impact on trade in industrial products and is given a weight of 0.08. On the other hand, the category for the number of different types of rules of origin is judged to have a smaller impact on trade and is given a weight of 0.03.

The provisions in PTAs are assessed against a set of criteria for each category. The criteria range from least liberal to most liberal and the greater the liberalisation, greater the score. The scores range from 0 (least liberal) to 1 (most liberal). For example, the investment category is assessed according to the following criteria — no provisions (least liberal), initiatives to reduce restrictions and facilitate investment, provisions giving national treatment for investors and provisions that prohibit restrictions on investment (most liberal).

The score for 'no provision' is assigned where the PTA has no provisions relating to that area of trade. This score depends on whether the provisions in that category usually promote or inhibit trade. Categories that aim to promote trade (eg

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[1] The weight for services trade will be understated because available statistics exclude commercial presence as mode of supply (Hardin and Holmes 1997).

investment) are given a low score for 'no provision' and categories that inhibit trade (eg safeguards) are given high scores for 'no provision'.

The overall score for each agreement is obtained by multiplying the weight of each category by the score for that and summing the result. The group's score is an indication of the agreement's liberalising effect for that type of trade — agriculture, industrials, services and the general trade.

Two issues arose during the calculation of the index. First was the treatment of non-binding statements. Non-binding provisions are those that do not compel any government to take the action contained in the provision. These have been given the same score as the equivalent binding provision. However, if an agreement contains many of these non-binding provisions, then it is scored as being voluntary in the binding category which contributes to a less liberal overall score.

Secondly, it is difficult to asses the extent to which members comply with provisions in PTAs. Some members of PTAs strictly comply with provisions in PTAs while the extent of compliance by other members is difficult to assess. Hence, the provisions in the PTAs are assessed in the index according to the actual provision rather than the extent to which the provision may have been implemented.

## A.2 Results

Figure A.1 presents the results for the index. The scores all lie in the range between 0.1 and 0.7, with a mean score of 0.32. The figure groups the PTAs according to type and there is little commonality in provisions for PTAs of the same type.

CER, EU and Singapore-New Zealand score much more highly than the other agreements. CER achieves a high score for measures covering trade in services and has a broad coverage of provisions covering industrial goods. Singapore-New Zealand achieves the highest overall score because of the comprehensiveness of the agreement. It covers most categories and hence scores well in all groupings.

## Figure A.1    **Member Liberalisation Index for selected PTAs**
Agreements ordered by type
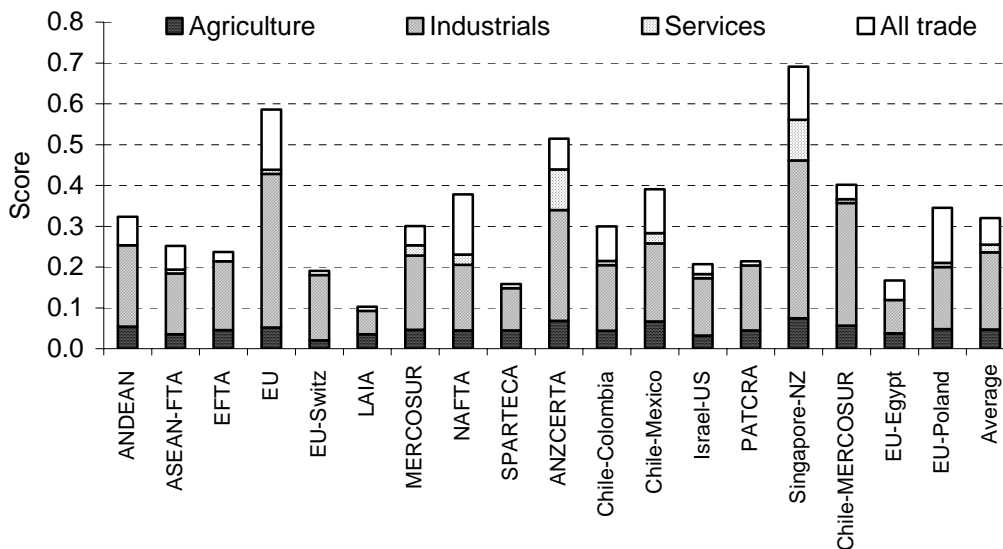


*Data Source:* Authors' estimates.

Figure A.2 gives the results separately for the merchandise and non-merchandise MLI, ordered by year of entry into force. This reveals, perhaps unsurprisingly, that the liberalisation resulting from the adoption of 'new age' measures has generally increased since mid 1980s. This 'new age' trend appears to underlie the observed trend for newer agreements to be more liberal than older ones.

It is important to note that each of the agreements has been assessed on the provisions that are currently in place. In some instances (most notably the EU) the agreements have changed over time as new provisions have been added. Hence, this agreement scores more highly than it would have had it been assessed in its original form. Had the agreements been scored in their original form, the observed trend for the older agreements to be less liberal would have been stronger.

The results were also examined for any trends against their geographical location, the size of their members, the distance between their major cities and the number of members in the PTA. No significant trend was found to exist in any of these relationships.

Figure A.2 **Merchandise and non-merchandise MLIs for selected PTAs**

Agreements ordered by year of commencement
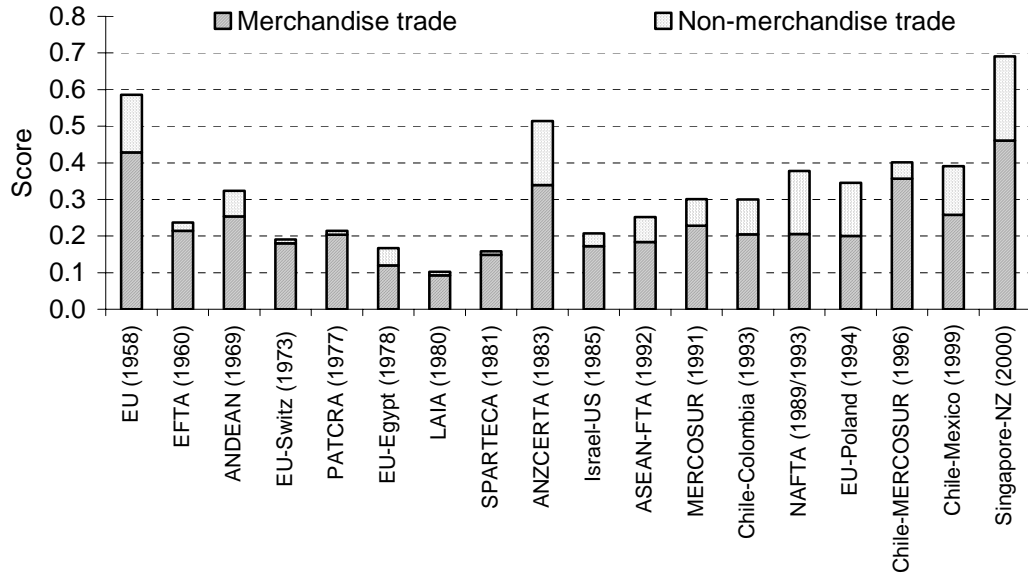


*Data Source*: Authors' estimates.

## Table A.1    **Member Liberalisation Index**

| Weight | Score | Category |
|---|---|---|

**Measures covering trade in agriculture**

| Weight | Score | Category |
|---|---|---|
| 0.003 | | **Technical barriers to trade** |
| | 0.00 | No provisions |
| | 0.10 | Initiatives to promote the harmonisation of standards |
| | 0.20 | Provisions that require notification to a committee, review and/or examination |
| | 0.40 | National treatment of standards |
| | 0.70 | Voluntary recognition of test results |
| | 1.00 | Harmonisation of standards |
| 0.006 | | **Export incentives** |
| | 0.00 | No provisions |
| | 0.50 | Provisions to review and exam |
| | 1.00 | Provisions that prohibit export incentives |
| 0.002 | | **Safeguards** |
| | 0.00 | Safeguard provisions |
| | 0.50 | No provisions |
| | 1.00 | Safeguard provisions are prohibited |
| 0.002 | | **Safeguards conditions - time limit** |
| | 0.00 | Safeguard provisions specify no time limit for the measure |
| | 0.25 | Safeguard provisions that permit safeguards to be in place for two years or more |
| | 0.50 | Safeguard provisions that permit safeguards to be in place for one year |
| | 0.75 | Safeguard provisions that permit safeguards to be in place for less than one year |
| | 1.00 | No safeguard provisions |
| 0.002 | | **Safeguards conditions - type of measure** |
| | 0.00 | Safeguard provisions permit any measure to be used |
| | 0.75 | Safeguard provisions specify the type of measure - quotas or suspension of preferences |
| | 1.00 | No safeguard provisions |
| 0.006 | | **Anti-dumping and countervailing measures** |
| | 0.00 | No restriction on the use of anti-dumping and countervailing measures |
| | 0.50 | Requires consultations with other members before anti-dumping or countervailing measures can be imposed |
| | 0.75 | Anti-dumping and countervailing measures can be imposed provided they are consistent with WTO rules |
| | 1.00 | Anti-dumping and countervailing measures are prohibited between members |
| 0.004 | | **Years remaining in tariff reduction schedules as at 1 January 2001 for agriculture** |
| | 0.00 | No provision to reduce tariffs |
| | 0.10 | Continuing reductions until 1 January 2008 |
| | 0.20 | Continuing reductions until 1 January 2007 |
| | 0.30 | Continuing reductions until 1 January 2006 |
| | 0.40 | Continuing reductions until 1 January 2005 |

| Weight | Score | Category |
|---|---|---|
| | 0.50 | Continuing reductions until 1 January 2004 |
| | 0.60 | Continuing reductions until 1 January 2003 |
| | 0.70 | Continuing reductions until 1 January 2002 |
| | 0.80 | Continuing reductions until 1 January 2002 |
| | 1.00 | Provisions that abolished tariffs on commencement or tariffs have been eliminated |
| 0.017 | | **Tariff quotas** |
| | 0.00 | No provision to liberalise agriculture |
| | 0.25 | Agreement does not permit the expansion of tariff quotas |
| | 0.50 | Agreement allows for the expansion of some tariff quotas |
| | 0.75 | Agreement allows for the expansion of all tariff quotas |
| | 0.25 | *Subtract this score if preferences are received by only one party* |
| | 0.90 | No provisions relating to tariff quotas |
| | 1.00 | Tariff quotas are prohibited |
| 0.018 | | **Domestic support** |
| | 0.00 | Agreement allows for the use of WTO "blue box" measures between members |
| | 0.10 | Agreement allows for the use of WTO "amber box" measures between members |
| | 0.30 | Agreement allows for the use of WTO "green box" measures between members |
| | 0.90 | No provision relating to domestic support |
| | 1.00 | Domestic support is prohibited |
| 0.010 | | **Tariff exceptions for those PTAs with tariff reduction schedules as at 1 January 2001** |
| | 0.00 | Exception list for agriculture |
| | 0.50 | Variable tariff rates for agriculture |
| | 1.00 | No exceptions list for agriculture |
| 0.002 | | **Number of different types of rules of origin available** |
| | 0.00 | One rule is available |
| | 0.25 | Two rules are available |
| | 0.50 | Three rules are available |
| | 0.75 | Four rules are available |
| | 1.00 | No rules of origin |
| 0.003 | | **Coverage of rules of origin for agriculture** |
| | 0.00 | The rules of origin are applied differently for different agricultural products |
| | 1.00 | The rules of origin are applied to all agricultural products |
| 0.010 | | **Restrictiveness of the rules of origin** |
| | 0.00 | 60 per cent value added component or the equivalent change in tariff heading, substantial transformation or specific process |
| | 0.10 | 55 per cent value added component or the equivalent change in tariff heading, substantial transformation or specific process |
| | 0.20 | 50 per cent value added component or the equivalent change in tariff heading, substantial transformation or specific process |

Table A.1    (Continued)

| Weight | Score | Category |
|---|---|---|
| | 0.30 | 45 per cent value added component or the equivalent change in tariff heading, substantial transformation or specific process |
| | 0.40 | 40 per cent value added component or the equivalent change in tariff heading, substantial transformation or specific process |
| | 0.50 | 35 per cent value added component or the equivalent change in tariff heading, substantial transformation or specific process |
| | 0.60 | 30 per cent value added component or the equivalent change in tariff heading, substantial transformation or specific process |
| | 1.00 | No rules of origin |
| 0.015 | | **Sanitary and phytosanitary measures** |
| | 0.00 | No provisions |
| | 0.25 | Mutual recognition of SPS measures |
| | 0.50 | Provisions require the adoption of international standards, but permit the implementation of more stringent science-based measures |
| | 1.00 | Provisions require the adoption of international standards |
| **0.100** | | ***Total weight for measures on trade in agriculture*** |

### Measures covering trade in industrials

| Weight | Score | Category |
|---|---|---|
| 0.060 | | **Technical barriers to trade** |
| | 0.00 | No provisions |
| | 0.10 | Initiatives to promote the harmonisation of standards |
| | 0.20 | Provisions that require notification to a committee, review and/or examination |
| | 0.40 | National treatment of standards |
| | 0.70 | Voluntary recognition of test results |
| | 1.00 | Harmonisation of standards |
| 0.060 | | **Export incentives** |
| | 0.00 | No provisions |
| | 0.50 | Provisions to review and exam |
| | 1.00 | Provisions that prohibit export incentives |
| 0.030 | | **Safeguards** |
| | 0.00 | Safeguard provisions |
| | 0.50 | No provisions |
| | 1.00 | Safeguard provisions are prohibited |
| 0.030 | | **Safeguards conditions - time limit** |
| | 0.00 | Safeguard provisions specify no time limit for the measure |
| | 0.25 | Safeguard provisions that permit safeguards to be in place for two years or more |
| | 0.50 | Safeguard provisions that permit safeguards to be in place for one year |
| | 0.75 | Safeguard provisions that permit safeguards to be in place for less than one year |
| | 1.00 | No safeguard provisions |

## Table A.1 (Continued)

| Weight | Score | Category |
|---|---|---|
| 0.020 | | **Safeguards conditions - type of measure** |
| | 0.00 | Safeguard provisions permit any measure to be used |
| | 0.75 | Safeguard provisions specify the type of measure - quotas or suspension of preferences |
| | 1.00 | No safeguard provisions |
| 0.080 | | **Anti-dumping and countervailing measures** |
| | 0.00 | No restriction on the use of anti-dumping and countervailing measures |
| | 0.50 | Requires consultations with other members before anti-dumping or counter-vailing measures can be imposed |
| | 0.75 | Anti-dumping and countervailing measures can be imposed provided they are consistent with WTO rules |
| | 1.00 | Anti-dumping and countervailing measures are prohibited between members |
| 0.050 | | **Years remaining in tariff reduction schedules as at 1 January 2001 for industrial products** |
| | 0.00 | No provision to reduce tariffs |
| | 0.10 | Continuing reductions until 1 January 2008 |
| | 0.20 | Continuing reductions until 1 January 2007 |
| | 0.30 | Continuing reductions until 1 January 2006 |
| | 0.40 | Continuing reductions until 1 January 2005 |
| | 0.50 | Continuing reductions until 1 January 2004 |
| | 0.60 | Continuing reductions until 1 January 2003 |
| | 0.70 | Continuing reductions until 1 January 2002 |
| | 0.80 | Continuing reductions until 1 January 2002 |
| | 1.00 | Provisions that abolished tariffs on commencement or tariffs have been eliminated |
| 0.040 | | **Tariff exceptions for those PTAs with tariff reduction schedules as at 1 January 2001** |
| | 0.00 | Exception list for industrial products |
| | 0.50 | Variable tariff rates for industrial products |
| | 1.00 | No exceptions list for industrial products |
| 0.030 | | **Number of different types of rules of origin available** |
| | 0.00 | One rule is available |
| | 0.25 | Two rules are available |
| | 0.50 | Three rules are available |
| | 0.75 | Four rules are available |
| | 1.00 | No rules of origin |
| 0.030 | | **Coverage of rules of origin for all industrial products** |
| | 0.00 | The rules of origin are applied differently for all industrial products |
| | 1.00 | The rules of origin are applied to all industrial products |
| 0.120 | | **Restrictiveness of rules of origin** |
| | 0.00 | 60 per cent value added component or the equivalent change in tariff heading, substantial transformation or specific process |

Table A.1    (Continued)

| Weight | Score | Category |
|---|---|---|
| | 0.10 | 55 per cent value added component or the equivalent change in tariff heading, substantial transformation or specific process |
| | 0.20 | 50 per cent value added component or the equivalent change in tariff heading, substantial transformation or specific process |
| | 0.30 | 45 per cent value added component or the equivalent change in tariff heading, substantial transformation or specific process |
| | 0.40 | 40 per cent value added component or the equivalent change in tariff heading, substantial transformation or specific process |
| | 0.50 | 35 per cent value added component or the equivalent change in tariff heading, substantial transformation or specific process |
| | 0.60 | 30 per cent value added component or the equivalent change in tariff heading, substantial transformation or specific process |
| | 1.00 | No rules of origin |
| **0.550** | | ***Total weight for measures on trade in industrials*** |

### Measures covering trade in services

| Weight | Score | Category |
|---|---|---|
| 0.100 | | **Services** |
| | 0.00 | No provisions |
| | 0.10 | Initiatives to promote services liberalisation |
| | 0.25 | Provisions for national treatment |
| | 0.50 | Provisions for market access |
| | 1.00 | Provisions for market access and national treatment |
| | *0.10* | *This score is subtracted where specified service sectors are excluded* |
| **0.100** | | ***Total weight for measures on trade in services*** |

### General measures covering all trade

| Weight | Score | Category |
|---|---|---|
| 0.010 | | **Binding** |
| | 0.00 | PTA is voluntary |
| | 1.00 | PTA is binding |
| 0.050 | | **National treatment** |
| | 0.00 | No provisions |
| | 0.25 | Initiatives to promote national treatment |
| | 0.75 | National treatment for traded products |
| | *0.10* | *Subtract this score for each sector that is exempt from national treatment* |
| 0.050 | | **Investment rules** |
| | 0.00 | No provisions |
| | 0.25 | Initiatives to reduce restrictions and facilitate investment |
| | 0.75 | National treatment for investment |
| | 1.00 | Provisions that prohibit restrictions |

Table A.1　　　(Continued)

| Weight | Score | Category |
|---|---|---|
| 0.050 | | **Domestic competition policy** |
| | 0.00 | No provisions |
| | 0.25 | Initiatives to promote adequate competition policy |
| | 0.75 | Competition policy provisions for the public sector |
| | 0.75 | Competition policy provisions for the private sector |
| | 1.00 | Competition policy provisions for the public sector and the private sector |
| 0.020 | | **Government procurement** |
| | 0.00 | No provisions |
| | 0.25 | Initiatives to promote best practice government procurement procedures |
| | 0.50 | Initiatives to allow 'fair' competition in the government procurement market |
| | 0.75 | National treatment for government procurement |
| 0.020 | | **Intellectual property rights** |
| | 0.00 | No provisions |
| | 0.50 | National treatment for intellectual property rights |
| | 1.00 | Provisions for adequate and effective protection |
| 0.025 | | **Permanent movement of people** |
| | 0.00 | No provisions |
| | 0.50 | Initiatives to promote the permanent movement of people |
| | 1.00 | Provisions for the free movement of people |
| 0.025 | | **Temporary movement of people** |
| | 0.00 | No provisions |
| | 0.50 | Initiatives to promote the temporary movement of people |
| | 1.00 | Provisions for the free movement of people |
| **0.250** | | ***Total weight for measures affecting all trade*** |
| **1.000** | | ***Total weight for Member Liberalisation Index*** |

*Source:* Authors' estimates.

Table A.2    **Member Liberalisation Index — detailed results**

| Provisions | EU | EFTA | ANDEAN | EU-Switz | PATCRA | EU-Egypt | LAIA | SPARTECA | ANZCERTA |
|---|---|---|---|---|---|---|---|---|---|
| **Measures covering trade in agriculture** | | | | | | | | | |
| Technical barriers to trade | 0.0021 | 0.0006 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0030 |
| Export incentives | 0.0000 | 0.0060 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0060 |
| Safeguards | 0.0010 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Safeguards – time limit | 0.0020 | 0.0015 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0005 |
| Safeguards – type of measure | 0.0020 | 0.0000 | 0.0000 | 0.0000 | 0.0015 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Antidumping and countervailing | 0.0000 | 0.0000 | 0.0030 | 0.0000 | 0.0030 | 0.0000 | 0.0000 | 0.0000 | 0.0030 |
| Years remaining in tariff reductions | 0.0040 | 0.0040 | 0.0040 | 0.0000 | 0.0040 | 0.0040 | 0.0000 | 0.0040 | 0.0040 |
| Tariff quotas | 0.0153 | 0.0153 | 0.0153 | 0.0000 | 0.0153 | 0.0153 | 0.0153 | 0.0153 | 0.0153 |
| Domestic support | 0.0000 | 0.0162 | 0.0162 | 0.0162 | 0.0162 | 0.0162 | 0.0162 | 0.0162 | 0.0162 |
| Tariff exceptions | 0.0100 | 0.0000 | 0.0100 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Number of different types of ROO | 0.0020 | 0.0000 | 0.0010 | 0.0005 | 0.0000 | 0.0005 | 0.0000 | 0.0000 | 0.0000 |
| Coverage of ROO | 0.0030 | 0.0000 | 0.0030 | 0.0030 | 0.0030 | 0.0000 | 0.0030 | 0.0030 | 0.0030 |
| Restrictiveness of ROO | 0.0100 | 0.0020 | 0.0020 | 0.0010 | 0.0020 | 0.0020 | 0.0010 | 0.0060 | 0.0020 |
| SPS measures | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0150 |
| **TOTAL** | **0.0514** | **0.0456** | **0.0545** | **0.0207** | **0.0450** | **0.0380** | **0.0355** | **0.0445** | **0.0680** |
| **Measures covering trade in industrials** | | | | | | | | | |
| Technical barriers to trade | 0.0420 | 0.0120 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0600 |
| Export incentives | 0.0000 | 0.0600 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0600 |
| Safeguards | 0.0150 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Safeguards – time limit | 0.0300 | 0.0225 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0075 |
| Safeguards – type of measure | 0.0200 | 0.0000 | 0.0000 | 0.0000 | 0.0150 | 0.0000 | 0.0150 | 0.0000 | 0.0000 |
| Antidumping and countervailing | 0.0000 | 0.0000 | 0.0400 | 0.0600 | 0.0400 | 0.0000 | 0.0000 | 0.0000 | 0.0400 |
| Years remaining in tariff | 0.0500 | 0.0500 | 0.0500 | 0.0500 | 0.0500 | 0.0500 | 0.0000 | 0.0500 | 0.0500 |

Table A.2 (Continued)

| Provisions | EU | EFTA | ANDEAN | EU-Switz | PATCRA | EU-Egypt | LAIA | SPARTECA | ANZCERTA |
|---|---|---|---|---|---|---|---|---|---|
| Tariff exceptions | 0.0400 | 0.0000 | 0.0400 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Number of different types of ROO | 0.0300 | 0.0000 | 0.0150 | 0.0075 | 0.0000 | 0.0075 | 0.0000 | 0.0000 | 0.0000 |
| Coverage of ROO | 0.0300 | 0.0000 | 0.0300 | 0.0300 | 0.0300 | 0.0000 | 0.0300 | 0.0300 | 0.0300 |
| Restrictiveness of ROO | 0.1200 | 0.0240 | 0.0240 | 0.0120 | 0.0240 | 0.0240 | 0.0120 | 0.0240 | 0.0240 |
| **TOTAL** | **0.3770** | **0.1685** | **0.1990** | **0.1595** | **0.1590** | **0.0815** | **0.0570** | **0.1040** | **0.2715** |
| **Measures covering trade in services** | | | | | | | | | |
| Services | 0.0100 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.1000 |
| **TOTAL** | **0.0100** | **0.0000** | **0.0000** | **0.0000** | **0.0000** | **0.0000** | **0.0000** | **0.0000** | **0.1000** |
| **Measures covering all trade** | | | | | | | | | |
| Binding | 0.0100 | 0.0100 | 0.0100 | 0.0100 | 0.0100 | 0.0100 | 0.0100 | 0.0100 | 0.0100 |
| National treatment | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0375 | 0.0000 | 0.0000 | 0.0000 |
| Investment rules | 0.0500 | 0.0000 | 0.0125 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Domestic competition policy | 0.0375 | 0.0125 | 0.0375 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Government procurement | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0150 |
| Intellectual property rights | 0.0000 | 0.0000 | 0.0100 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| Permanent movement of people | 0.0250 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0250 |
| Temporary movement of people | 0.0250 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0250 |
| **TOTAL** | **0.1475** | **0.0225** | **0.0700** | **0.0100** | **0.0100** | **0.0475** | **0.0100** | **0.0100** | **0.0750** |
| **GRAND TOTAL** | **0.5859** | **0.2366** | **0.3235** | **0.1902** | **0.2140** | **0.1670** | **0.1025** | **0.1585** | **0.5145** |
| **Index of merchandise trade provisions** | **0.4284** | **0.2141** | **0.2535** | **0.1802** | **0.2040** | **0.1195** | **0.0925** | **0.1485** | **0.3395** |
| **Index of non-merchandise trade provisions** | **0.1575** | **0.0225** | **0.0700** | **0.0100** | **0.0100** | **0.0475** | **0.0100** | **0.0100** | **0.1750** |

## Table A.2    (Continued)

| Provisions | Israel-US | ASEAN-FTA | MERCOSUR | Chile-Colombia | NAFTA | EU-Poland | Chile-MERCOSUR | Chile-Mexico | Singapore-NZ |
|---|---|---|---|---|---|---|---|---|---|
| **Measures covering trade in agriculture** | | | | | | | | | |
| Technical barriers to trade | 0.0000 | 0.0003 | 0.0000 | 0.0021 | 0.0012 | 0.0021 | 0.0021 | 0.0000 | 0.0021 |
| Export incentives | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0030 | 0.0000 | 0.0030 | 0.0060 | 0.0060 |
| Safeguards | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0020 | 0.0000 | 0.0020 |
| Safeguards – time limit | 0.0000 | 0.0000 | 0.0005 | 0.0000 | 0.0005 | 0.0000 | 0.0020 | 0.0010 | 0.0020 |
| Safeguards – type of measure | 0.0000 | 0.0015 | 0.0015 | 0.0000 | 0.0015 | 0.0000 | 0.0020 | 0.0015 | 0.0020 |
| Antidumping and countervailing | 0.0000 | 0.0000 | 0.0030 | 0.0000 | 0.0030 | 0.0000 | 0.0045 | 0.0000 | 0.0045 |
| Years remaining in tariff reductions | 0.0040 | 0.0000 | 0.0040 | 0.0040 | 0.0004 | 0.0028 | 0.0004 | 0.0040 | 0.0040 |
| Tariff quotas | 0.0043 | 0.0000 | 0.0153 | 0.0153 | 0.0085 | 0.0153 | 0.0153 | 0.0153 | 0.0153 |
| Domestic support | 0.0162 | 0.0162 | 0.0162 | 0.0162 | 0.0162 | 0.0000 | 0.0162 | 0.0162 | 0.0162 |
| Tariff exceptions | 0.0000 | 0.0100 | 0.0000 | 0.0000 | 0.0000 | 0.0100 | 0.0050 | 0.0050 | 0.0100 |
| Number of different types of ROO | 0.0000 | 0.0000 | 0.0010 | 0.0010 | 0.0010 | 0.0000 | 0.0010 | 0.0005 | 0.0000 |
| Coverage of ROO | 0.0030 | 0.0030 | 0.0030 | 0.0030 | 0.0000 | 0.0030 | 0.0030 | 0.0000 | 0.0030 |
| Restrictiveness of ROO | 0.0050 | 0.0040 | 0.0020 | 0.0020 | 0.0020 | 0.0000 | 0.0000 | 0.0020 | 0.0040 |
| SPS measures | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0075 | 0.0150 | 0.0000 | 0.0150 | 0.0038 |
| **TOTAL** | **0.0325** | **0.0350** | **0.0465** | **0.0436** | **0.0448** | **0.0482** | **0.0565** | **0.0665** | **0.0749** |
| **Measures covering trade in industrials** | | | | | | | | | |
| Technical barriers to trade | 0.0000 | 0.0060 | 0.0000 | 0.0420 | 0.0240 | 0.0420 | 0.0600 | 0.0000 | 0.0420 |
| Export incentives | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0300 | 0.0000 | 0.0300 | 0.0600 | 0.0600 |
| Safeguards | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0300 | 0.0000 | 0.0300 |
| Safeguards – time limit | 0.0000 | 0.0000 | 0.0075 | 0.0000 | 0.0075 | 0.0000 | 0.0300 | 0.0150 | 0.0300 |
| Safeguards – type of measure | 0.0000 | 0.0150 | 0.0150 | 0.0000 | 0.0150 | 0.0000 | 0.0200 | 0.0150 | 0.0200 |
| Antidumping and countervailing | 0.0000 | 0.0000 | 0.0400 | 0.0000 | 0.0400 | 0.0000 | 0.0600 | 0.0000 | 0.0600 |
| Years remaining in tariff reductions | 0.0500 | 0.0500 | 0.0500 | 0.0500 | 0.0050 | 0.0400 | 0.0050 | 0.0500 | 0.0500 |

Table A.2    (Continued)

| Provisions | Israel-US | ASEAN-FTA | MERCOSUR | Chile-Colombia | NAFTA | EU-Poland | Chile-MERCOSUR | Chile-Mexico | Singapore-NZ |
|---|---|---|---|---|---|---|---|---|---|
| Tariff exceptions | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0400 | 0.0200 | 0.0200 | 0.0400 |
| Number of different types of ROO | 0.0000 | 0.0000 | 0.0150 | 0.0150 | 0.0150 | 0.0000 | 0.0150 | 0.0075 | 0.0000 |
| Coverage of ROO | 0.0300 | 0.0300 | 0.0300 | 0.0300 | 0.0000 | 0.0300 | 0.0300 | 0.0000 | 0.0300 |
| Restrictiveness of ROO | 0.0600 | 0.0480 | 0.0240 | 0.0240 | 0.0240 | 0.0000 | 0.0000 | 0.0240 | 0.0240 |
| **TOTAL** | **0.1400** | **0.1490** | **0.1815** | **0.1610** | **0.1605** | **0.1520** | **0.3000** | **0.1915** | **0.3860** |
| **Measures covering trade in services** | | | | | | | | | |
| Services | 0.0100 | 0.0100 | 0.0250 | 0.0100 | 0.0250 | 0.0100 | 0.0100 | 0.0250 | 0.1000 |
| **TOTAL** | **0.0100** | **0.0100** | **0.0250** | **0.0100** | **0.0250** | **0.0100** | **0.0100** | **0.0250** | **0.1000** |
| **Measures covering all trade** | | | | | | | | | |
| Binding | 0.0100 | 0.0100 | 0.0100 | 0.0100 | 0.0100 | 0.0100 | 0.0100 | 0.0100 | 0.0100 |
| National treatment | 0.0000 | 0.0000 | 0.0000 | 0.0375 | 0.0375 | 0.0000 | 0.0000 | 0.0375 | 0.0000 |
| Investment rules | 0.0000 | 0.0375 | 0.0375 | 0.0125 | 0.0375 | 0.0500 | 0.0125 | 0.0000 | 0.0375 |
| Domestic competition policy | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0375 | 0.0500 | 0.0000 | 0.0375 | 0.0500 |
| Government procurement | 0.0050 | 0.0000 | 0.0000 | 0.0050 | 0.0150 | 0.0000 | 0.0000 | 0.0000 | 0.0100 |
| Intellectual property rights | 0.0100 | 0.0100 | 0.0000 | 0.0200 | 0.0100 | 0.0000 | 0.0000 | 0.0100 | 0.0100 |
| Permanent movement of people | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0125 | 0.0000 | 0.0000 | 0.0000 |
| Temporary movement of people | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0125 | 0.0125 | 0.0125 | 0.0125 |
| **TOTAL** | **0.0250** | **0.0575** | **0.0475** | **0.0850** | **0.1475** | **0.1350** | **0.0350** | **0.1075** | **0.1300** |
| **GRAND TOTAL** | **0.2075** | **0.2515** | **0.3005** | **0.2996** | **0.3778** | **0.3452** | **0.4015** | **0.3905** | **0.6909** |
| **Index of merchandise trade provisions** | **0.1725** | **0.1840** | **0.2280** | **0.2046** | **0.2053** | **0.2002** | **0.3565** | **0.2580** | **0.4609** |
| **Index of non-merchandise trade provisions** | **0.0350** | **0.0675** | **0.0725** | **0.0950** | **0.1725** | **0.1450** | **0.0450** | **0.1325** | **0.2300** |

*Source:*  Authors' estimates.

# B    Data sources

## B.1    Dependent variables

This study used data on bilateral trade and foreign direct investment from two main sources.

The bilateral world trade flows from 1970 to 1997 for 116 economies were drawn from the World Trade Flows databases of bilateral trade (WTF 1997 and 2000), the World Bank's World Development Indicators (WDI 2001) and a number of other sources.

The original source of the data in WTF is the United Nations Statistical Office. The United Nations collects the trade data from individual countries, which classify the data, as best they can, from their national classification systems into United Nations international trade classifications. These data are published in the United Nations Yearbook of International Trade Statistics but lack consistency across countries and years. Statistics Canada recompiles the UN trade data on a consistent basis using the Standard International Trade classification (SITC) Revision 2. The resulting data set is known as the World Trade Analyzer (WTA). The WTA database is then used as the basis for producing the World Trade Flows database, which improves on the WTA by:

- removing discrepancies between exports and imports for the same trade flow;

- adjusting for *entrepot* trade (products that are imported by an economy and re-exported with little or no value added); and

- reclassifying the data for revisions of the SITC (Feenstra 2000).

The World Trade Flows databases cover the period from 1970 to 1997 (WTF 1997 and 2000). Aggregated bilateral exports have been used in their original form. Data for any economies not included in this study have been deleted, as have any trade flows to or from unidentified destinations. Zero trade flows between members have been left in the database to avoid any bias from eliminating them. The full sample of countries included in the analysis is listed in table B.1.

## Table B.1   **Full sample of countries in the gravity model**

| Ctry | Country name | Ctry | Country name | Ctry | Country name |
|---|---|---|---|---|---|
| 1 | Algeria | 41 | Ghana | **81** | **Pakistan** |
| 2 | Angola | **42** | **Greece** | **82** | **Panama** |
| **3** | **Argentina** [a] | 43 | Guatemala | **83** | **PNG** |
| **4** | **Australia** | **44** | **Guinea** | **84** | **Paraguay** |
| **5** | **Austria** | 45 | Guyana | **85** | **Peru** |
| 6 | Bahamas, The | **46** | **Haiti** | 86 | **Philippines** |
| 7 | Bahrain | **47** | **Honduras** | 87 | **Poland** |
| **8** | **Bangladesh** | **48** | **Hong Kong, China** | **88** | **Portugal** |
| 9 | Barbados | **49** | **Hungary** | **89** | **Romania** |
| **10** | **Belgium-Lux** | **50** | **Iceland** | 90 | Rwanda |
| 11 | Belize | **51** | **India** | **91** | **Saudi Arabia** |
| 12 | Benin | **52** | **Indonesia +** [b] | 92 | Senegal |
| **13** | **Bhutan** | 53 | Iran, Islamic Rep. | 93 | Sierra Leone |
| **14** | **Bolivia** | **54** | **Ireland** | **94** | **Singapore** |
| **15** | **Brazil** | **55** | **Israel** | **95** | **Solomon Is** |
| 16 | Burkina Faso | **56** | **Italy** | **96** | **South Africa** |
| 17 | Burundi | 57 | Jamaica | **97** | **Spain** |
| **18** | **Cameroon** | **58** | **Japan** | **98** | **Sri Lanka** |
| **19** | **Canada** | **59** | **Jordan** | 99 | Suriname |
| 20 | Central African Rep | 60 | Kenya | **100** | **Sweden** |
| 21 | Chad | **61** | **Korea, Rep.** | **101** | **Switzerland** |
| **22** | **Chile** | 62 | Kuwait | **102** | **Syrian** |
| **23** | **China** | **63** | **Lao PDR** | 103 | Tanzania |
| **24** | **Colombia** | **64** | **Madagascar** | **104** | **Thailand** |
| 25 | Congo, Rep. | 65 | Malawi | 105 | Togo |
| **26** | **Costa Rica** | **66** | **Malaysia** | 106 | Trinidad & Tobago |
| 27 | Cote d'Ivoire | 67 | Mali | 107 | Tunisia |
| 28 | Cyprus | 68 | Malta | 108 | Turkey |
| **29** | **Denmark +** [b] | **69** | **Mauritania** | 109 | Uganda |
| **30** | **Dominican Republic** | **70** | **Mauritius** | **110** | **UAE** |
| **31** | **Ecuador** | **71** | **Mexico** | **111** | **United Kingdom** |
| **32** | **Egypt, Arab Rep.** | 72 | Morocco | **112** | **United States** |
| **33** | **El Salvador** | 73 | Mozambique | **113** | **Uruguay** |
| 34 | Ethiopia | **74** | **Nepal** | **114** | **Venezuela** |
| **35** | **Fiji** | **75** | **Netherlands** | 115 | Zambia |
| **36** | **Finland** | **76** | **New Zealand** | 116 | Zimbabwe |
| **37** | **France** | **77** | **Nicaragua** | | |
| 38 | Gabon | 78 | Niger | | |
| 39 | Gambia, The | 79 | Nigeria | | |
| **40** | **Germany** | **80** | **Norway** | | |

**a** Bolded countries are included in the analysis of investment in chapter 5. **b** + sign denotes a country and its associated islands.

*Source:* WTF(1997) and WTF(2000).

Table B.2 gives trade, GDP, population and distance statistics for each PTA featured in the MLI. The PTAs are ranked by the amount of trade among members. The EU and NAFTA are significantly larger, in terms of trade and GDP, than any other PTA. Generally, those PTAs that have a larger amount of trade are also larger in terms of population and GDP, and tend to have a lower average distance among members. As one would expect, the PTAs that have a larger number of members also tend to have more trade.

Table B.2     **Summary statistics for selected PTAs, 1997**

|  | Trade among members[a] | Total GDP [b] | Total population | Average GDP per capita[c] | Average distance |
|---|---|---|---|---|---|
|  | Millions of $US | Millions of $US | Millions | $US | Kilometres |
| EU | 1 288 236 | 8 241 782 | 374 | 22 037 | 1 362 |
| NAFTA | 514 757 | 9 264 235 | 396 | 23 395 | 2 392 |
| EU-Switzerland | 112 074 | 8 497 819 | 381 | 22 304 | 976 |
| ASEAN-FTA | 80 480 | 685 287 | 438 | 1 565 | 1 575 |
| LAIA | 48 162 | 1 886 279 | 423 | 4 459 | 3 364 |
| EU-Poland | 45 763 | 8 390 644 | 407 | 20 616 | 1 355 |
| MERCOSUR | 21 667 | 1 127 805 | 208 | 5 422 | 1 117 |
| US-Israel | 13 477 | 8 340 475 | 280 | 29 787 | 9 136 |
| EU-Egypt | 8 681 | 8 317 387 | 434 | 19 164 | 3 109 |
| ANZCERTA | 7 195 | 484 799 | 22 | 22 036 | 2 161 |
| Chile-MERCOSUR | 5 271 | 1 203 091 | 222 | 5 419 | 1 655 |
| Andean | 3 668 | 223 041 | 83 | 2 687 | 1 910 |
| SPARTECA | 2 535 | 492 249 | 28 | 17 580 | 2 684 |
| Chile-Mexico | 1 515 | 476 377 | 109 | 4 370 | 6 585 |
| PATCRA | 1 505 | 424 913 | 23 | 18 474 | 2 733 |
| EFTA | 1 075 | 418 482 | 12 | 34 874 | 1 926 |
| Singapore-NZ | 607 | 159 416 | 8 | 19 927 | 8 411 |
| Chile-Colombia | 448 | 181 953 | 55 | 3 308 | 4 227 |

**a** The trade figure for PTA to economy bilaterals, such as EU-Poland, includes only trade between the economy (ie Poland) and PTA members (ie Germany or France). It does not include trade among the PTA members themselves (ie it does not include trade between Germany and France). The population and GDP figures on the other hand include all of the countries involved in the PTA. Hence, the population and GDP figures for the PTA-to-economy bilaterals look much larger than the trade figures alone suggest. **b** GDP is basically gross value added accrued to all resident producers. **c** Average GDP per capita is a population weighted average of the GDP per capita of the participating countries.

*Sources:* WDI (2001), Boisso and Ferrantino (1997) and WTF (2001).

Two sources were used to compile the bilateral investment data. The main source was United Nations Conference on Trade and Development (UNCTAD). It publishes bilateral investment data for various continents in a series of volumes.

- Volume 1: *World Investment Directory 1992 Asia and the Pacific*. Country tables provide data on FDI flows and stocks for 21 countries during the 1980s (UNCTAD 1992a).

- Volume 2: *World Investment Directory 1992 Central and Eastern Europe*. Country tables provide data on FDI flows and stocks for 26 countries during the 1980s (UNCTAD 1992b).

- Volume 3: *World Investment Directory 1993 Developed economies*. Country tables provide data on FDI flows and stocks for 22 countries during the 1980s (UNCTAD 1993).

- Volume 4: *World Investment Directory 1994 Latin America and the Caribbean*. Country tables provide data on FDI flows and stocks for 24 countries during the 1980s (UNCTAD 1994).

- Volume 5: *World Investment Directory 1996 Africa*. Country tables provide data on FDI flows and stocks for 53 countries during the late 1980s and early 1990s (UNCTAD 1997a).

- Volume 6: *World Investment Directory 1996 West Asia*. Country tables provide data on FDI flows and stocks for 15 countries during the late 1980s and early 1990s (UNCTAD 1997b).

- Volume 7: *World Investment Directory 2000 Asia and the Pacific*. Country tables provide data on FDI flows and stocks for 23 countries during the 1990s (UNCTAD 2000).

The primary source of the bilateral FDI data for UNCTAD was respective country finance departments, central banks, and TNC operations.

OECD collects FDI data for 23 countries. For many developed countries, the OECD data were used to extend the UNCTAD bilateral data which ended at 1991. The OECD data are available electronically. The UNCTAD investment data are not available electronically. UNCTAD use a country-specific definition of FDI and the OECD uses a semi-standardised definition of FDI — the OECD benchmark definition.[1]

The bilateral FDI data have a number of limitations (Bellak 1998).

- There is little consistency in the attribution of nationality to transit investment, ie FDI undertaken by a regional headquarters rather than a parent company.

- The coverage is limited, even in developed countries.[2]

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[1] Not all OECD countries comply with the OECD benchmark definition, which requires 10 per cent or more of the ordinary shares or voting power for investment to be 'direct'. The OECD uses the 'fully consolidated' system, ie the subsidiary of an subsidiary is automatically a subsidiary.

[2] The UK statistics exclude oil and the financial sector in most years. Given the importance of the United Kingdom as a financial centre of the world and as an oil trading country, this leads to a serious underestimation of the United Kingdom's foreign investment.

- The data are sporadic for developing and under developed countries.

- Stock data are imputed from flows data by simple cumulative addition, with no allowance for depreciation.

## B.2    Explanatory variables

Most of the other data on the explanatory variables were sourced from World Bank's World Development Indicators 2001 database (WDI 2001). The WDI database covers a wide range of time series data on social and economic indicators, including data on population, arable land and exchange rates.  The remaining data were sourced from similar gravity model studies.  The details are as follows.

The GDP data measure gross domestic product at purchasing power parity (PPP). Most of the GDP data were sourced from the World Bank's World Development Indicators (WDI 2001). GDP is basically gross value added accrued to all resident producers, measured in local currency units. Insufficient data were available for some economies and some years, and data were supplemented from the IMF and the OECD (IMF 2001 and OECD 2001).

The GDP data were converted to current international dollars using PPP conversion factors from the WDI. There were no data from 1970 to 1974 and the data were insufficient for some economies from 1975 to 1997. The PPP conversion factors were estimated, for the missing economies and years, by extrapolating the data back to 1970. GDP at PPP was then calculated by dividing GDP in local currency units by the PPP conversion factors. GDP per capita was calculated by dividing GDP by population for each economy.

Population data were sourced from the WDI 2001. Population is measured as the mid-year population and counts all residents of an economy regardless of legal status or citizenship.

The primary source of the distance data was Boisso and Ferrantino (1997), who calculate the distance between the two largest cities. Distance is measured in kilometres and is the great circle distance or 'as the crow flies'. Data were not available for a number of smaller economies, and data for the missing economies were taken from Haveman (2000), who measures the distance between capital cities.

The measure of linguistic similarity was sourced from Boisso and Ferantino (1997). The variable measures the degree of commonality in the languages that are spoken between any two economies. The measure takes a value ranging from 0 to 10 000, depending on the percentage of people in each economy who speak the same

language. In general, the percentage of people speaking the same language in one economy is multiplied by the percentage of people speaking that language in the other economy. The linguistic similarity index receives a value of zero when the two economies are completely dissimilar and a value of 10 000 when the entire populations of the two economies speak the same language.

The data for colonial and currency links were sourced from Frankel and Rose (2000). Two dummy variables were formed, the first with a value of one where one economy colonised the other economy and zero otherwise, the second with a value one when the two countries share a currency, and zero otherwise.

Most of the adjacency data were obtained from Boisso and Ferrantino (1997). Data from Haveman (2000) were used to supplement the Boisso and Ferrantino data in order to fill some gaps in the economy coverage. The adjacency variable is a dummy with a value one when the two economies share a border, and zero otherwise.

The data for the island and landlocked variables were taken from Times (1993). Two dummy variables were formed, one with a value one where an economy is an island and zero otherwise, the other with a value of one when the economy is landlocked and zero otherwise.

Exchange rate data were sourced from WDI (2001). The exchange rate is measured as the period average exchange rate — the number of local currency units that can be traded for one US dollar. A bilateral exchange rate (the value of a unit of the exporter's currency in terms of the importer's currency) was calculated by dividing the importer's $US exchange rate by the exporter's $US exchange rate.

The tariff data were sourced from the TRAINS database (UNCTAD 2001). The variable is measured as the simple average tariff rate — total value divided by the number of tariff lines.

The Member Liberalisation Index (MLI) measures the extent of liberalisation within a PTA. The value of the MLI for a bilateral trade flow depends on wether the two economies are members of the same PTA. A variable was formed that allocates the score from the MLI where the two economies are members of the same PTA and in all other cases allocates a score of zero. When the two economies have more than one PTA in common, an a priori judgement was made as to which PTA was more likely to dictate the trading conditions between the two countries. Appendix A provides detailed information on how the index was calculated.

# C    Econometric estimation and issues

In the gravity model of bilateral trade, the sample is limited by censoring. Bilateral exports cannot take a negative value. To account for the truncated distribution of possible values for the dependent variable, a censored regression technique is used in this study.

While techniques for estimating single equation censored regression models have been available in a number of popular statistics and econometric software packages for quite some time, estimation in a panel context is a recent phenomena. The appendix first discusses fixed versus random effects specifications, and then discusses estimation of a Tobit model with fixed effects. Finally it discusses the relationship between the resulting parameter estimates and marginal effects.

## C.1  Fixed versus random effects specifications

The fixed and random effects models are alternative ways of accounting for unobserved heterogeneity. The random effects model requires an impractical orthogonality assumption — it requires that the unobserved effects be uncorrelated with the included explanatory variables. The fixed effects model relaxes this orthogonality assumption, but is widely recognised to suffer from an incidental parameter problem in a panel context — the estimator is inconsistent because the asymptotic variance of the estimator of the main parameters is a function of the size of the fixed groups (Lancaster 2000). How serious this problem is in practical terms remains to be established in the literature, although it appears to be worse in a non-linear (eg Tobit) context.

Statistical tests are available to choose between fixed and random effects specifications. Hausman's statistic for testing random versus fixed effects is applied for the positive trade values in this study (Baltagi 1995 and Greene 2000). The Hausman statistic tests for the orthogonality of the random effects and the regressors, and is thus a test for misspecification. A significant test statistic reveals a high importance of individual specific effects and their correlation with the regressors. In such a case, the random effect estimates are significantly inconsistent. In a specification that allowed both the fixed and random effects to vary by exporting and importing country pair, the estimated Hausman test statistic was

3342.7, which was more than the critical value at the 5 per cent level (34.5). Thus the random effects specification was rejected.[1] This study has therefore adopted a fixed effects specification within a Tobit model.

## C.2    Tobit model with fixed effects

Only few studies have discussed and estimated fixed effects Tobit models — Honere and Kyriazidou (2000) and Greene (2002).

Honere (1992) initially proposed artificially censoring the dependent variable in such a way that the fixed effects could be differenced out. In a later study, Honere and Kyriazidou (2000) used semiparametric and generalised methods of moments approaches with latent heterogeneity. The practical limitation of their estimator is that although it provides estimates of the primary slope parameters, it does not provide estimates for the full set of model parameters and thus precludes computation of marginal effects (elasticities), probabilities of predictions for the dependent variable and their standard errors.

Greene (2002) argued that in spite of several shortcomings, the conventional (unconditional) fixed effects estimator has some merits in a Tobit panel context. He obtained results that show the slope estimates in the Tobit model do not appear to be affected by the incidental parameters problem. However, the variance of the model estimate is affected, and this is a crucial parameter in a Tobit model for inference and analysis purposes. But the bias in the variance appears to fall fairly quickly as the number of time periods in the panel increases. This study has twenty-eight years of data in the panel and thus overcomes the small time period bias.

The fixed effects estimator is nevertheless inconsistent because its variance does not converge to zero as the sample size increases. Greene (2002) showed that as a result, there is clearly some downward bias in all the estimated standard errors of the Tobit model parameters. The implication of this is that test statistics such as the Wald statistic will tend to be too large.

In addition, there may be a small sample bias in the Tobit fixed effects specification. Greene (2002) showed that increasing the sample size from 100 to 1000 did little to remove this small sample bias, but increasing the group size from 2 to 20 had a very large effect. He concluded that the bias was primarily a problem in panels with a small number of time periods. Again, the reasonably large number

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[1] Maddala (1987) and Baltagi (1995) argued that the fixed effects estimator derived from the linear panel model may not carry to non-linear models.

of time periods in the current study suggest that small sample bias may not be a problem.

## C.3   Marginal effects

The Tobit model can be viewed as consisting of two parts. The first specifies a structural relationship between the explanatory variables and a hypothetical or a 'latent' underlying dependent variable, the distribution of which is not censored. The second part specifies how the observations on this latent dependent variable are censored. The interpretation of Tobit estimates depends on whether one is interested in latent or censored outcomes. If one is interested in latent outcomes (unobserved non-positive trade flows), the Tobit estimates obtained can be directly interpreted as the marginal effects of the explanatory variables on the dependent variable. If the interest lies in the determinants of observed trade flows, as it does here, the marginal effects of the explanatory variables on censored outcomes need to be estimated separately. Table C.1 provides the estimated marginal effects corresponding to the raw maximum likelihood Tobit estimates of table D.2 in appendix D.

The results confirm that the marginal effects differ from the raw Tobit estimates. However, for any particular PTA, the marginal effects of the three PTA dummies tend to be roughly proportional to the corresponding raw parameter estimates. Therefore, in practice, conclusions about whether the net trade effects of a particular PTA are positive or negative are invariant to whether the marginal effects or the raw parameter estimates are used.

## Table C. 1   **Marginal effects and Tobit estimates**

| Variable name | Maximum likelihood Tobit estimates | Marginal effects |
|---|---|---|
| Ln SGDP | 2.008*** | 1.541 |
| Ln Similarity | 0.637*** | 0.489 |
| Ln RLFA | 0.310*** | 0.238 |
| Ln distance | -2.193*** | -1.683 |
| Ln bilateral real exchange rate | 0.054*** | 0.041 |
| Linguistic similarity | 0.000*** | 0.000 |
| Colonial | 1.759*** | 1.465 |
| Border | -0.571*** | -0.424 |
| Currency union | 3.136*** | 2.729 |
| Exporting country is an island | -2.250*** | -1.551 |
| Importing country is an island | -3.369*** | -2.176 |
| Exporting country is landlocked | -3.456*** | -2.262 |
| Importing country is landlocked | 3.276*** | 2.754 |
| Non-merchandise MLI | 13.899*** | 10.669 |
| Andean1 | 4.544*** | 3.488 |
| Andean2 | -0.600 | -0.461 |
| Andean3 | -3.088*** | -2.370 |
| APEC1[a] | -2.727*** | -1.728 |
| APEC2[a] | 0.583*** | 0.460 |
| APEC3[a] | 0.486*** | 0.382 |
| EFTA1 | -7.023*** | -5.391 |
| EFTA2 | 0.252 | 0.193 |
| EFTA3 | 3.141*** | 2.411 |
| EC/EU1 | -16.022*** | -12.299 |
| EC/EU2 | -1.209*** | -0.928 |
| EC/EU3 | -0.486* | -0.373 |
| GCC1[a] | -1.782*** | -1.216 |
| GCC2[a] | 0.139* | 0.108 |
| GCC3[a] | -0.600*** | -0.445 |
| LAFTA/LAIA1 | 17.419*** | 13.371 |
| LAFTA/LAIA2 | -6.517*** | -5.002 |
| LAFTA/LAIA3 | -0.635 | -0.487 |
| MERCOSUR1 | -9.376*** | -7.197 |
| MERCOSUR2 | 1.929*** | 1.481 |
| MERCOSUR3 | -1.306*** | -1.002 |
| NAFTA1 | -14.970*** | -11.491 |
| NAFTA2 | 1.166** | 0.895 |
| NAFTA3 | -0.790 | -0.607 |
| SPARTECA1 | 35.093*** | 26.937 |

## Table C.1 (Continued)

| Variable name | Maximum likelihood Tobit estimates | Marginal effects |
|---|---|---|
| SPARTECA2 | -0.402 | -0.308 |
| SPARTECA3 | 0.557 | 0.427 |
| ANZCERTA1 | -24.283*** | -18.639 |
| ANZCERTA2 | -2.229*** | -1.710 |
| ANZCERTA3 | -2.073*** | -1.591 |
| EU-Switzerland1 | -32.320*** | -24.809 |
| EU-Switzerland2 | 5.339*** | 4.098 |
| EU-Switzerland3 | 5.076*** | 3.896 |
| Chile-Colombia1 | -14.407** | -11.059 |
| Chile-Colombia2 | 4.116*** | 3.159 |
| Chile-Colombia3 | 2.237*** | 1.717 |
| US-Israel1 | 10.984*** | 8.431 |
| US-Israel2 | -2.725*** | -2.091 |
| US-Israel3 | -1.435** | -1.102 |
| Australia-PNG1 | -6.200** | -4.759 |
| Australia-PNG2 | -1.202* | -0.923 |
| Australia-PNG3 | -0.946 | -0.726 |
| Chile-MERCOSUR1 | -11.064*** | -8.493 |
| Chile-MERCOSUR2 | 2.136*** | 1.640 |
| Chile-MERCOSUR3 | 1.145*** | 0.879 |
| EU-Egypt1 | -8.702*** | -6.679 |
| EU-Egypt2 | 3.048*** | 2.340 |
| EU-Egypt3 | 4.185*** | 3.213 |
| EU-Poland1 | -27.309*** | -20.962 |
| EU-Poland2 | -0.834*** | -0.640 |
| EU-Poland3 | -0.741** | -0.569 |
| ASEAN-FTA1 | -9.232*** | -7.086 |
| ASEAN-FTA2 | 4.191*** | 3.217 |
| ASEAN-FTA3 | 4.826*** | 3.705 |
| $\sigma$ (standard deviation of the error term) | 3.547 | |

**a** While a Member Liberalisation Index has not been calculated for APEC (a non-preferential arrangement) or for the Gulf Cooperative Council (a preferential one), their possible effects on the trade flows of their members have been controlled for through a set of three conventional zero-one dummy variables. See table 4.2 for a list of members.

*Source:* Table D.1, dynamic PTA indexes, and author's estimates.

# D    Econometric results

Table D.1    **Gravity model of trade — econometric results from full sample**

Dependent variable: Ln exports; time period 1970-1997; unbalanced panel, Tobit maximum likelihood estimates

| Variable name | Dynamic PTA indexes | | Antimonde PTA indexes | |
|---|---|---|---|---|
| | *Without fixed* | *With fixed[a]* | *Without fixed* | *With fixed[a,b]* |
| Ln Sum of exporting and importing countries GDP (SUM) | 2.841*** | 2.008*** | 2.185*** | 2.066*** |
| Similarity in exporting and importing country's GDPs | 1.245*** | 0.637*** | 0.965*** | 0.665*** |
| Ln of absolute differences in per capita GDPs of exporting and importing country | 0.361*** | 0.310*** | 0.217*** | 0.251*** |
| Ln distance | -1.729*** | -2.193*** | -2.292*** | -2.306*** |
| Ln bilateral real exchange rate | 0.162*** | 0.054*** | 0.023** | 0.049*** |
| Linguistic similarity | 0.000*** | 0.000*** | 0.000*** | 0.000*** |
| Colonial | 1.167*** | 1.759*** | 1.628*** | 1.575*** |
| Border | -0.088 | -0.571*** | -0.529*** | -0.626*** |
| Currency union | 1.201*** | 3.136*** | 1.148*** | 3.025*** |
| Exporting country is an island | 0.684*** | -2.250*** | 0.670*** | 0.289 |
| Importing country is an island | 1.070*** | -3.369*** | 1.163*** | -3.268*** |
| Exporting country is landlocked | -2.292*** | -3.456*** | -1.869*** | -0.648* |
| Importing country is landlocked | -2.052*** | 3.276*** | -1.929*** | 4.515*** |
| $3^{rd}$ wave provisions of PTAs | 20.074*** | 13.899*** | -10.760*** | -8.748*** |
| Andean1 | 3.135* | 4.544*** | 3.871*** | 2.774*** |
| Andean2 | 2.496*** | -0.600 | 11.257*** | |
| Andean3 | -0.943*** | -3.088*** | 13.716*** | |
| APEC1[c] | -2.081*** | -2.727*** | -0.052 | 0.091* |
| APEC2[c] | -0.240*** | 0.583*** | 2.118*** | -0.666*** |
| APEC3[c] | 1.245*** | 0.486*** | 4.404*** | 1.941*** |
| EFTA1 | -6.252*** | -7.023*** | -1.972 | -0.690 |
| EFTA2 | 12.322*** | 0.252 | 9.111*** | |
| EFTA3 | 17.195*** | 3.141*** | 15.189*** | |
| EC/EU1 | -16.129*** | -16.022*** | 8.763*** | 9.608*** |
| EC/EU2 | 5.344*** | -1.209*** | -8.208*** | 10.632*** |
| EC/EU3 | 6.343*** | -0.486* | -7.920*** | 18.188*** |
| GCC1[c] | -0.400 | -1.782*** | -0.135 | -0.341* |
| GCC2[c] | -0.498*** | 0.139* | 0.950*** | 0.855*** |
| GCC3[c] | -2.098*** | -0.600*** | 0.118*** | 2.379*** |
| LAFTA/LAIA1 | 30.591*** | 17.419*** | 28.057*** | 26.432*** |
| LAFTA/LAIA2 | -20.659*** | -6.517*** | -22.841*** | |
| LAFTA/LAIA3 | -5.267*** | -0.635 | -32.910*** | |

## Table D.1 (Continued)

| | Dynamic PTA indexes | | Antimonde PTA indexes | |
|---|---|---|---|---|
| | Without fixed | With fixed[a] | Without fixed | With fixed[a,b] |
| MERCOSUR1 | -6.894** | -9.376*** | 0.800 | 1.075 |
| MERCOSUR2 | 1.451*** | 1.929*** | -5.002*** | |
| MERCOSUR3 | 2.917*** | -1.306*** | 23.916*** | |
| NAFTA1 | -17.152*** | -14.970*** | -2.072 | -0.966 |
| NAFTA2 | 5.195*** | 1.166** | 7.310*** | |
| NAFTA3 | -2.720*** | -0.790 | -1.938*** | |
| SPARTECA1 | 42.499*** | 35.093*** | 31.956*** | 31.573*** |
| SPARTECA2 | -9.865*** | -0.402 | -12.250*** | |
| SPARTECA3 | -13.312*** | 0.557 | -18.496*** | |
| CER1 | -28.857*** | -24.283*** | -16.504*** | -17.251*** |
| CER2 | 3.329*** | -2.229*** | 2.285*** | |
| CER3 | 8.040*** | -2.073*** | 7.650*** | |
| EU-Switzerland1 | -24.872*** | -32.320*** | -28.599*** | -27.680*** |
| EU-Switzerland2 | 9.457*** | 5.339*** | 25.975*** | |
| EU-Switzerland3 | 11.542*** | 5.076*** | 26.380*** | |
| Chile-Colombia1 | -17.149** | -14.407** | 4.525* | 3.281 |
| Chile-Colombia2 | 2.234*** | 4.116*** | -4.483*** | |
| Chile-Colombia3 | -0.251 | 2.237*** | 3.093*** | |
| Chile-Mexico1 | | | -4.187* | -4.096*** |
| Chile-Mexico2 | | | -4.933*** | |
| Chile-Mexico3 | | | 1.400*** | |
| US-Israel1 | 15.060*** | 10.984*** | 14.783*** | 14.185*** |
| US-Israel2 | -5.774*** | -2.725*** | 1.888*** | |
| US-Israel3 | 1.112** | -1.435** | 9.056*** | |
| Australia-PNG1 | 0.669 | -6.200** | -10.816*** | -10.797*** |
| Australia-PNG2 | 0.784* | -1.202* | 2.390*** | |
| Australia-PNG3 | 1.487*** | -0.946 | -2.706*** | |
| Singapore-New Zealand1 | | | 2.186* | 1.802* |
| Singapore-New Zealand2 | | | 4.390*** | |
| Singapore-New Zealand3 | | | 3.587*** | |
| Chile-MERCOSUR1 | -7.199** | -11.064*** | -3.888*** | -4.124*** |
| Chile-MERCOSUR2 | 2.632*** | 2.136*** | 11.792*** | |
| Chile-MERCOSUR3 | 0.328 | 1.145*** | 1.603*** | |
| EU-Egypt1 | -4.724 | -8.702*** | 0.622 | -0.055 |
| EU-Egypt2 | -12.498*** | 3.048*** | 3.582*** | |
| EU-Egypt3 | -15.582*** | 4.185*** | -2.505*** | |
| EU-Poland1 | -19.307*** | -27.309*** | -9.699*** | -11.991*** |
| EU-Poland2 | -4.386*** | -0.834*** | 13.716*** | |
| EU-Poland3 | -2.186*** | -0.741** | 21.851*** | |
| AFTA1 | -3.783 | -9.232*** | -5.953*** | -5.597*** |
| AFTA2 | 7.170*** | 4.191*** | 0.492* | |
| AFTA3 | 7.375*** | 4.826*** | -2.095*** | |
| Constant | -12.101 | -2.067*** | -1.962*** | -1.910*** |

(Continued on next page)

## Table D.1     (Continued)

|  | Dynamic PTA indexes | | Antimonde PTA indexes | |
|---|---|---|---|---|
|  | Without fixed | With fixed[a] | Without fixed | With fixed[a,b] |
| LR $\chi^2$ (chi2) | 307352.95 | 422218.2 | 351561.7 | 424106.7 |
| Pseudo R-squared | 0.1829 | 0.2512 | 0.2092 | 0.2524 |
| Log likelihood | -686398.4 | -629010.8 | -664294.0 | -628021.5 |
| σ (standard deviation of the error term) | 4.407 | 3.547 | 4.036 | 3.542 |

**a** To save space the fixed effect coefficients associated with exporting country, importing country and time are not reported here.   **b** In the antimonde specification, some PTA indexes are dropped because of high multicollinearity between the country fixed effects and the PTA indexes.   **c** While a Member Liberalisation Index has not been calculated for APEC (a non-preferential arrangement) or for the Gulf Cooperative Council (a preferential one), their possible effects on the trade flows of their members have been controlled for through a set of three conventional zero-one dummy variables.

*Source:* Authors' estimates.

## Table D.2 Gravity model of trade — results from limited sample with tariff variable included

Dependent variable: Ln exports; time period 1988-1997; unbalanced panel, Tobit maximum likelihood estimates

| Variable name | Dynamic PTA specific variables – fixed effects[a] | | Antimonde PTA specific variables – fixed effects[a,b] | |
| --- | --- | --- | --- | --- |
| | Without tariff | With tariff | Without tariff | With tariff |
| Ln Sum of exporting and importing countries GDP (SUM) | 2.063*** | 2.036*** | 2.838*** | 2.869*** |
| Similarity in exporting and importing country's GDPs | 0.562*** | 0.542*** | 1.534*** | 1.557*** |
| Ln of absolute differences in per capita GDPs of exporting and importing country | -0.154*** | -0.086*** | -0.100*** | -0.031 |
| Ln distance | -1.404*** | -1.393*** | -1.458*** | -1.469*** |
| Ln bilateral real exchange rate | 0.494*** | 0.513*** | 0.448*** | 0.454*** |
| Ln tariff | | -0.134*** | | -0.142*** |
| Linguistic similarity | 0.000*** | 0.000*** | 0.000*** | 0.000*** |
| Colonial | 1.141*** | 1.087*** | 1.170*** | 1.113*** |
| Border | -0.099 | -0.052 | -0.138 | -0.079 |
| Currency union | 0.230 | 0.425 | 0.203 | 0.421 |
| Exporting country is an island | -0.718*** | -0.746*** | -0.472*** | -0.492*** |
| Importing country is an island | 1.177*** | 1.338*** | 4.027*** | 4.380*** |
| Exporting country is landlocked | -1.402*** | -1.315*** | -1.251*** | -1.166*** |
| Importing country is landlocked | -0.236 | -0.300 | 0.421** | 0.429** |
| 3$^{rd}$ wave provisions for all PTAs | 1.222 | 1.748 | -1.328 | -2.067 |
| Andean1 | 5.702*** | 5.545*** | 5.123*** | 5.123*** |
| Andean2 | -8.696*** | -8.485*** | 2.428** | 3.014*** |
| Andean3 | -1.503*** | -1.461*** | 9.368*** | 9.130*** |
| APEC1[c] | 0.929*** | 1.032*** | 0.931*** | 1.029*** |
| APEC2[c] | -0.839*** | -0.817*** | -6.988*** | -7.133*** |
| APEC3[c] | 3.062*** | 2.994*** | 3.500*** | 3.414*** |
| EFTA1 | 0.203 | 0.796 | 3.117 | 2.963 |
| EFTA2 | 12.657*** | 14.513*** | | |
| EFTA3 | 11.631*** | 11.115*** | 8.552*** | 8.364*** |
| EU1 | -3.231*** | | 3.626*** | 5.341*** |
| EU2 | 5.184*** | 6.189*** | 1.118** | 2.207*** |
| EU3 | -0.572 | -0.289 | -5.442*** | -5.031*** |
| GCC1[c] | 2.348 | 2.406 | 2.210 | 2.217 |
| GCC2[c] | -0.537 | 0.173 | | -1.452 |
| GCC3[c] | -0.186** | -0.267*** | 0.051 | -0.026 |
| LAIA1 | 16.159*** | 16.046*** | 17.917*** | 17.605*** |
| LAIA2 | 23.259*** | 24.735*** | | |
| LAIA3 | 15.478*** | 14.820*** | -16.838*** | -16.752*** |
| MERCOSUR1 | -1.432 | -1.132 | 3.227 | 3.169 |
| MERCOSUR2 | -8.512*** | -8.380*** | | |
| MERCOSUR3 | 1.793*** | 1.969*** | 18.830*** | 18.874*** |

(Continued on next page)

## Table D.2 (Continued)

| Variable name | Dynamic PTA specific variables – fixed effects[a] | | Antimonde PTA specific variables – fixed effects[a,b] | |
|---|---|---|---|---|
| | Without tariff | With tariff | Without tariff | With tariff |
| NAFTA1 | -2.800 | -2.692 | 2.551 | 3.315 |
| NAFTA2 | 13.591*** | 14.416*** | 29.870*** | 31.170*** |
| NAFTA3 | -8.453*** | -8.562*** | -8.137*** | -8.385*** |
| SPARTECA1 | 17.033*** | 18.523*** | 17.702*** | 19.271*** |
| SPARTECA3 | -11.930*** | -12.128*** | -14.163*** | -14.880*** |
| CER1 | -8.356** | -8.976 | -6.959** | -7.056** |
| CER2 | 4.704*** | 5.267** | 9.138*** | 9.382*** |
| CER3 | 8.616*** | 8.523*** | 7.378*** | 7.396*** |
| EU-Switzerland1 | -15.405*** | -14.934*** | -15.718*** | -15.541*** |
| EU-Switzerland3 | 17.254*** | 16.723*** | 21.229*** | 20.401*** |
| Chile-Colombia1 | 0.079 | 0.416 | -1.304 | -0.673 |
| Chile-Colombia2 | 3.275*** | 3.013*** | -18.101*** | -18.457*** |
| Chile-Colombia3 | -0.705 | -0.545 | 4.641*** | 4.742*** |
| Chile-Mexico1 | | | -4.612 | -4.405 |
| Chile-Mexico2 | | | 49.545*** | 50.383*** |
| Chile-Mexico3 | | | 4.116*** | 4.243*** |
| US-Israel1 | 7.763 | 10.386* | 10.255* | 13.218** |
| US-Israel3 | 11.120*** | 10.649*** | 10.811*** | 10.341*** |
| Australia-PNG1 | -1.166 | -2.097 | -3.080 | -5.104 |
| Australia-PNG3 | -1.492* | -1.382 | -3.609*** | -3.157*** |
| Singapore-NZ1 | | | -0.235 | 1.892 |
| Singapore-NZ3 | | | 1.307*** | 1.455*** |
| Chile-MERCOSUR1 | -3.654* | -3.440 | -3.682*** | -3.478*** |
| Chile-MERCOSUR2 | 1.403*** | 1.321*** | -4.953*** | -4.780*** |
| Chile-MERCOSUR3 | -1.171** | -1.148** | -2.080** | -2.222** |
| EU-Egypt1 | 5.573 | 5.454 | 5.688** | 4.870* |
| EU-Egypt3 | 0.682 | 0.144 | 0.336 | 0.006 |
| EU-Poland1 | 2.517 | 1.837 | -3.763** | -4.049** |
| EU-Poland2 | -1.457*** | -0.600* | | |
| EU-Poland3 | 2.099*** | 1.956*** | 10.075*** | 9.820*** |
| AFTA1 | -9.693*** | -8.204* | -9.629*** | -8.946*** |
| AFTA2 | -0.484 | 0.354 | | |
| AFTA3 | 3.060*** | 2.827*** | 0.572 | 0.222 |
| | | | | |
| LR $\chi^2$ (chi2) | 32088.3 | 28186.5 | 33800.9 | 29892.8 |
| Pseudo R-squared | 0.1724 | 0.1656 | 0.1816 | 0.1756 |
| Log likelihood | -77034.8 | -71010.6 | -76178.6 | -7.0157.4 |
| σ (standard deviation of the error term) | 2.859 | 2.855 | 2.776 | 2.766 |

[a] To save space the fixed effect coefficients associated with exporting country, importing country and time are not reported here.   [b] In the antimonde specification, some PTA indexes are dropped because of high multicollinearity between country fixed effects and PTA indexes.   [c] While a Member Liberalisation Index has not been calculated for APEC (a non-preferential arrangement) or for the Gulf Cooperative Council (a preferential one), their possible effects on the trade flows of their members have been controlled for through a set of three conventional zero-one dummy variables.

*Source:* Authors' estimates.

## Table D.3 Tests of significance of groups of PTA dummy coefficients for bilateral versus plurilateral agreements[a]

| | Group of PTA dummies being tested | F statistic | F critical | Accept or reject[b] |
|---|---|---|---|---|
| **Effect on intra-bloc** | | | | |
| Bilaterals | EU-Poland, EU-Egypt, Chile-MERCOSUR, Australia-PNG, Israel-US, Chile-Colombia, ANZCERTA | 21.77 | 2.66 | Reject |
| Plurilaterals | Andean, APEC[c], EFTA, EU, GCC[c], LAIA, MERCOSUR, NAFTA, SPARTECA, ASEAN-FTA, EU-Switzerland | 291.22 | 2.27 | Reject |
| **Effect on extra-bloc (imports)** | | | | |
| Bilaterals | EU-Poland, EU-Egypt, Chile-MERCOSUR, Australia-PNG, Israel-US, Chile-Colombia, ANZCERTA | 28.46 | 2.66 | Reject |
| Plurilaterals | Andean, APEC[c], EFTA, EU, GCC[c], LAIA, MERCOSUR, NAFTA, SPARTECA, ASEAN-FTA, EU-Switzerland | 59.65 | 2.27 | Reject |
| **Effect on extra-bloc (exports)** | | | | |
| Bilaterals | EU-Poland, EU-Egypt, Chile-MERCOSUR, Australia-PNG, Israel-US, Chile-Colombia, ANZCERTA | 19.99 | 2.66 | Reject |
| Plurilaterals | Andean, APEC[c], EFTA, EU, GCC[c], LAIA, MERCOSUR, NAFTA, SPARTECA, ASEAN-FTA, EU-Switzerland | 58.79 | 2.27 | Reject |

[a] The test has been done on the estimates from the preferred specification with dynamic PTA dummy variables and fixed effects in table D.1. [b] The null hypothesis of joint significance of the group of coefficients is tested at the 1 per cent level of significance. [c] While a Member Liberalisation Index has not been calculated for APEC (a non-preferential arrangement) or for the Gulf Cooperative Council (a preferential one), their possible effects on the trade flows of their members have been controlled for through a set of three conventional zero-one dummy variables.

*Source:* Authors' estimates.

## Table D.4    **Gravity model of investment**

Dependent variable: Ln stock of outward investment; time period: 1988–97;
unbalanced panel; Tobit maximum likelihood estimates

| | Dynamic PTA indexes | |
|---|---|---|
| Variable name[c] | Without fixed | With fixed[a,b] |
| Ln Sum of exporting and importing countries GDP (SUM) | 1.129*** | 0.946*** |
| Similarity in exporting and importing country's GDPs | 0.682*** | 0.618*** |
| Ln of absolute differences in per capita GDPs of exporting and importing country | -0.586*** | -0.532*** |
| Ln distance | -0.675*** | -0.691*** |
| Ln bilateral real exchange rate | 0.035 | -0.302*** |
| Ln tariff | 0.030 | 0.026 |
| Linguistic similarity | 0.000*** | 0.000*** |
| Colonial | 2.188*** | 1.344*** |
| Border | 0.388 | 0.547** |
| Currency union | 1.295* | 0.821 |
| Home country is an island | -1.478*** | -0.830* |
| Host country is an island | -0.186 | -0.199 |
| Home country is landlocked | -0.938*** | -0.647 |
| Host country is landlocked | 0.829*** | 0.760*** |
| Investment treaties signed | 0.116 | 0.119 |
| Investment treaties enacted | 0.378 | -0.036 |
| M-ANDEAN1 | 7.562 | 5.766 |
| M-ANDEAN2 | -0.531 | -0.022 |
| M-ANDEAN3 | 0.316 | 1.774 |
| M-APEC1[d] | -0.865 | -1.106 |
| M-APEC2[d] | 0.115 | 0.040 |
| M-APEC3[d] | 0.121 | 0.093 |
| M-EFTA1 | 4.474 | 0.053 |
| M-EFTA2 | 0.879 | 1.152 |
| M-EFTA3 | -0.117 | 1.651 |
| M-EU1 | -0.266 | -0.692 |
| M-EU2 | 0.878** | 0.371 |
| M-EU3 | -0.523 | -0.969* |
| M-NAFTA2 | -0.387 | -2.601 |
| M-NAFTA3 | -8.300 | -3.565 |
| M-SPARTECA1 | 15.094 | 21.207** |
| M-SPARTECA2 | 3.578* | 1.964 |
| M-SPARTECA3 | 10.397*** | 9.248*** |
| M-CER1 | -3.780 | -6.503 |
| M-CER2 | -1.636 | -1.667 |
| M-CER3 | -3.776* | -2.352 |
| M-US-Israel2 | 2.245 | 3.768 |
| M-US-Israel3 | -6.243* | -9.181* |
| F-ANDEAN1 | -1.908 | -9.653 |
| F-ANDEAN2 | 3.372 | 4.050 |

## Table D.4    (Continued)

| Variable name[c] | Dynamic PTA indexes | |
|---|---|---|
| | *Without fixed* | *With fixed*[a,b] |
| F-ANDEAN3 | -8.618 | -2.131 |
| F-APEC1[d] | 0.796*** | 0.709*** |
| F-APEC2[d] | 0.727*** | 0.679*** |
| F-APEC3[d] | 0.010 | 0.057 |
| F-EFTA1 | 40.950** | 30.772* |
| F-EFTA2 | -27.664** | -41.555*** |
| F-EFTA3 | 132.456*** | 140.814*** |
| F-EU1 | -0.126 | 0.046 |
| F-EU2 | 4.698*** | 3.184** |
| F-EU3 | 19.588*** | 19.486*** |
| F-MERCOSUR2 | 31.527*** | 32.493*** |
| F-NAFTA1 | -9.653* | -10.113** |
| F-NAFTA2 | 4.345** | 4.896*** |
| F-NAFTA3 | 21.273*** | 21.914*** |
| F-SPARTECA1 | 173.394 | 277.184 |
| F-SPARTECA2 | 165.503*** | 142.560*** |
| F-CER1 | -9.653 | -19.975* |
| F-CER2 | -6.506* | -6.481** |
| F-CER3 | 27.525*** | 29.245*** |
| F-US-Israel1 | 12.250 | -1.938 |
| F-US-Israel2 | 12.503 | 14.412 |
| F-US-Israel3 | 35.107*** | 14.583 |
| F-AFTA1 | 7.661 | 1.276 |
| F-AFTA2 | 5.459 | 5.483 |
| F-AFTA3 | 15.746*** | -16.512** |
| | | |
| LR $\chi^2$ (chi2) | 1655.9 | 2120.6 |
| Pseudo R-squared | 0.2386 | 0.3055 |
| Log-likelihood | -2642.6 | -2410.3 |
| σ (standard deviation of the error term) | 1.794 | 1.510 |

**a** To save space the fixed effect coefficients associated with home country, host country and time are not reported here.   **b** Some PTA indexes are dropped because of high multicollinearity among explanatory variables.  **c M** before each PTA name denotes index of traditional merchandise trade provisions and **F** before each PTA name denotes index of 'new age' provisions.  **d** While a Member Liberalisation Index has not been calculated for APEC (a non-preferential arrangement), its possible effects on the trade flows of its members has been controlled for through a set of three conventional zero-one dummy variables.

*Source:* Authors' estimates.

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