NBER WORKING PAPER SERIES

THE TRADE AND INVESTMENT EFFECTS OF PREFERENTIAL TRADING ARRANGEMENTS

Philippa Dee
Jyothi Gali

Working Paper 10160
http://www.nber.org/papers/w10160

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
December 2003

Paper prepared for Fourteenth Annual NBER-East Asian Seminar on Economics, Taipei, 5-7 September 2003.

The Trade and Investement Effects of Preferential Trading Arrangements
Philippa Dee and Jyothi Gali
NBER Working Paper No. 10160
December 2003
JEL No. F1

ABSTRACT

This study quantifies the impact of traditional and 'new age' provisions of preferential trading arrangements (PTAs) on merchandise trade and investment. It does so by estimating gravity models of bilateral trade and investment. It finds that recent and some past PTAs are not as benign as some contemporary empirical assessments have suggested. A careful consideration of the analytical issues – including controlling comprehensively for other observable and unobservable factors, and testing explicitly for whether the trade and investment effects are significantly different after PTA formation than before – accounts for less favourable finding in this study. It is also possible for PTAs to have adverse effects on investment flows. If investment responds in 'beachhead' fashion to the trade provisions of PTAs, the trade carried out from those beachheads could constitute traditional trade diversion. However, the paper finds little evidence of 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, since trade diversion is still possible from the new investment positions.

Philippa Dee
APSEG
Crawford Building
Australian National University
Canberra 0200
Australia

Jyothi Gali
APSEG
Crawford Building
Australian National University
Canberra 0200
Australia

The trade and investment effects of preferential trading arrangements

The number of preferential trading arrangements (PTAs) has grown dramatically over the last decade or so. By the end of March 2002, there were 250 agreements in force that had been notified to the World Trade Organisation, compared with 40 in 1990 (WTO 2002).

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.

1 Theoretical review

The 'first wave' of PTAs in the 1950s to 1970s were generally limited in scope, with preferential liberalisation of merchandise trade playing a central role (the EU was an important early exception). In part, this was because general tariff levels were higher to start with.

The static analysis of 'first wave' PTAs challenged the presumption that these were a step in the right direction.[1] It concluded that although PTAs eased one economic distortion, namely, the average tariff on imports in general, they 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 PTA members or the world as a whole. The answer 'depends', and the devil is in the detail. The analysis is summarised in appendix A, using a diagrammatic exposition similar to that first developed by Johnson (1960).

The literature also recognised that if the answer 'depends', then the question is an empirical one. Various analysts 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' direction — trade diversion. There is a degree of apparent consensus (summarised later) about which PTAs have been beneficial and which have been harmful to members. There have also been recent generalisations that PTAs are relatively benign.

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 'second wave' agreements were predominantly *free trade agreements*,

---

[1] The seminal work is Viner (1950). Other early contributions came from Gehrels, (1957), Lipsey (1957), (1958), Johnson (1960), Mundell (1964), Corden (1972) and Riezman (1979). Comprehensive surveys of the literature are available in Baldwin and Venables (1995), Pomfret (1997), Bhagwati, Krishna and Panagariya (1999) and Panagariya (2000), among others. Two recent policy-oriented reviews are by the WTO (1995) and the World Bank (2000).

where members retained their own external tariffs, as opposed to *customs unions*, which adopt a common external tariff. Hence rules of origin became important to prevent trade deflection, whereby imports would enter through the country with the lowest external tariff. The 'second wave' of PTAs also 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.

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 free trade. Bhagwati, Krishna and Panagariya (1999) identified two distinct approaches. First, suppose a PTA expands its membership. Will that reduce or increase welfare? If expansion increases welfare, then PTAs are seen as building blocks. Second, 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? This approach uses political economy considerations.

Some partial answers to these questions were provided by Krugman (1993), Deardorff and Stern (1994), Baldwin, (1996), Levy (1997) and Krishna (1998). The most recent, comprehensive analyses by Zissimos and Vines (2000) and Andriamananjara (2002) acknowledge that joining a PTA is the best safe-haven strategy when other countries are doing so. But they find 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.[2] Any redesign of the WTO rules disciplining the formation of PTAs would need to recognise that reality.

During the 1990s the number of PTA expanded dramatically. In addition to new preferential initiatives by the European Union and the United States, the 'third wave' now includes players such as Japan. Until 2002 Japan was one of only four WTO members not to participate in any PTA (although it was a member of non-discriminatory APEC). Its first agreement, the Japan-Singapore Agreement for a New Age Partnership, typifies many 'new age' agreements. The provisions governing merchandise trade are very limited. Both countries already have zero or very low tariffs on imports of non-agricultural products, and 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. Instead the agreement focuses on 'new age' issues — especially e-commerce and services. Other such agreements include foreign direct investment, competition policy, government procurement, labour and environmental standards.

Despite the evolution of third wave or new age agreements, there has been little literature dealing with the effects of preferential non-tariff provisions. Two exceptions are Pomfret

---

[2] These are further developments of the arguments about the negative externalities from terms of trade changes developed by Bond and Syropoulos (1996) and Bagwell and Staiger (1998, 1999), among others.

(1997, chapter 10) and Ethier (1998a, b, 1999, 2001), who deal primarily with effects on investment.

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. 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.

The analogy with preferential liberalisation of *investment provisions* is as follows.

- 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, irrespective of whether the partner is the least-cost location (see also Baldwin 1994).

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

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. Many third wave agreements are between small and larger countries. The small countries want to reform their internal economies so that they can be accepted as members of the global trading system. The sign of successful reform is whether these countries attract foreign direct investment. The small countries use (often asymmetrical) trade concessions to large countries as a way of signalling a credible commitment to reform.

There is no presumption in Ethier's framework that the investment they attract comes from the large PTA partner. The aim of these small reforming countries is often to divert investment from non-member countries. Ethier (2001) also examines in detail the incentives for the larger 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 associated with agglomeration economies.

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 (1999) fears), the competition for investment may itself be less benign.

At first sight, the focus of third wave agreements on non-tariff issues may suggest that traditional concerns about trade diversion are outmoded. But the theoretical literature 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.

The second section of this paper summarises the trade and non-trade provisions included in a number of recent PTAs. The third section empirically estimates the effects of recent trade and non-trade provisions on bilateral trade and investment flows. The fourth section recapitulates the key findings.

2 Breadth of coverage of PTAs

Figure 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 Member Liberalisation Index (MLI) is described in detail in Adams et al. (2003). 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.

The index includes provisions covering:

- agricultural products — including domestic support measures, tariff quotas, sanitary and phytosanitary measures, tax exceptions, export incentives, and technical barriers to trade, among others;
- industrial products — including coverage and restrictiveness of rules of origin, safeguards, antidumping, coverage and timing of tariff preferences, among others;
- services — including provisions governing market access and national treatment in services; and
- general measures — general national treatment provisions, investment rules, domestic competition policy, government procurement, intellectual property rights, and general provisions covering the temporary and permanent movement of people.

These provisions are classified into two sub-indexes for quantitative analysis. The merchandise MLI includes the provisions covering agriculture and industrial products —

an index of traditional provisions. The non-merchandise MLI, covering 'third wave' issues, includes the services provisions, plus the general measures covering all trade.

The coverage varies from one PTA to another. Some involve only a few products or sectors, while others stretch well beyond the traditional tariff elimination. Note that the scores are based on how the language of the agreements is written, not on whether or how the provisions are used. A high index for non-merchandise trade indicates that a PTA is more liberal to members in its services trade, investment and related provisions. This index takes a high value for Singapore-NZ, followed by CER (between Australia and New Zealand), NAFTA and EU.

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, nor in the subsequent econometric analysis. For this reason, the econometrics may understate (where interaction effects reinforce) or overstate (where interaction effects cancel) the overall effects of PTAs.

The estimated relationship between these provisions and the level of trade (or investment) provides an indication of whether provisions included in PTAs have any effect collectively on trade (or investment) 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 (or investment) may become barriers to non-member countries.

3 Empirical analyses

The key empirical task is to disentangle the effects of PTA formation or expansion from all other influences on trade and investment flows. There are two main approaches available in the literature.

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 can also 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 appendix A, 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 is an *ex post* evaluation of the effects of PTAs.

3.1 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.[3]

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

---

[3] The gravity model can be 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. Anderson and Wincoop (2003) nevertheless showed that many empirical implementations have strayed from the theoretically derived reduced form.

bilateral trade determinants. 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 — 'a 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 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. 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.

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 2). 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.

The current analysis also uses three dummy variables for each PTA. But instead of taking simple zero-one values, irrespective of the scope or coverage of the PTA provisions, the dummies take the value of the MLI index (or sub-index), whenever the PTA is in force.

Since the gravity model is estimated using panel data, the PTA-specific dummy variables are introduced in one of two ways. 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. In contrast, *antimonde* PTA-specific indexes take a non-zero value for all the years in the sample, irrespective of when the PTA was formed. These antimonde indexes are used as the panel analogue to the non-dynamic indexes of previous cross sectional gravity model studies. They have the same disadvantage as these studies of allowing the formation, expansion, contraction of a PTA to affect trade and investment 'before the event'.

3.2 Model specification

Effects on trade

The panel data includes information on all potential trading partners, even when a country has no exports to some 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.[4] 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] Adams et al. (2003) describes the data sources in detail. The panel

[4] For the full sample trade model, the number of observations is 116 countries x 115 partners x 28 years = 373520, with about 44 per cent having zero values.

[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. Arbitrarily small numbers can be used in place of zeros. Eichengreen and Irwin (1995)

has a relatively long time dimension, covering 1970–97 for the estimation of trade effects (1988–97 for the estimation of investment effects). While this risks the problem of sub-sample instability, it has the advantage that it helps to overcome the problem of nuisance parameters in the estimation of fixed effects in a Tobit context (Greene 2002).

The gravity model estimated here allows for *product differentiation* at the country level. Much of the recent literature on PTAs has focused on imperfectly competitive behaviour. 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 the current gravity model specification. 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.

The corresponding reduced form of gravity model for trade is:

---

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.

$$
\begin{aligned}
LnY^{*}_{ijt} = a + \alpha_i + \gamma_j + \lambda_t + \beta_1 LnSGDP_{ijt} + \beta_2 LnRLFA_{ijt} + \beta_3 LnSimilar_{ijt} \\
+\beta_4 LnDis_{ij} + \beta_5 LnRER_{ijt} + \beta_6 LnTar_{ijt} + \beta_7 Lin_{ij} + \beta_8 Bor_{ij} \\
+\beta_9 Col_{ij} + \beta_{10} Cur_{ij} + \beta_{11} Is_i + \beta_{12} Is_j + \beta_{13} lock_i + \beta_{14} lock_j \\
+\beta_{15} 3wave_{ij} + \sum {}_{ij} MRTA_{ij} + \sum {}_{-j} MRTA_{i-j} + \sum {}_{-i} MRTA_{j-i} \\
+Ln\varepsilon_{ijt}
\end{aligned}
\qquad (1)
$$

where

Ln is natural logarithmic transformation;

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;

α_i is unobserved specific effects in exporting country i;

γ_j is unobserved specific effects in importing country j;

λ_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 in importing country j on goods from country i 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; 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;

ε_{ijt} is an error term.

From an econometric point of view, the α_i , γ_j and λ_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) and Anderson and van Wincoop (2003).

The expected relationship of the observed explanatory variables with bilateral exports is discussed in detail in Adams et al. (2003). In a model of product differentiation, countries similar in size will trade more, and the trade will be of 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. The absolute difference in the per capita *GDP* between exporting and importing countries (*RLFA*) is included as an explanatory variable in the gravity model as a way of distinguishing the traditional from the differentiated product approaches.[6]

The above gravity model specification includes the real exchange rate (*RER*) as a relevant price variable in order to control for fluctuations in relative prices among trading partners.

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

---

[6] 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.

the bilateral tariff variable includes preferential tariffs,[7] 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.

Effects on investment

The product differentiation specification also provides a rationale for applying the gravity model to investment flows (Egger 2001).

The raw foreign direct investment data for this analysis are sourced from UNCTAD and OECD for the period between 1988 and 1997 for about 77 countries (see Adams et al. 2003). As there are some deficiencies in this data, the qualitative aspects of the analytical results rather than the precise magnitude of the investment estimates are of main interest.

The dependent variable in the 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.

[7] The bilateral tariff data are applied rates obtained from UNCTADs' TRAINS database. As such they incorporate tariff preferences.

Secondly, statistical tests suggested that a gravity model based on the stock of outward investment was preferred to a model based on outflows.

Apart from the more limited number of years and countries analysed, the investment model is similar to the trade model. In particular, the key bilateral determinants are the same for trade and investment (see also Egger 2001), although the sign and magnitude of the impact of some of these explanatory variables differs.

For each PTA, three merchandise MLIs and three indexes of 'third wave' provisions are included in the investment gravity model to test how the investment to members, and to and from non-members, responds to the traditional and 'third wave' provisions embedded in each PTA. Three merchandise MLIs and only one (intra-bloc) non-merchandise MLI were included in trade gravity model. 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 in the trade model.

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 either signed or enacted between a pair of countries.

There are clearly some interdependencies between the trade equation and the investment equation, but in the absence of the remaining elements of the balance of payments, there is an insufficiently tight link to warrant Seemingly Unrelated Regression or some other

systems estimation technique. Similarly, there are no obvious cross-equation restrictions that would improve the efficiency of estimation. One option would have been to include trade flows in the investment equation and investment flows in the trade equation, but this would have created a severe simultaneity problem. In the current PTA context, it was felt that including trade PTA dummies in the investment equation and vice versa was a minimalist approach to capturing the interdependencies.

The expected effects of traditional and 'new age' provisions on investment are not 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 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 positions in one PTA member country in order to serve the market of the others. Alternatively, if multinational 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.

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.

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 significant coefficients of the three separate non-merchandise MLI variables in parallel fashion to the trade equation. One further qualification to the welfare implications of investment 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.

3.3 New evidence on trade creation and diversion

The observable effects — normal bilateral trade determinants and trade provisions of PTAs — and unobservable country and time specific effects all significantly influence the bilateral trade flows. The signs and significance of the coefficients on the observable effects are generally as expected (table 1). 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. In the preferred specification with dynamic PTA variables and fixed effects, the coefficient on the sum of GDPs is about 2, as expected.

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 PTAs do 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 2, which shows whether the net effects are positive or negative.

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.[8]

---

[8] The assessment of net trade effects is based on the marginal effects of PTAs reported in Adams et al. (2003), rather than the raw maximum likelihood Tobit estimates in table 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 Adams et al. 2003), in practice the assessment of the direction of net trade effects is the same, whichever is used.

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.[9] 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.

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.

All the past gravity model studies surveyed here estimated the PTA effects using PTA dummies defined in antimonde form.[10] The comparable dynamic and antimonde estimates in this analysis are reported in table 1. They show that when PTA dummies are

---

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

[10] A more recent study with panel data and dynamic dummies is by Fukao, Okubo and Stern (2003).

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. 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. 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 PTA specific indexes, compared to a significant positive effect found using antimonde indexes. The dynamic dummies account for individual countries switching from EFTA to the EU.

Another reason for the more negative findings in this study is the use of panel analysis which allows unobservable heterogeneity to be controlled for. Without allowing for country specific effects, the coefficients on 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. The 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.[12]

A model with the average bilateral tariff variable as an additional determinant of trade is estimated on a restricted dataset,[13] and the results are shown in table 3. The average tariff rate in the importing country has a significant and negative effect on its imports, as expected. The PTA specific indexes also show a significant effect. This is because they capture not just the existence of tariff preferences (as also captured in the tariff variable), but also the effects of non-tariff measures affecting merchandise trade, such as rules of origin.

The coefficients on the PTA specific indexes 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

---

[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 findings here are also more negative than those in a recent panel study by Clarete, Edmonds and Wallack (2003). However, their study uses antimonde dummies and fails to control for unobserved country- and time-specific heterogeneity. It also controls for fewer observable factors than here.

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

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 non-merchandise provisions show a positive (complementary) relationship with trade when PTA indexes 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.

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 trade creation. Other recent empirical assessments have shown a more optimistic outlook for trade in preferential agreements by ignoring these analytical issues.

One potential puzzle is that the intra-bloc effect is found to be negative for apparently more comprehensive and liberal PTAs — EU, CER, NAFTA, MERCOSUR and some of the recent bilateral agreements. One possible reason is that total discrimination 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.[14]

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

---

[14] For analyses of the welfare effects of rules of origin, see Dattagupta and Panagariya (2002), Krueger (1999b), Ju and Krishna (1998) and Krishna and Krueger (1994).

PTAs that were found to have a negative intra-bloc effect, relative to average trade patterns in the sample.

Sensitivity analysis

The above model specification differs from standard specifications in several respects. One is the inclusion of the sum of importing and exporting country GDPs, rather than each country's GDP separately. As noted, this comes from a model of product differentiation originating with Helpman and Krugman (1985) and Helpman (1987). But in the original model, the dependent variable was total bilateral trade — the sum of exports in both directions — rather than bilateral exports. This paper has followed Egger (2001) and others by using bilateral exports as the dependent variable, to allow a more refined examination of the trade diversion issue. And the resulting estimate of the coefficient on the sum of GDPs is very similar to that of Egger (2001). But the question arises whether the results are sensitive to this treatment of GDPs, especially given the redefinition of the dependent variable. To test this, the above model was reestimated with (the log of) GDPs of importing and exporting country entered separately. The coefficient on the exporting country's GDP was 1.118 and the coefficient on the importing country's GDP was 0.766, with the sum being close to the result in table 1. In all other respects, the results were similar to those shown in table 1. The results are available on request from the authors.

The specification also differs from some others by using 'triple indexed' fixed effects, controlling separately for importing country, exporting country and time related unobservable effects. This is in contrast to specifications that use a single country-pair

fixed effect, as well as a time effect. As noted, the triple indexed approach was advocated by Matyas (1997, 1998) for econometric reasons. It is also the approach needed to control for the misspecifications identified by Haveman and Hummels (1998) and Anderson and van Wincoop (2003). Haveman and Hummels note that total exports are likely to be a better measure of 'economic mass' than GDP. Gravity models are likely to be misspecified when bilateral exports grow faster than GDP simply because total exports grow faster than GDP, not because of some PTA effect. The extent to which total exports grow faster than GDP is an individual country effect, not a country pair effect. Similarly, Anderson and van Wincoop (2003) note that in the correct theoretical specification, bilateral trade flows should depend on three measures of trade barriers — the bilateral trade barrier between the two countries, and each country's resistance to trade with all regions. Again, the two latter resistance effects are country effects, not country pair effects.

It was not possible to test the sensitivity of the above Tobit specification to the inclusion of a country pair fixed effects because there were too many country pair groups, preventing estimation. The approach also risks over-specification, with the country pair effects duplicating much of the work of the PTA dummies.

A final piece of sensitivity analysis is the inclusion of a lagged dependent variable. Appropriate econometric estimation of such a specification in a Tobit context with fixed effects is unlikely to have been possible on a dataset of this size. In many other contexts, ordinary least squares would be an acceptable alternative to Tobit estimation in practice, with the results not differing greatly between the two estimation methods. Were this the case here, it would have been possible to test sensitivity to the inclusion of a lagged

dependent variable in an OLS context. However, Tobit estimation matters greatly here, as would be expected with 44 per cent of the observations on the dependent variable being zero. OLS estimation of the original triple indexed specification on the full sample (with zero export values replaced by small positive numbers) led to results with a coefficient on the sum of GDPs being unreasonably low, at 0.555, and similar downward bias in other coefficients, including those on distance, currency union, and the PTA dummies. Thus the results of further sensitivity analysis on the OLS specification were judged unreliable. For what it is worth, adding a lagged dependent variable produced short-run coefficients even lower than the already low OLS estimates, while the value of the coefficient on the lagged dependent variable itself implied long-run coefficients somewhat higher than the OLS estimates. In all other respects, the results were unchanged.

3.4 New evidence on investment creation and diversion

The observable effects — normal bilateral investment determinants and traditional and 'third wave' provisions of PTAs — and unobservable country and time specific effects all significantly influence the bilateral stock of outward investment (table 4). The signs of coefficients on the normal bilateral investment determinants are 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 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-merchandise trade provisions. A single PTA can fall into more than one category.

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. SPARTECA is a non-reciprocal agreement between Australia, New Zealand and selected South Pacific Island countries with few non-trade provisions and with trade provisions only for selected products. But the non-reciprocal tariff preferences have allowed the 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 sub-sample attract investment mainly from non-member countries as a result of their 'third wave' 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. It appears that Ethier's beachhead investment is not an important phenomenon empirically.

Table 5 tentatively indicates investment responses to the traditional and 'third wave' 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 6.

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 figure 1). 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 growth of superannuation 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 7). Of the nine PTAs examined for investment effects, 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.

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 factor not controlled for in the analysis that make these countries net capital exporters, rather than the effects of PTA formation and 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, 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 similar tone, 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 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, member countries can gain in welfare terms, despite investment diversion. But either case, members could well gain even more from multilateral liberalisation of non-trade restrictions.

4 Summary

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.

The new empirical work outlined in this paper 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.

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 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, 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 empirical work in this paper 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.

There is 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 also found here.

Thus the results of this paper suggest that there may be 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.

Appendix A — The static welfare effects of PTAs

In figure A.1, 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'.

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.[15] 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. 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? 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.[16] 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.

---

[15] 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).

[16] 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 empirical tests for trade creation and trade diversion. 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.

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 (see Panagariya (2000) for a summary), although it has not always been explicit about the nature or source of the less-than-perfect competition there.

The easiest way to see the dramatic effects that less-than-perfect competition can have is to imagine in figure A.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.

One of the most general treatments of less-than-perfect competition is by Mundell (1964). He draws the following 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." (Mundell 1964, p. 8)

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 (1999) conclusion, for example, that the United States is likely to gain, but that Mexico could lose, from NAFTA.

References

Adams, R., Dee, P., Gali, J. and McGuire, G. 2003, *The Trade and Investment Effects of Preferential Trading Arrangements — Old and New Evidence*, Productivity Commission Staff Working Paper, Canberra, May.

Aitken, N. 1973, 'The effect of the EEC and EFTA on European trade: A temporal cross section analysis', *American Economic Review*, 63(5), pp. 881–92.

Anderson, J. and Wincoop, E. van 2003, 'Gravity with gravitas: A solution to the border puzzle', *American Economic Review*, 93(1), pp. 170–92.

Andriamananjara, S. 2002, 'On the size and number of preferential trading arrangements', *Journal of International Trade and Economic Development*, 11(3), pp. 279–95.

Bagwell, K. and Staiger, R. 1998, 'Will preferential arrangements undermine the multilateral trading system?', *Economic Journal*, 108(449), pp. 1162–82.

Bagwell, K. and Staiger, R. 1999, 'An economic theory of the GATT', *American Economic Review*, 89(1), pp. 215–48.

Baier, S.L. and Bergstrand, J.H. 2001, 'The growth of world trade: Tariffs, transport costs and income similarity', *Journal of International Economics*, 53(1), pp. 1–27.

Balassa, B. 1967, 'Trade creation and trade diversion in the European common market', *Economic Journal*, 77(1), pp. 1–21.

Baldwin, R. 1994, *Towards an Integrated Europe*, Centre for Economic Policy Research, London.

Baldwin, R. 1996, 'A domino theory of regionalism', in Baldwin, R.E. Haapranta, P. Kiander, J. (eds), *Expanding European regionalism: The EU's new members,* Cambridge University Press, Cambridge, UK, pp. 25–48.

Baldwin, R.E., Forslid, R. and Haaland, J. 1995, 'Investment creation and investment diversion: Simulation analysis of the single market program', CEPR Discussion Paper No. 1308, Centre for Economic Policy Research, London.

Baldwin, R.E. and Venables, A.J. 1995, 'Regional economic integration', in Grossman, G. and Rogoff, K. (eds), *Handbook of International Economics, Vol. III*, Elsevier, Amsterdam, pp. 1597–644.

Battellino, R. 2002, 'Australia as a capital exporter', Paper presented at the conference on The Impact of An Australian–US Free Trade Agreement: Foreign Policy Challenges and Economic Opportunities, Canberra, 29-30 August 2002.

Bayoumi, T. and Eichengreen, B. 1995, 'Is regionalism simply a diversion? Evidence from the evolution of the EC and EFTA', CEPR Discussion Paper no. 1294, Centre for Economic Policy Research, London.

Bhagwati, J. 1999, 'Regionalism and multilateralism: an overview', in Bhagwati, J., Krishna, P. and Panagariya, A. (eds), *Trading Blocs: Alternative Approaches to Analyzing Preferential Trade Agreements*, The MIT Press, Cambridge and London, pp. 3–32.

Bhagwati, J., Krishna, P. and Panagariya, A. 1999, *Trading Blocs: Alternative Approaches to Analyzing Preferential Trade Agreements*, The MIT Press, Cambridge and London.

Binder, M., Papadimitrou, J. and Monday, I. 2001, *International Investment Rules: An Efficiency Perspective*, Staff Working Paper, Productivity Commission, Canberra, May.

Boisso, D. and Ferrantino, M. 1997, 'Economic distance, cultural distance, and openness in international trade: Empirical puzzles', *Journal of Economic Integration*, 12(4), pp. 456–84.

Bond, E. and Syropoulos, C. 1996, 'The size of trading blocks, market power and world welfare effects', *Journal of International Economics*, 40(3–4), pp. 411–37.

Clarete, R., Edmonds, C. and Wallack, J. 2003, 'Asian regionalism and its effects on trade in the 1980s and 1990s', *Journal of Asian Economics*, 14(1), pp. 91–129.

Clark, X. and Tavares, J. 2000, 'A quantitative approach using the gravity equation', Development Discussion Paper no. 748, Harvard Institute for International Development, Harvard University.

Corden, M. 1972, 'Economies of scale and customs union theory', *Journal of Political Economy*, 80(3), pp. 465–75.

De Rosa, D.A. 1998, 'Regional integration arrangements: static economic theory, quantitative findings and policy guidelines', Mimeo, http://www.worldbank.org/research/projects/regional.htm (accessed 5 May 2001).

Deardorff, A. and Stern, R. 1994, 'Multilateral trade negotiations and preferential trading arrangements', in Deardorff, A. and Stern, R. (eds), *Analytical and Negotiating Issues in Global Trading System*, University of Michigan Press, Ann Arbor, pp. 53–85.

Deardorff, A.V. 1998, 'Determinants of bilateral trade flows: Does gravity work in a neoclassical world', in Frankel, J.A. (eds), *The Regionalization of the World Economy,* The University of Chicago Press, Chicago and London, pp. 23–28.

Duttagupta, R. and Panagariya, A. 2002, 'Free trade areas and rules of origin: economics and politics', Mimeo, http://www.bsos.umd.edu/econ/panagariya/apecon/Technical%20Papers/FTA-ROO-rd-ap-pub13.pdf (accessed 6 January 2003).

Egger, P. 2001, 'European exports and outward foreign direct investment: A dynamic panel data approach', *Weltwirtschaftliches Archiv*, 137(3), pp. 427–49.

Eichengreen, B. and Irwin, D.A. 1995, 'Trade blocs, currency blocs and the reorientation of world trade in the 1930s', *Journal of International Economics*, 38(1-2), pp. 1–24.

Ethier, W. 1998a, 'Regionalism in a multilateral world', *Journal of Political Economy*, 106(6), pp. 1214–45.

Ethier, W. 1998b, 'The new regionalism', *Economic Journal*, 108(449), pp. 1149–61.

Ethier, W. 1999, 'Multilateral roads to regionalism', in Piggott, J. and Woodland, A. (eds), *International Trade Policy and the Pacific Rim*, St Martin's Press, New York, pp. 131–52.

Ethier, W. 2001, 'The new regionalism in the Americas: A theoretical framework', *North American Journal of Economics and Finance*, 12(2), pp. 159–72.

Evenett, S.J. and Keller, W. 1998, 'On theories explaining the success of the gravity equation', NBER Working Paper no. 6529, National Bureau of Economic Research, Cambridge.

Feenstra, R.C., Markusen, J.R. and Rose, A.K. 2001, 'Using the gravity equation to differentiate among alternative theories of trade', *Canadian Journal of Economics*, 34(2), pp 430–47.

Fink, C. and Primo Braga, C.A. 1999, 'How stronger protection of intellectual property rights affects international trade flows, The World Bank Working Paper no. 2051, World Bank, Washington DC, URL:http://www.worldbank.org/html/dec/Publications/Workpapers/wps2000series/wps2051/wps2051.pdf (accessed January 2002).

Frankel, J. 1997, *Regional Trading Blocs in the World Economic System*, Institute for International Economics, Washington DC.

Frankel, J. Stein, E. and Wei, S. 1995, 'Trading blocs and the Americas: The natural, the unnatural, and the super-natural', *Journal of Development Economics*, 47(1), pp. 61–95.

Freund, C. 2000, 'Different paths to free trade: The gains from regionalism', *Quarterly Journal of Economics,* 115(4), pp. 1317–41.

Fukao, K., Okubo, T. and Stern, R.M. 2003, 'An econometric analysis of trade diversion under NAFTA', *North American Journal of Economics and Finance*, 14, pp. 3–24.

Gehrels, F. 1957, 'Customs union from a single-country viewpoint', *Review of Economic Studies*, 24(1), pp. 61–4.

Gilbert, J., Scollay, R. and Bora, B. 2001, 'Assessing regional trading arrangements in the Asia-Pacific', Policy Issues in International Trade and Commodities Study Series No. 15, UNCTAD, United Nations, Geneva.

Greene, W. 2002, 'The behaviour of fixed effects estimator in non-linear models', mimeo, Department of Economics, Stern School of Business, New York University.

Haveman, J. and Hummels, D. 1998, 'Trade creation and trade diversion: New empirical results', *Journal of Transnational Management Development*, 3(2), pp. 47–72.

Helpman, E. 1987, 'Imperfect competition and international trade: Evidence from fourteen industrial countries', *Journal of the Japanese and International Economies,* 1(1), pp. 62–81.

Helpman, E. and Krugman, P. 1985, *Market Structure and International Trade*, MIT Press, Cambridge.

Hertel, T., Walmsley, T. and Itakura, K. 2001, 'Dynamic effects of the "new age" free trade agreement between Japan and Singapore', Journal of Economic Integration, 16(4), pp. 446–84.

Johnson, H. 1960, 'The economic theory of customs union', *Pakistan Economic Journal*, 10(1), pp. 14–32.

Ju, Jiandong and Krishna, K. 1998, 'Firm behaviour and market access in a free trade area with rules of origin', NBER Working paper no. 6857, National Bureau of Economic Research, Cambridge.

Krishna, K. and Krueger, A.O. 1994, 'Implementing free trade areas: Rules of origin and hidden protection', CIES Seminar Paper 94-09, Centre for International Economic Studies, Adelaide, Australia.

Krishna, P. 1998, 'Regionalism and multilateralism: A political economy approach', *Quarterly Journal of Economics*, 113(1), pp. 227–51.

Krueger, A. 1999a, 'Trade creation and trade diversion under NAFTA', NBER Working Paper no. 7429, National Bureau of Economic Research, Cambridge.

Krueger, A. 1999b, 'Free trade agreements as protectionist devices: rules of origin', in James, R. M., James, C. M. and Raymond, R. (eds), *Trade Theory and Econometrics: Essays in Honour of John S. Chipman,* Routledge, New York, pp. 91–102.

Krugman, P. 1993, 'Regionalism versus multilateralism: analytical notes', in de Melo, J. and Panagariya, A. (eds), *New Dimensions in Regional Integration*, Cambridge University Press, Cambridge, UK, pp. 58–79.

Levy, P. 1997, 'A political-economic analysis of free-trade agreements', *American Economic Review*, 87(4), pp. 506–19.

Li, Q. 2000, 'Institutional rules of regional trade blocs and their impact on international trade', in Switky, R. and Kerremans, B. (eds), *The Political Consequences of Regional Trade Blocks*, Ashgate, London, pp. 85–118.

Lipsey, R. 1957, 'Mr Gehrels on customs unions', *Review of Economic Studies*, 24(2), pp. 211–14.

Lipsey, R. 1958, *The Theory of Customs Unions: A General Equilibrium Analysis*, PhD Thesis, University of London.

Markusen, J. R. 1983, 'Factor movements and commodity trade as complements', *Journal of International Economics*, 14(3/4), pp. 341–56.

Matyas, L. 1997, 'Proper econometric specification of the gravity model', *World Economy*, 21(3), pp. 363–68.

Matyas, L. 1998, 'The gravity model: some econometric consideration', *World Economy*, 20(3), pp. 397–401.

McLaren, J. (2002), 'A theory of insidious regionalism', *Quarterly Journal of Economics*, CXVII(2), pp. 571–608.

Michaely, M. 1976, 'The assumptions of Jacob Viner's theory of customs unions', *Journal of International Economics*, 6(1), pp. 75–93.

Mundell, R. 1964, 'Tariff preferences and the terms of trade', *Manchester School of Economic and Social Studies*, 32, pp. 1–13.

Panagariya, A. 1999, 'The regionalism debate: An overview', *World Economy*, 22(4), pp. 477–511.

Panagariya, A. 2000, 'Preferential trade liberalization: The traditional theory and new developments', *Journal of Economic Literature*, XXXVIII(2), pp. 287–331.

Panagariya, A. and Duttagupta, R. 2002, 'The "gains" from preferential trade liberlisation in the CGE models: Where do they come from?', Mimeo, http://www.bsos.umd.edu/econ/panagariya/apecon/techpaper.htm (accessed 6 January 2003).

Pomfret, R. 1997, *The Economics of Regional Trading Arrangements*, Clarendon Press, Oxford.

Riezman, R. 1979, 'A 3x3 model of customs unions', *Journal of International Economics*, 9(3), pp. 341–54.

Robinson, S. and Thierfelder, K. 2002, 'Trade liberlisation and regional integration: the search for large numbers', *Australian Journal of Agricultural and Resource Economics*, 46(4), pp. 585–604.

Scollay, R. and Gilbert, J. 2000, 'Measuring the gains from APEC trade liberalisation: an overview of CGE assessements', *World Economy*, 23(3), pp. 175–97.

Soloaga, I. and Winters, L.A. 2001, 'Regionalism in the nineties: What effect on trade?', *North American Journal of Economics and Finance*, 12(1), pp. 1–29.

Viner, J. 1950, *The Customs Union Issue*, Carnegie Endowment for International Peace, New York.

Winters, L. 1997, 'Assessing regional integration arrangements', Development Research Group, The World Bank, Washington DC.

World Bank 2000, *Trade Blocs*, World Bank, Washington DC.

WTF (World Trade Flows) 1997, *World Trade Flows Database 1970-1992*, National Bureau of Economic Research, United States.

WTF (World Trade Flows) 2000, *World Trade Flows 1980-1997 Database*, Institute of Governmental Affairs, University of California, Davis, United States.

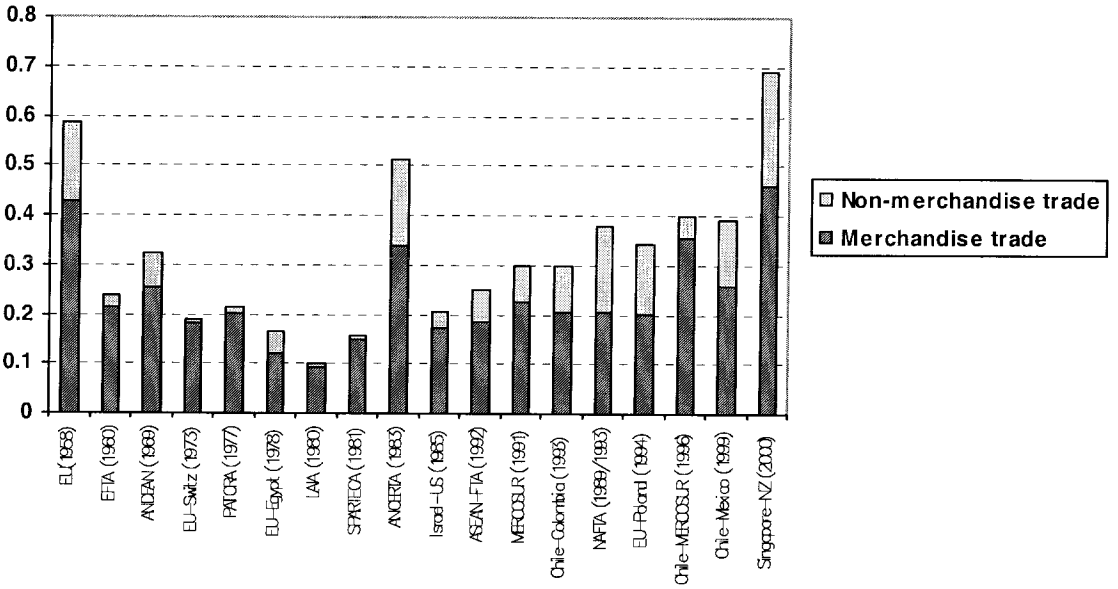
WTO (World Trade Organisation) 1995, *Regional Trading Arrangements and the World Trading System*, WTO, Geneva.

WTO (World Trade Organisation) 2002, 'Work of the Committee on Regional Trade Agreements', http://www.wto.org/english/tratop_e/region_e/regcom_e.htm (accessed 18 June 2002).

Zissimos, B. and Vines, D. 2000, 'Is the WTO's Article XXIV a free trade barrier?', CSGR Working Paper No. 49/00, Centre for the Study of Globalisation and Regionalisation, University of Warwick.

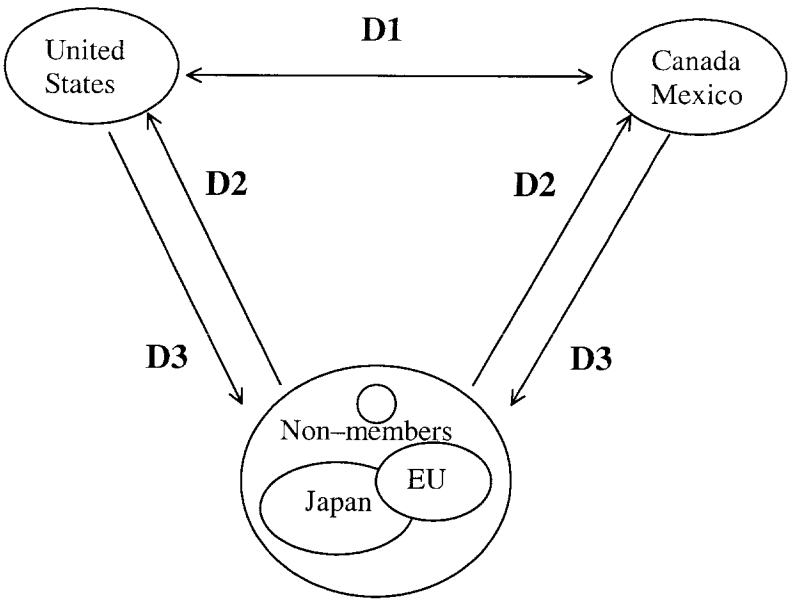
Figure 1 **Member Liberalisation Index for selected PTAs**

Index score ranges between zero and one



Data source: Adams et al. (2003).

Figure 2 **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.

Figure A.1 **An illustration of trade creation and diversion effects of a PTA**

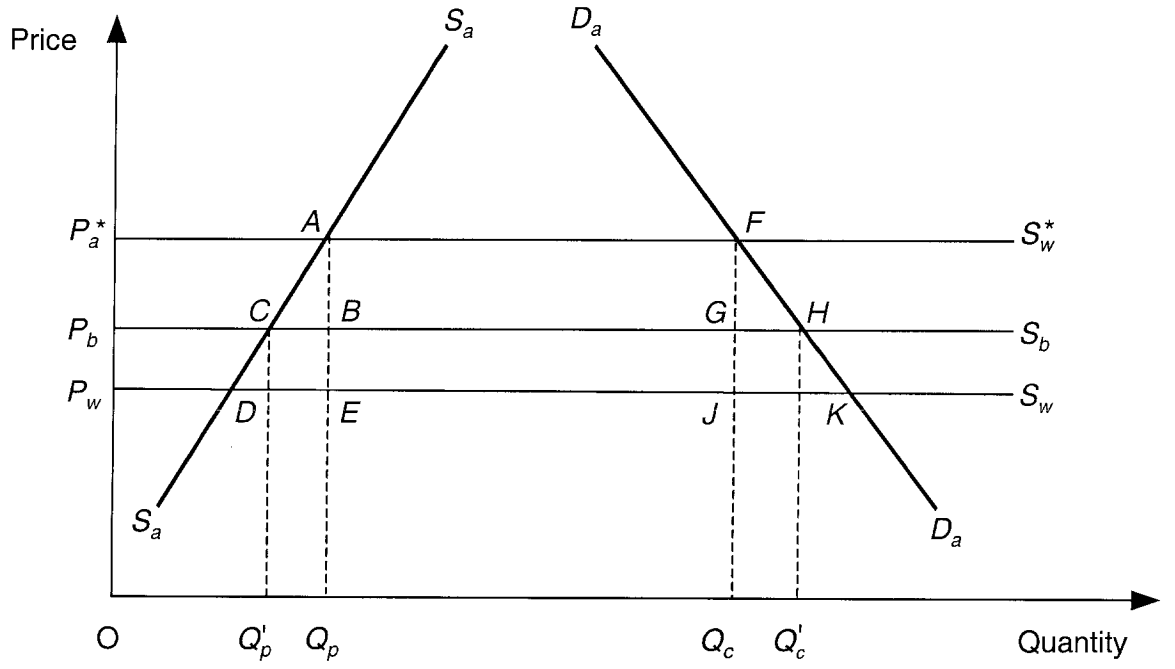


Table 1 **Gravity model of trade — econometric results from full sample**

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

	Dynamic PTA indexes		*Antimonde PTA indexes*	
Variable name	*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***
3rd 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***	

(Continued on next page)

Table 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 1 (Continued)

	Dynamic PTA indexes		*Antimonde PTA indexes*	
	Without fixed	*With fixed*[a]	*Without fixed*	*With fixed*[a,b]
LR χ^2 (chi2)	307352.95	422218.2	351561.7	424106.7
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 2 **New evidence on PTAs as causing net trade creation or diversion**

Past estimates[a]			*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

[a] Assessment based on the findings from a majority of the following studies: 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).

Sources: References above and table 1.

Table 3 **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

	Dynamic PTA specific variables – fixed effects[a]		*Antimonde PTA specific variables – fixed effects*[a,b]	
Variable name	*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**
3rd 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 3 (Continued)

	Dynamic PTA specific variables – fixed effects[a]		*Antimonde PTA specific variables – fixed effects*[a,b]	
Variable name	*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 χ^2 (chi2)	32088.3	28186.5	33800.9	29892.8
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 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

(Continued on next page)

Table 4 (Continued)

	Dynamic PTA indexes	
Variable name[c]	*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 χ^2 (chi2)	1655.9	2120.6
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.

Table 5 **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 4, fixed effects estimates.

Table 6 **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 4, fixed effects estimates.

Table 7 **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 4, fixed effects estimates.