



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
<http://ageconsearch.umn.edu>
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*



UNIVERSITÀ DELLA CALABRIA



CEPII



University of Dublin
Trinity College



UNIVERSIDAD
POLITECNICA
DE VALENCIA



Regional integration and production location: what theories (do not) tell us

Margherita Scoppola
(University of Macerata, Italy)

Working Paper 06/10

TRADEAG is a Specific Targeted Research Project
financed by the European Commission within its VI
Research Framework. Information about the Project, the
partners involved and its outputs can be found at
<http://tradeag.vitamib.com>

Regional integration and production location: what theories (do not) tell us[°]

Margherita Scoppola

Dipartimento di studi sullo sviluppo economico

University of Macerata, Italy (scoppola@unimc.it)

Abstract: There is broad empirical evidence showing that regional integration considerably influences the choice of firms over the location of production; nevertheless, the theoretical literature on this issue is rather limited. Traditional preferential trade theory does not include the driving force of these changes, that is, economies of scale. The paper surveys recent contributions from the new economic geography and the multinational enterprise literature addressing the issue of the effects of preferential trade, with the aim of examining the main features of the models, and assessing their predictions and policy implications critically. The paper shows, among other things, that the findings are often contradictory, depending upon the underlying hypotheses of the models used. Overall, there is a need of further research on the welfare implications of preferential trade agreements when location effects are considered; policy implications may be relevant, especially for small countries joining preferential trade areas with the expectation of benefiting from the location of economic activity in their territory.

JEL classification: F12, F13, F15

Key words: regional integration, multinational firms, economic geography.

1. Introduction

There is a host of empirical evidence that regional integration influences firms' choice as on the location of production, although the pattern and the consequences of these changes are still debated¹. Several studies have shown that integration in the European Union (EU) has attracted outside firms - in the early decades mainly from the US and more recently from Japan - and also has caused an upsurge of intra-UE foreign direct investment (FDI); few

[°] I wish to thank Giovanni Anania for his useful comments on an earlier draft of the paper. Financial support received by the 'Agricultural Trade Agreements (TRADEAG)' research project, funded by the European Commission (Specific Targeted Research Project, Contract no. 513666), is gratefully acknowledged.

¹ Surveys of the empirical literature on this issue may be found, among others, in Yannopoulos (1990), Blomstrom and Kokko (1997), Dunning (1997a, 1997b), Barba Navaretti and Venables (2004).

studies have found that integration has also affected the distribution of the economic activity within a member State. More recently, a number of papers have emphasised how the prospects of entering the Union have profoundly influenced the pattern of FDI and trade between the candidate and the EU member countries. As for other preferential trade agreements (PTAs), such as NAFTA and MERCOSUR, there is evidence to suggest changes in the location of production both within participating countries and between the area and the rest of the world.

Moreover, in the policy arena there is a general consensus that one of the main benefits from joining a PTA is that a country may thereby attract outside firms and benefit from a growth of industrial activity in its territory; this opinion often persuades governments of small countries to sign a PTA with large developed countries.

These facts raise a number of questions that should be addressed by the theory.

The first issue is related to the effects of a PTA on location choices of inside and outside firms: how does a PTA affect the pattern of FDI within the area and between member states and outsiders? And how is the geographical distribution of economic activity within the area likely to change?

The second issue is related to the impact of changes in the location of production on internal and external trade: does the upsurge of FDI in the area substitute previous trade or encourage new trade? And how does the new pattern of geographical distribution of economic activities within the area affect trade?

The third issue is related to the welfare implications of a PTA when taking into account location effects: who are the losers and the winners of regional integration? Under what circumstances is it wise to join a PTA? And what are the consequences of PTAs for multilateralism?

The traditional theory of PTAs, based on Vinerian's framework assuming perfect competition, does not fully capture the widespread effects of relocation linked with regional integration. This is essentially because the driving force of these changes is the presence of economies of scale: the reduction of internal barriers to trade and the enlargement of the "internal" market induce firms to reorganize their production inside the area, by concentrating production to exploit economies of scale. In addition, theories of PTAs do not take into consideration the multinationality of firms and FDI and, thus, do not take into account the effects of PTAs, not only on the location of firms, but also on their ownership.

To date, the theoretical literature addressing these issues is rather limited. One of the reasons for this is that trade policy theories, over the last few decades, have extensively incorporated industrial organization models, but there has been little progress in including the two branches of international economics which are more likely to help explain production location patterns. One is new economic geography (NEG): drawing on the early work by Krugman (1991), an extensive body of literature has addressed the issue of production location within international trade models with economies of scale; however, Baldwin *et al* (2003) note that NEG models have hardly ever been used to analyse trade policy issues. The other branch of international economics which could be useful to capture location effects is the theory of multinational firms and FDI; many papers have incorporated multinational firms in international trade models,² but only a few have addressed trade policy issues.

It is thus not surprising to note that in most recent surveys of PTA theories³ location effects are hardly ever mentioned; Panagariya (2000) just mentions it in the conclusions, by stating that a major gap in the theory of PTAs is “little theoretical work drawing the link” between FDI and PTAs.

This paper surveys the international trade models addressing the issue of the relationship between regional integration and the location of production, in particular the more recent models, and compare and critically assess their predictions and their policy implications.

Basically, this means that the survey focuses on theoretical papers developed within two general frameworks: the NEG models, and the models including FDI. As already mentioned, these two families of international trade models are likely to be the most appropriate to deal with the location effects of PTAs: the former because they try to depict the geographical pattern of the distribution of production in the presence of economies of scale; the latter because their main objective is to explain the (location) choices of multinational firms. In both models, trade costs are a crucial variable affecting the firms’ choice on the location of production and, therefore, a discriminatory reduction of tariffs in these models directly affects their decision making.

It is worth noting that, although within this literature there is a great variety of models, two features distinguish NEG models from those including FDI. NEG models focus on the agglomeration factors which induce firms to concentrate geographically, while models with FDI do not consider agglomeration. Further, models with FDI take into account the

² An overview of this literature may be found in Markusen (2002) and Barba Navaretti and Venables (2004).

³ See, among others, Panagariya (2000) and Krishna (2005).

multinationality of firms and, consequently, include the factors inducing firms to invest abroad; this means that they deal with changes not only in the location of production, but also in the ownership of production plants.

Table 1 presents a tentative classification of the surveyed papers. The majority of contributions focus on positive analysis - aiming at answering questions like “what are the effects of PTAs on location and trade?” – while only a few of them address normative issues, and focus on the welfare implications of regional integration. A further important distinction is between papers that assume symmetry of firms and countries, from those that introduce certain asymmetries: while the former mainly deal with the location effects of integration between similar (developed) countries, the latter examine the effects of integration between a developed and a less developed country.

An additional difference among the papers - which is not included in Table 1 - is the kind of regional agreement that they model. In most papers, regional integration basically means a reduction (or an elimination) of internal trade barriers – a Free Trade Area (FTA) – or a change in the external tariffs - a Custom Union (CU). Some papers specifically consider also the “hub-and-spoke” agreements, that is, bilateral free trade agreements of one country, the hub, with several other countries, the spokes. In all papers assuming symmetry between countries, preferences are modelled as reciprocal, i.e. there is a bilateral reduction of tariffs. Conversely, papers assuming asymmetries between countries generally examine the location effects of a reduction of the industrial tariffs only in the more developed countries.⁴ Only one paper takes into account the fact that regional agreements, together with trade liberalization, frequently include other arrangements such as investment liberalisation and, for small developing countries, commitments to economic reform;⁵ these arrangements may become relevant, as both trade and location effects of a PTA may also depend on the other commitments included in the agreement.

The paper is organised as follows. The next section briefly surveys early contributions, while the following two sections review the main features of the NEG models and of models including FDI. The final section summarizes the main findings of the surveyed literature and presents some concluding remarks.

⁴ It should be noted, as will be illustrated in the following sections, that this is the consequence of the lack of an industrial sector in the less developed countries, which in most models are assumed to produce only a non-tradable good. This is the reason why a PTA leads to a reduction of tariffs only in the more developed countries.

⁵ There are several examples of this form of regionalism; among others, the enlargement of the EU to the Central and Eastern European countries and the participation of Mexico in NAFTA.

2. Regional integration, economies of scale and multinational firms: early contributions

Early contributions may be placed in two different branches of the literature: within the traditional theory of PTAs, some papers introduced the hypothesis of increasing returns, while in the literature on multinational firms a number of contributions qualitatively addressed the issue of the effects of regional integration on FDI.

The consideration of economies of scale in regional integration theory dates back to Corden, (1972), who assumes perfect competition and homogenous products. The effects of a CU under this hypothesis are illustrated in Figure 1.⁶ Assume two small integrating countries, H and P, with identical demand ($D_{h,p}$), but different production costs, AC_h and AC_p , with H being the least efficient country. Production costs in the partner countries are assumed to be higher than in the rest of the world; the world price is S_w . In free trade, H and P would not produce, and import from the rest of the world Oq_6 at price OA.

Assume that, before the CU, the non discriminatory tariff is equal to AB: in that case, H and P do not produce, but import quantity Oq_5 from the rest of the world at price OB. The formation of a CU permits producers of country P to enter production, as they can benefit from the larger union-wide market and exploit economies of scale. This means that the domestic demand of the CU is entirely satisfied by the production of country P (Oq_3), so that the “rest of the world” production is fully replaced by internal production. This has been called by Baldwin and Venables (1995) the “production shifting” effect of a PTA. From a welfare point of view, the effect of the CU is ambiguous, since the negative effects (trade diversion + loss of tariff revenue) may be (or may not be) counterbalanced by the positive effects from the decrease in the domestic price (from OB to OD).

However, a CU may also be unambiguously welfare improving. This happens if the pre-PTA non discriminatory tariff is large enough (i.e. is such that the world price plus the tariff is higher than the minimum average cost of CU member countries) to allow CU producers to enter production even before the formation of a CU. In Figure 1 this happens when the tariff in country P (H) is greater than AC (AD); before the CU, P and H produce and consume quantities Oq_1 and Oq_2 , respectively, and there are no imports. In this case, a CU does not divert trade, and there is only trade creation; production concentrates in the lower cost CU

⁶ A later paper by Choi and Yu (1984) further extended Corden’s analysis. The illustration presented here is based on Panagariya (2000) and El-Agraa (1999).

country, from where the good is exported to the least efficient CU country. As can be seen in the figure, all production will concentrate in P, which produces quantity Oq_3 at price OD. Thus, CU member countries enjoy the positive effects of integration, which are due to the decline in costs and, thus, in prices.

Although quite simple, this framework illustrates two important effects of regional integration in an industry with economies of scale: a) the shifting of the whole production from outside the CU to inside the CU; b) the concentration of the whole production in the most efficient country of the CU. As regards traditional CU theory, the key feature is that, with economies of scale, the rest of the world and the least efficient member countries no longer produce.

Turning to FDI theory, Kindleberger (1966) argued that the effects of a CU are not only trade creation and trade diversion, but also investment creation and investment diversion.

Investment creation is due to an increase of inward FDI flows to the CU from third countries, and is the response of firms from non-member countries to trade diversion: outside firms previously exporting to the area locate plants inside the CU in order to maintain their market share. Investment diversion is the shifting of FDI within the CU and is the consequence of trade creation, that is, the re-organization of production inside the CU, and this implies a shift of investments from one member to another.

Yannopoulos (1990) and Dunning (1993) further extended Kindleberger's ideas by considering the dynamic effects of integration; they identify four types of investment as a response to the static and dynamic effects of a CU:

- a) Defensive export-substituting investments are the response of non-member firms to the trade diversion effect in order to maintain market share (investment creation). In this case, FDI replaces trade: the net trade effect is negative, while the net FDI effect is positive.
- b) Reorganization investments occur when outside firms are already inside the block before integration, and emerge as a consequence of trade creation (investment diversion); they imply a consolidation of previous operations into fewer larger plants. The net trade and FDI effects are likely to be neutral for the region as a whole; however, the net FDI effect may be positive for some countries (those where FDI are concentrated) and negative for others;
- c) Offensive export-substituting investments are the consequence of one of the dynamic effects of the CU, that is, the increase in the growth rate of member countries; firms

invest in the CU to take advantage of the growing demand; these investments do not necessarily replace existing trade, even though they may preclude a further expansion of trade; the net FDI effect is positive.

- d) Rationalised investments are the consequence of another dynamic effect of regional integration, that is, the possibility to exploit economies of scale and reduce production costs; these investments are thus mainly motivated by international differences in production costs and are likely to be complementary to trade. Further, the net FDI effects are also likely to be positive.

In later contributions, Dunning (1997a, 1997b) emphasises that regional integration effects are likely to be sector-specific. More significant location effects tend to be found in technology intensive industries in which plant economies are important relative to transport costs, while a less concentrated pattern is expected where products are more dependent on classical resource endowments for their competitiveness. These factors, however, explain the location pattern of the economic activities, but not the pattern of FDI.⁷ A further necessary condition for foreign ownership is the significant presence of firm specific intangible assets; in these industries multinational firms are likely to prevail because there is a strong incentive for firms to exploit their intangible assets abroad, at no additional cost.⁸

3. Regional integration and the location of firms in the New Economic Geography

One of the early efforts to address the issue of the effects of regional integration in an economic geography model is found in Baldwin and Venables (1995), followed by two papers by Puga and Venables (1997, 1999). The three papers develop a model (that we will refer to as the BPV model) and use it to assess the effects of PTA under different circumstances⁹.

Drawing on the early work of Krugman (1991) and on part of the subsequent NEG literature (e.g. Krugman and Venables, 1995), they investigate the ways in which regional integration

⁷ It is worth noting that changes in FDI due to regional integration may or may not coincide with a change of *plant location*; what this literature points out is that the *ownership* of the economic activity changes and this may have relevant consequences on the structure and location of economic activities, as well as on the welfare of integrating countries.

⁸ The reference here is to the traditional theory of the multinational enterprise, predicting that FDI is likely to arise if firms own intangible assets which may not be profitably sold on the international markets because of high transaction costs (Caves, 1996). Market failure for intangible assets can explain why multinational firms may displace arm's-length transactions.

⁹ For example, while Puga and Venables (1997) consider several symmetric countries, in a later paper (Puga and Venables, 1999) the model is reduced to four countries which may differ even before the implementation of a PTA.

may alter the distribution of economic activity within the area and, thereby, increase regional inequalities.

As in most NEG models, the location of an economic activity is the complex outcome of various forces at work: some forces drive toward dispersion, while others push in the opposite direction and encourage firms to agglomerate. The BPV model has two distinctive features with respect to the basic NEG model developed by Krugman (1991): first, while in the Krugman model agglomeration occurs as a consequence of the labour force migration, here labour is assumed to be immobile between countries; this hypothesis is aimed at extending the basic NEG model to cases where labour mobility is rather limited, as is the case within the European Union; second, the BPV model explicitly considers input-output linkages within the industrial sector; these become the driving forces of agglomeration.¹⁰

Turning to the main features of the BPV model, all countries have identical factor endowment and technology. There are two sectors: the commodity sector is perfectly competitive, the product is homogeneous and there are constant returns to scale, while in the industrial sector firms are imperfectly competitive, products are differentiated and there are increasing returns to scale (Figure 2). As factor of production the commodity sector uses labour, which is assumed to be perfectly mobile among sectors, whereas the industrial product requires not only labour but also production inputs which are themselves industrial differentiated products. The key assumption of the model is, therefore, that each firm's output is used both as an input by other firms (the input-output linkage) and as a final product by consumers.

Firms perceive their own price demand elasticity and apply a constant mark-up over marginal costs; in the long run, as firms are free to enter and exit, profits in the industrial sector vanish. Wages are the only source of consumer income and, thus, an increase (decrease) in wages in a given location means an increase (decrease) in consumer demand.

There are trade barriers only for the industrial goods which take the iceberg form, that is, it is assumed that only a fraction of the quantity shipped arrives at the final destination.

In this framework, four locational forces determine the profitability of firms in a particular country. The first two forces, the labour and output market, are "traditional" and induce firms to disperse. A high geographical concentration of industry, on the one hand, increases labour demand and, accordingly, wages, and this induces firms to disperse; on the other hand, there will be a greater competition from other firms producing different varieties and this reduces

¹⁰ A comprehensive presentation of various NEG models can be found in Baldwin *et al* (2003).

prices and profitability, and pushes firms to spread the economic activity.¹¹ Thus, low wages and low competition induce firms to disperse their activities, by locating production in each country.

The other two forces, backward and forward linkages, may push firms to agglomerate. Cost linkages (i.e. backward linkages) arise because a greater number of firms in a location means that more intermediate inputs are locally available at a lower price; this is the consequence of economies of scale in the production of intermediate goods as well. Demand (i.e. forward) linkages arise because the presence of more firms in a location means an increase in the demand for intermediate goods and, thus, in sales and profitability, given that firms produce both intermediate and final goods.¹² Therefore, these linkages push firms to agglomerate economic activities in one country.

The BPV model predicts that, overall, industrial location is dispersed (concentrated) if dispersion forces are higher (lower) than agglomeration forces. The key parameters affecting the final equilibrium are the level of trade barriers, the degree of substitution between industrial goods, the scale economies due to fixed costs, and input-output links. More specifically, agglomeration forces are likely to prevail when the level of internal trade barriers and product substitution are low and economies of scale and input-output links high.

Before analysing the location effects of a PTA between symmetric countries, it may be useful to investigate the effects of a non discriminatory reduction of a tariff. In the BPV model, if tariffs are very high, all countries produce both industrial products and commodities and are self-sufficient; countries continue to be totally symmetric (i.e. they have the same number of firms, the same wages, and so on) and there is no trade. A small reduction of trade barriers induces the development of intra-industry trade - as predicted by the models of the new trade theory assuming differentiated products and increasing returns – but countries are still identical. However, if trade barriers fall below a critical value,¹³ then firms agglomerate in some countries, because forward and backward linkages (a lower cost of input and a higher

¹¹ In the NEG literature this is referred to as the “competition effect”.

¹² It should be noted that the “demand linkages” effect in the BPV model corresponds to the so called “home market” effect of the basic NEG model; however, the home market effect here is due to an expansion of the *firm’s* demand for industrial goods, rather than to an increase in the *consumer* demand following an increase of the labour force, given that in the BPV model, as already mentioned, labour is immobile. It should be also noted that, with respect to the basic NEG model, here there is an additional agglomeration force that is the “cost linkages”.

¹³ This value of the trade barriers is positively correlated with the value of input-output links, external trade barriers and scale economies.

demand for output) give higher profits to firms located in the more industrialised countries.¹⁴

Agglomeration triggered by trade liberalization has positive effects in countries where industrial firms agglomerate, and negative effects in the others: countries with (without) industry will be richer (poorer), since wages are higher (lower) and consumer prices are lower (higher).

What if liberalization occurs on a discriminatory basis? On the basis of numerical simulations, the BPV model predicts different location effects depending on the stage of integration (Figure 3).

- a) *Early stage of integration*: if internal trade barriers are above the critical value below which agglomeration forces drive location decisions (IT^* in Figure 3), then a discriminatory reduction of the trade barriers increases the number of firms within the PTA (n_u and n_g in Figure 3), and decreases those outside the PTA (n_j); this is because the former can enjoy a larger market within the area and save trade costs (the “production-shifting effect”). This will clearly benefit PTA countries, which increase their welfare; the number of varieties increases, by improving consumer welfare; trade costs decrease; competition increases, causing a fall of the firms’ mark-up (the so called “pro-competitive effect”) and an increase of the production scale, ultimately leading to a reduction of the firms’ costs and of prices of goods. At the same time the PTA, for the opposite reasons, is harmful to the rest of the world.
- b) *Intermediate integration*: if internal trade barriers fall below the critical value, agglomeration forces prevail and industry concentrates in some of the PTA member countries, the “core” (country U in Figure 3), while the others, the “periphery” (country G in Figure 3) lose industry shares. At this stage, the rest of the world does not lose any more and can even gain. The wages gap within the PTA increases, because of industrial agglomeration. Preferential liberalization is now clearly welfare improving for the “core”, while the “periphery” is worse off.
- c) *Deep integration*: as liberalization proceeds and internal trade barriers fall further (lower than IT^{**} in Figure 3), location become more sensitive to differences in production costs. The periphery of the PTA may once again become attractive, because of low wages and

¹⁴ In this framework, it is not possible to determine in which country firms agglomerate because *ex-ante* countries are identical. Below the trade barriers critical value, there are multiple asymmetric equilibriums. It should be noted that one of the important features of NEG models is that, starting from an initial setting in which countries are identical, a non discriminatory liberalisation may end up with wide asymmetries between countries. This outcome may not be obtained in models that do not take into account agglomeration forces.

free access to the core market; firms in the PTA periphery increase while those in the rest of the world decrease. The wages gap between the core and the periphery is then reduced. The PTA is now welfare improving for the periphery, while the rest of the world is worse off.

The effects of a PTA among symmetric countries may slightly differ with a hub-and-spoke agreement (Figure 4). In this case, in the early stages of integration firms shift from the spokes (G and J) to the hub (U), because from there they can sell the product with lower trade costs to several markets (the hub and all the spokes), while from the spokes they exploit the lower trade costs only when exporting to the hub (the so called hub-effect; Krugman, 1993). In an intermediate stage of integration the shift of production to the hub drastically accelerates, as a consequence of the agglomeration forces; the hub may specialise completely in industrial production. With deep integration the spokes may become attractive again, as production costs and wages are lower than in the hub; moreover, they also benefit from the lower cost of intermediates produced in the hub. The model, however, predicts that just one of the spokes may see an increase in firms, while there will be a reduction in the others. As a consequence, a deep hub-and-spoke integration may lead not only to a hub-effect, but also to a divergence between the spokes.

A final question is how results change if countries are initially different. Suppose that, before the PTA, countries have identical factor endowments and technology, but industrial firms are concentrated in one country, while the others produce the commodity only.¹⁵ The model predicts that a reduction of tariffs on a non discriminatory basis initially leads to a shift of some industrial firms to one of the less industrialised countries, since low wages and the reduced cost of intermediates make this country attractive. In an early stage of liberalization, however, the other less industrialised countries may be penalised as they specialise in the commodity sector. Only with deep liberalization will firms also locate in the other less industrialised countries. Conversely, a PTA between a developed and a less developed country will benefit the latter more than a multilateral liberalisation, as the number of firms in the less developed member of the PTA will be greater; this is because the benefits from improved market access to the industrialised country and the reduction of input costs are, by and large, greater than with multilateral liberalisation. However, the improved situation of one

¹⁵ This case is aimed at depicting the possible effects of a PTA on the industrialisation process of a developing country (Puga and Venables, 1999). The assumption of identical factor endowment and technology is obviously naive when studying the effects of a PTA between a developed and a developing country.

of the less developed countries is at the expenses of the others, which suffer a significant reduction in number of firms and welfare.¹⁶

On the whole, although the BPV model has been mostly used to address positive issues, there are some interesting policy implications. The first is that a PTA between symmetric countries is likely to be beneficial for some (the periphery) only if there is a strong and credible commitment to full integration; this may “convince the peripheral regions to put up with the harder times during the intermediate stages” (Puga and Venables, 1997, p. 362). The second is that, even if there is a commitment to full integration, a hub-and-spoke agreement between symmetric countries is not desirable for all the spokes, as some of them are likely to end up worse off. The third implication is that a less industrialised country may find a PTA with a developed country more fruitful than a multilateral liberalisation.

The BPV model, despite focusing on the relationships between regional integration and where firms locate, does not consider foreign direct investment and the multinationality of firms, which are modelled merely “as single plant operations” (Puga and Venables, 1999, p.26). Gao (1999) introduced vertical multinationals within a NEG model. Basically, the model is very similar to the BPV one, but with one important distinction. In the manufacturing industry there is a two-stage production technology: to produce variety, a firm first needs to produce headquarter services, which may be located only in the home country, and then the final product, using labour and headquarter services, which may be located either at home or in a foreign country. Thus, unlike the previous models, there are two kinds of firms: the national firm produces both the headquarter services and the final product at home and then serves the other markets through exports; the multinational firm produces headquarter services in the home country and sets up plants of the final product in the foreign country. The simulations show that the inclusion of multinational production does not qualitatively change the results of the BPV model; rather, it changes the range of parameters in which the different industry structures are stable. More specifically, the critical value of trade costs below which agglomeration forces lead to industrialization at the periphery is higher. Thus, the most relevant conclusion of the paper is that multinational production may speed up the spread of industry and the process of industrialization in the peripheral country.

¹⁶ The paper also examines the effects of a PTA between less developed countries and concludes that it may be sufficient to induce industrialization (the driving force of location being only the enlarged market) but, again at the intermediate stage of integration, only in one country.

A further contribution by Baldwin *et al* (2003) uses a fairly different model from the BPV one and has a number of interesting policy implications. The authors extend the so called “footloose capital” model – i.e. a more tractable and simple version of the basic core-periphery model - to the three countries case, in order to investigate the effects of preferential agreements. There are many differences between the BPV and the “footloose capital” models. One is the assumption about production factors. In the footloose capital model there are two factors of production, capital and labour; capital, which is used by the industrial sector, is assumed to be mobile among countries; further, owners of capital are assumed to repatriate profits to their own country and, therefore, the country where capital is concentrated may be different from the country where profits are spent. Furthermore, there are no vertical linkages in this model and agglomeration forces are driven only by the “market access advantage”, that is, the advantage of shifting production to larger markets protected by trade barriers.

Dispersion forces, as usual, are due to the increased competition in the country with the larger number of firms (market-crowding effect). Countries are assumed to be identical from all points of view, with the exception of the size of the market, which is a key variable of production location decisions. This model, thus, limits the mechanisms explaining production location, but gains in analytical tractability; unlike the contributions by Puga and Venables (1997, 1999) all findings are derived analytically and do not rely on numerical simulations.

In this model, larger countries will host a share of world industry which is larger than their share on world expenditure (the home market effect), as the ratio between the market access advantage and the market-crowding disadvantage increases with the size of the market. Further, this effect is amplified by the openness of trade, since freer trade weakens the market crowding effect much faster than the market access effect.

The model predicts that preferential liberalization will induce a production shifting effect (firms relocate from outside to inside) and this in turn will induce capital to shift inside the area (investment diversion effect). This production shifting effect is larger the lower internal and world-wide trade barriers, and the smaller the size of the PTA, as this increases the amount of outside industry that could be shifted.

It is interesting to see what happens during gradual preferential liberalization. As in Puga and Venables (1997), during the formation of a PTA there will be also an internal home market effect, that is industry agglomerates in the largest member country. The critical value of internal trade barriers for agglomeration is higher (i.e. it comes sooner) when the asymmetries

in size between member countries are large and when trade barriers with the rest of the world are high.

A first policy implication thus is that a PTA would be more feasible for small countries if accompanied by multilateral liberalization, since this will limit the internal home market effect. Further, small countries might prefer a big-bang PTA rather than a gradual liberalization, because the former will not result in internal relocation and avoids spatial inequalities within the area.

4. Regional integration in international trade models with Foreign Direct Investment

A limited number of papers have explicitly introduced FDI and multinational firms in theoretical models of regional integration. Most of them build on partial equilibrium models, while just two use general equilibrium frameworks.

4.1 Partial equilibrium models

All partial equilibrium models build on early game theoretical models of multinational firms (e.g. Smith, 1987; Horstmann and Markusen, 1992; Motta, 1992), and, therefore, share certain assumptions. The basic idea is that each country has a single firm which makes a choice as to the mode of entry into the foreign market of a homogeneous product. If the firm serves the foreign market by exports, then it faces certain trade costs. The firm may also choose to establish a plant abroad and to serve the foreign market from the local plant; in this case the firm incurs some set-up fixed costs, but it “jumps the tariff”.

Unlike the NEG models and general equilibrium models including FDI, as will be seen in the next section, the most distinctive feature of these papers is the consideration of strategic competition among firms, mainly modelled as a two-stage Cournot game. In the first stage, firms choose how to enter the market, while in the second firms compete *à la* Cournot. In this setting, the key variables affecting the equilibrium are the size of the markets relative to the economies of scale, due to fixed costs, and trade costs: if trade costs are low (high) relative to fixed costs, then firms choose to export (invest abroad).

4.1.1 Positive analysis

The basic two-country framework was first extended by Motta and Norman (1996) to three countries, in order to investigate the effects of economic integration on FDI (Figure 5). The

first distinctive assumption of this model is that countries and firms are totally symmetric (identical consumer preferences; size of the market; marginal and fixed costs); second, firms compete only within the integrating area, that is, while firms from the outside country sell both at home and in the integrating area (through exports or FDI), firms from the integrating countries sell only within the area, by means of exports or FDI; thus, there is no competition in the outside country.

By means of numerical simulations, the paper studies the possible market equilibriums, which depend upon three variables: the relationship between fixed costs and market size and the values of the internal and external tariffs. The paper also provides a welfare analysis; the welfare of a country here is given by consumer surplus plus firms' profits.

Among the various equilibria illustrated in the paper, three "pre-PTA" equilibria are considered here (Figure 6):

- (1) All firms export: this is likely to happen when both internal and external tariffs are low and/or the ratio fixed costs/market size is high. This is because, under these circumstances, there are not enough incentives to invest abroad.
- (2) Inside firms serve markets through FDI, outside firms through exports: this is an intermediate equilibrium, which is likely to prevail if the value of the pre-PTA internal tariff is intermediate and close to the external tariff and/or the ratio fixed costs/market size is low. In this case, internal firms find it profitable to serve the foreign country by FDI, as fixed costs are not so high relative to the size of the market and the internal tariff induces inside firms to "jump" it; however, incentives for FDI are not strong enough for the outside firm.
- (3) All firms invest abroad: this happens when both internal and external tariffs are very high and/or the ratio fixed costs/market size is low. For the opposite reasons to those in equilibrium (1), in this case there are strong incentives to invest abroad.

The authors consider two possible kinds of PTA: an agreement implying only a reduction of the internal tariff and an agreement leading to an increase in the external tariff as well.

Figure 6 reproduces some of the results of the simulations by Motta and Norman (1996) for a given value of the external tariff.¹⁷ The figure illustrates that the effects of a reduction of the internal tariff depend upon the pre-PTA equilibrium:

- Starting from the initial equilibrium (1), a reduction in the internal tariff induces outside firms to invest in one of the integrating countries and to export from that single plant to the other member countries (export platform). Thus, this case depicts a typical investment creation effect of regional integration: FDI substitutes previous exports, but may also create new exports within the area. Welfare effects for the integrating countries are straightforward: the reduction in internal trade costs increases competition and reduces profits, but prices decrease and consumers gain. According to Motta and Norman, the balance between consumer gains and profit losses is positive, as long as the reduction of internal tariff is large enough. The authors also show how an increase in the external trade barriers may have similar effects, i.e. induce outside firms to invest in the area.
- Starting from initial equilibrium (2), a reduction in the internal tariff makes the option of exporting within the area more profitable. Thus, insiders will dismantle the second plant in the partner country and serve it through exports; the outside firm will rationalise FDI in the integrating area, by leaving a single plant in one member country from which it exports to the others. This case illustrates the investment diversion effect of regional integration. In the area there will be less FDI, more trade, and lower consumption. This leads to an increase in prices as well as profits; nevertheless, according to the simulation results, the increase in profits offsets the decrease in consumer surplus. Thus, investment diversion is welfare improving. An increase in the external tariff in this case clearly does not have any effect.
- Starting from equilibrium (3) a reduction in the internal tariff induces the outside firm to invest in the area and the inside firms to switch to the export mode. Overall, there will be a replacement of internal FDI by FDI from outside; however, if the fixed costs /market size ratio is large enough, a decrease in the internal tariff may only lead to the exit of the outside firm from the market. This happens because the market share of the outside firm decreases and, if the market is small relative to fixed costs, its profits become negative.

¹⁷ The results presented in Figure 6 correspond to an external tariff equal to 3 and to an internal tariff ranging from 3 to 0.

There are two important implications of the results of Motta and Norman (1996). First, the effects of a decrease in the internal tariff in this model are very different from those of an enlargement of the market (Figure 6); while a decrease in the internal tariff induces export platform FDI, an increase in the market size leads to dispersed FDI. Thus, it may be misleading to assume that regional integration stands for an enlargement of the market. Second, countries should have a strong incentive to reduce internal tariffs and encourage market regimes characterised by high levels of intra-regional exports and export platform FDI, as these are welfare improving, mainly because the pro-competitive effects (i.e. the reduction of costs, prices, and profits) are, on the whole, positive for the integrating countries.

The Motta and Norman paper was one of the first efforts to investigate the effects of regional integration by means of a partial equilibrium model with FDI, assuming strategic interaction between firms. Their results rely on numerical simulations and, thus, depend upon the choices made regarding the values of the parameters; this limitation is common to many new trade theory papers, as well as some of the NEG papers reviewed above and most of the papers with FDI. In addition, welfare implications rely on a number of simplistic assumptions and do not take into consideration tariff revenues.

Neary (2002) developed a very similar model with analogous conclusions. Unlike in Motta and Norman (1996), the effects of a PTA on market equilibriums are not determined by means of numerical simulations, but analytically. This implies more “reliable” results, at the price of a more simplified setting. Inside firms are assumed to export to the partner country but do not have the option of FDI. In other words, the focus of the model is only on FDI from outside countries; therefore, issues related to the relocation of inside firms are not addressed; hence, FDI flows between countries U and G in Figure 5 are eliminated by assumption. A further point is that the paper does not present any welfare analysis. The paper stresses three distinctive influences of regional integration on multinational firms. The first is the “tariff jumping” motive for FDI – i.e. a dispersed pattern of FDI - which increases with the increase in the external tariffs, but decreases with the reduction of the internal tariffs. The second is the export platform motive: the reduction of internal tariffs may induce one plant-FDI, even when outside firms did not export to the integrating countries before integration. Third, reduced internal tariffs lead to an increase in internal competition which works against both FDI and exports and may lead outside firms to leave member countries; this may occur if both external tariff and fixed costs are high. Overall, Neary (2002) confirmed analytically, for some market equilibriums, the results of the simulations by Motta and Norman (1996).

A later paper by Mountout and Zitouna (2005), within the same analytical framework, explicitly considered asymmetries between countries. In their model, the two integrating countries, North and South, have different production costs due to different wages; further, firms come only from North and sell the product only in North. In Figure 5 this means that variable costs between U and G are different, while U and J have the same costs; further, demand in country G is by assumption equal to zero; finally, exports and FDI from country G are not considered.

The model considers the effects of a reduction in the internal tariffs between North and South on the strategies of two potential multinationals, one from North and the other from outside. Before the PTA, the inside firm chooses to make an export platform FDI in South if the cost advantages, due to the wages gap, offsets fixed costs and trade costs that firms incur re-exporting the product from South to North. On the other hand, the outside firm makes FDI within the area if fixed costs are low relatively to external trade costs; further, it decides to locate in South if cost advantages are high relative to internal trade costs.

The reduction of internal tariffs may have different effects, once again depending on the pre-PTA equilibrium. The most interesting finding of the paper is that, as a consequence of asymmetries, regional integration acts as a strong incentive for export platform FDI in South, for both inside and outside firms; and this incentive increases if the rival does not invest in South. As a consequence, there may be an “eviction effect”, since if the inside (outside) firm locates first in South, then the outside (inside) firm may just exit the market. Thus, the paper puts forward the hypothesis of a possible first-mover advantage, which may be exploited by one firm if it has some *ex-ante* advantage over the rival, such as lower set-up costs.

The effects of regional integration in the presence of asymmetries between countries have been further explored by Ekholm *et al* (2003), by means of a more complicated model. The aim of the paper is to explain under what conditions different kinds of export platform FDI are likely to arise. Again, there are two integrating countries, W (West) and S (South), which differ because of wages; and an outside country, E (East), which is assumed to be identical to W. The product is consumed only in W and E, and there are two firms from W and E; thus, unlike all the papers considered above, firms in this model compete both in their own and in their rival’s market, allowing for two-way flows of both exports and FDI. One distinctive feature is the consideration of two different goods: the intermediate good can be produced

only in the home country, and the final good can be assembled in one or all countries.¹⁸ In this setting, it is possible to analyse various kinds of FDI, i.e. to distinguish between horizontal and vertical FDI.

Depending on the relative values of trading cost of the components, fixed cost and assembly cost advantages in S, different market equilibriums arise. One is that firms from W and E only export from their home country, i.e. they are national firms; this happens when fixed costs and trading cost of components are high, and assembly costs in S are close to those in W and E. As the trading cost of components and fixed costs decrease, a second equilibrium arises which is the pure horizontal strategy, that is, each firm locates a plant in the other firm's country, but does not locate in S. This implies two-way flows of FDI between the two developed countries. A higher assembly cost advantage for S may lead to a shift to a pure export platform, that is, firms from W and E maintain a plant at home which serves the domestic market, but locate a plant in S from which they export to the rival market. Finally, a further increase in cost advantages and/or a decrease in fixed costs and in the trading cost of components may lead to a vertical export platform strategy, that is firms locate all production in S and serve their own market and the rival market through exports.

The paper shows the effects of a PTA (i.e. a decrease in internal trading costs) between W and S. The first effect is that a firm in W will find it more profitable to shift all production to S (vertical export platform strategy) and to export back to W as well as to E. This will give the firm from W an absolute cost advantage with respect to the firm from E; everything else constant, the firm from W can fully exploit the assembly costs advantage of locating in S, without (any or few) trading costs, i.e. the trading costs of moving components from home to S, and exporting the final good back to the home country.

This cost advantage of the inside firm increases with the decrease in the internal tariffs and, more importantly, leads to a profit-shifting effect: the high-cost firm from E loses market shares and profits, while the low-cost firm from W will, symmetrically, gain market shares and increase profits.

One of the main and more interesting policy implications of the paper by Ekholm *et al* (2003) is that a high-wage country may be penalised if its rival negotiates a PTA with a low-wage country and may respond by finding a low-wage partner as well. Although the paper does not

¹⁸ With respect to the basic framework of Figure 5, there are several important differences: first, South (country G) has no demand and no firms, but benefits from a lower marginal cost; second, the firm from West (country U) can invest or export to East (country J); third, in East (J) the demand is different from zero and equals that in West (country U); finally, there are two integrated sectors.

explicitly present any welfare analysis, the results may be interpreted straightforwardly from a “strategic trade policy” perspective. For a high-wage country, a PTA with a low-wage country may be the optimal trade policy, because it gives strategic advantages to its own firms with respect to rivals from other high wage countries.

The prediction of the papers assuming asymmetries between integrating countries¹⁹ are, thus, slightly different from those assuming symmetry; while in the former regional integration is likely to lead to export-platform FDI only from the outside firms, in the latter regional integration acts as a strong incentive for export-platform FDI also by inside firms and may be much more harmful for outside firms.

4.1.2 Normative analysis

Two papers have addressed the issue of what is the optimal (preferential) trade policy more explicitly, albeit with rather different objectives, within a partial equilibrium framework. Donnenfeld (2003) aims at showing that, when FDI are considered, trading blocks may lead to a lower level of protection than that predicted by models which do not take FDI into account. Conversely, the paper by Raff (2004) investigates the interactions between trade and tax policies within a PTA.

The paper by Donnenfeld (2003), unlike those which have been considered so far, considers several countries forming two regional blocks (CU), with symmetric countries and firms (i.e. identical market size, consumer preferences and fixed and marginal costs). The other difference with respect to previous models is that firms’ actions are limited by two assumptions: first, firms from one block make FDI only in the other block, while within their own block they only export to partner countries; as in Neary (2002), this paper does not take into account the effects of regional integration on inside firms FDI; second, firms invest in the other block by locating just one plant, from which they export to the other members; this means that the model considers only export-platform FDI, and not dispersed FDI within the blocks. Despite these restrictive assumptions, the model has the advantage of taking into account two-way flows of FDI between the two blocks.²⁰ Finally, the formation of the blocks is exogenous, while the external tariff level is determined endogenously.

¹⁹ It should be noted that in partial equilibrium models asymmetries between countries are due to differences in production costs, different demands and the lack of firms from the low-cost country.

²⁰ With respect to the basic framework of Figure 5, the main differences are the following: first, there is another country forming a customs union with country J, which is identical to the customs union between U and G; second, inside FDI flows within the CU are zero; third, outside FDI are just export platform, that is, FDI goes

The main finding of the paper is that the optimal external tariff of a CU is just below the “critical” tariff, that is, the tariff above which outside firms invest to “jump the tariff”. This is because: a) a tariff higher than the critical one induces FDI in the block (the consequent reduction of internal firms’ profits and losses in tariff revenues more than offsets the increase in consumer welfare); b) a tariff well below the critical one would also reduce national welfare (losses due to the reduction of both tariff revenues and internal firms’ profits counterbalance consumer gains).

The first implication of this model is that the growth of regional blocks does not necessarily lead to an escalation of tariffs, as predicted by other models.²¹ Rather, the mutual threat to invade the other’s block by FDI have the effect of maintaining the tariffs level just below the critical threshold, which is lower than the tariff that would prevail without FDI.

The second implication is that a tariff war is likely to occur when the value of fixed costs is high; the higher the fixed costs, the lower the threat of an invasion of the rival market by FDI. Moreover, also the size of the blocks is (negatively) related with the optimal tariff, as the larger the block, the lower the revenue losses due to a tariff reduction, and the higher consumer gains. Therefore, the third implication is that a few large blocks may imply a lower level of protection than several small blocks.

It is worth noting that welfare implications in this paper are slightly different from those predicted by Motta and Norman (1996); while in the former integrating countries are worse off with export-platform FDI, in the latter export-platform FDI are welfare improving. The reason for this contradiction is that tariff revenues are not considered in Motta and Norman (1996): FDI to be welfare improving needs only consumer gains to outweigh profit losses.

The paper by Raff (2004), which deals with optimal policies in the presence of FDI, differs in many respects from the previous one. The key issue addressed is how the location choice of multinationals in a PTA interacts with government decisions on both the external tariff and corporate tax policy. On the one hand, if outside multinationals enter through FDI (exports), the PTA governments are likely to increase corporate taxes (external tariffs) to maximise revenues. On the other hand, government decisions have a strong influence on the choices of multinationals, as high (low) corporate taxes and low (high) external tariffs induce multinationals to choose exports (FDI).

just to one country; fourth, there is two-way FDI, i.e. there is an additional FDI flow from the block on the right hand side to the other block.

²¹ For a comprehensive review of the “trading blocks” literature see Panagaryia (2000).

The paper, therefore, tackles an issue which has not been explored previously, that is, what is the rationale for a tax competition between countries within a PTA to attract FDI.

From the point of view of the modelling of firms' behaviour, the analytical setting is simple: there are no domestic firms in the PTA and one outside multinational has monopoly power and decides either to export or to invest in the area with one or more plants. This assumption is quite restrictive from a positive perspective, as it limits the robustness of the findings to cases in which there are no inside firms. Further, by eliminating internal firms, the model removes one important component of CU countries' welfare, that is, profits of inside firms. Thus, one of the negative impacts of an increase of FDI induced by a PTA - i.e. the loss of market shares and profits by inside firms - is not considered at all.

The model assumes further asymmetries between countries. First, the three countries have different production costs. Second, only PTA countries tax profits and imports; while profit taxes are chosen non-cooperatively by PTA countries, tariffs depend upon the agreement: in a FTA they choose external tariffs non-cooperatively and internal tariffs are zero, while in a CU they choose cooperatively a common external tariff. The outside firm and the PTA governments play a sequential game: in the first stage, governments decide the kind of trade agreement (FTA or CU); in the second stage, they simultaneously choose taxes on profits and tariffs; in the third stage, the firm observes the policies and chooses how to enter the PTA markets; finally, the firm chooses the price.

In this game, there are three possible non-PTA equilibriums:

- A) both governments choose a prohibitive tax on profits to prevent FDI and to induce the foreign firm to export; then, set the optimal tariff; this is likely to occur (i.e. it is the welfare maximising set of policies) when production costs inside the PTA are high relative to the outside country and/or fixed cost are very high; in this case, the outside firm has a low incentive to invest in both CU countries;
- B) one government chooses a prohibitive tariff to induce FDI and then sets an optimal tax on profits, while the other chooses a prohibitive one to prevent FDI and then sets the optimal tariff; this is likely to occur when production costs in the former country are lower than those in the partner and the outside countries; and when fixed costs are not high. In this case, the incentive to invest in the first country is higher than in the second;

- C) both governments choose a prohibitive tariff to induce FDI and then set the optimal profit tax; this occurs when production costs inside the PTA are low relative to those of the outside country; and when fixed costs are low.

How will regional integration affect these equilibriums? And what will be the optimal trade agreement between the two countries?

Assume first that the outside firm exports to the area. An FTA may induce a foreign firm to locate at least one plant within the area, from which to serve both markets (FDI creation). This is likely to happen if internal costs are low enough with respect to the size of the market and to the costs of the outside country. FDI creation is welfare improving (consumer gains plus tax revenue increases are higher than the tariff revenue losses) for both FTA countries; but this occurs only if there is no tax competition between the two FTA countries to attract FDI, as this may reduce tax revenues. It is worth noting that governments are unlikely to engage in tax competition if there are large differences in production costs between the two PTA countries; in fact, the high-cost country would not gain from tax reduction, as this would not be sufficient to increase FDI, given its cost disadvantage.

The first implication of the model, therefore, is that a FTA is the optimal agreement if: i) internal production costs are low enough relative to the size of the internal market and to the production costs in the outside country; ii) the gap between production costs in the two FTA countries is sufficiently large.

The second implication of the model is that if internal production costs are high relative to those in the outside country, then an FTA is not sufficient to create FDI. In this case, a CU may be the optimal agreement between the two countries: the coordination for a higher external tariff may induce FDI creation and improve welfare, despite the loss of tariff revenues.

An FTA may be the optimal agreement even if we assume that initially the outside firm has FDI in both integrating countries. In this case, a liberalization of internal trade induces the firm to close the plant in the high-cost country (FDI consolidation). As a consequence, the low cost country is better off, while the high cost country loses; however, the overall welfare of the area may increase if there is no tax competition among countries.

The paper by Raff is interesting, especially because it addresses the issue of what the optimal preferential trade policy, in the presence of multinational firms, is when governments do not coordinate their corporate tax policies. The main policy implication is that an FTA may be the

optimal trade policy only if countries do not engage in tax competition to attract FDI; this happens in the model if they have different production costs.

4.2. General equilibrium models

Only two papers have introduced FDI in general equilibrium models, both addressing normative issues but from quite different perspectives. The paper by Ethier (1998) aims at explaining why small developing countries compete with each other to sign PTAs with developed countries despite the fact that the latter seldom offer them significant trade concessions; the purpose of the paper by Ludema (2002) is to explain why countries which are geographically contiguous are more likely to form a PTA than distant countries. From an analytical point of view the two papers are also fairly different. Ethier develops a specific factor model with perfect competition and external economies of scale, while Ludema builds on the basic new trade theory models with multinational firms, and on the literature explaining international agreements on the basis of repeated games. A common feature of the papers is that both exclude the terms of trade effects from the analysis, i.e. they assume a small country hypothesis.

Ethier (1998) develops an analytical framework to incorporate the new forms of regionalism, i.e. small less advanced countries, which unilaterally reform their economies, sign agreements with a large developed country; these agreements generally imply one-sided trade concessions by the small countries and lead to a low degree of overall trade liberalization;²² however, they also include issues often linked with economic reform of the small countries (deep integration) other than trade liberalization. The basic question is “why does a small country do it?”.

The model distinguishes developed from developing economies. Developed countries have identical endowment of human capital, skilled and unskilled labour, and produce two goods. The commodity is produced only with labour (both skilled and unskilled) and is not tradable, while the industrial good is modelled as a two-stage production process: the first stage uses only human capital and can be located only at home (i.e. the headquarter services), while the second stage uses skilled labour and may be located either at home or in a foreign country.

An important assumption of this paper is that in the second stage there are international external economies of scale; returns increase, as the global size of the skilled labour employed

²² Ethier (1998) mentions several examples to support the view of a low degree of trade liberalization following the implementation of trade agreements, such as the 1995 enlargement of the European Union and the European Agreements with the Central and Eastern European countries; NAFTA and MERCOSUR.

in producing the final good (and not the firm's or the country's size) increases. Firms in both sectors are assumed to be perfectly competitive.

A further distinctive feature of the paper by Ethier (1998) is that it is the only one which includes an explicit, albeit quite simple, political economy modelling of trade policy decisions; the trade policy of each developed country is the outcome of a political process, in which unskilled labour attempts to secure rents. The government's objective function is assumed to be based on a trade-off between aggregate welfare and unskilled wages.

The paper firstly determines conditions under which multilateralism between developed countries is likely to occur. The first finding is that the unilateral optimal tariff is greater than zero, even in the absence of a terms of trade effect; this is because tariffs have the effect of increasing the relative price of the non-tradable good²³ and, consequently, raise the wages of unskilled labour; as a result, a unilateral tariff may improve social welfare, as it increases the rents of unskilled labour. A second finding is that, in equilibrium, developed countries set a lower tariff than the unilateral one: the reason is that, by so doing, world-wide production of the industrial good increases, and all countries benefit from international economies of scale which are welfare improving. Thus, in this model the first purpose of multilateralism is to endogenise an externality, that is, the benefits of international economies of scale.

As for developing countries, the model assumes that they only produce one rudimentary good, which uses skilled labour. Governments make a choice between two possible policies: autarchy and reform. If they are successful in carrying out reforms, then firms from developed countries establish subsidiaries in developing countries (export platform FDI). This may have positive effects on the local economy for two reasons. The demand of skilled labour increases and local wages increase. In addition, FDI involves a transfer of global technology, which is also assumed to spill-over to the production of the rudimentary good. However, governments of developing countries are also under pressure from special interest groups for autarchy. Therefore, they choose reform if the benefits from FDI are large enough to outweigh pressure from interest groups.

The main question addressed in the paper is whether, within a multilateral framework, developing countries are likely to make a PTA with developed countries, given that this means that they must choose economic reforms. The choice crucially depends upon the

²³ The decrease in the relative price of the industrial good as a consequence of the tariff is due mainly to a crucial assumption, i.e., industrial products are imperfect substitutes; thus, a tariff on the imported industrial goods has the effect of deflecting spending from the imported goods to the commodities, raising their prices and the wages of unskilled labour.

expected benefits from FDI. The lower the tariffs in developed countries, the higher the benefits for developing countries from FDI for two reasons. First, higher tariffs mean firms from developed countries cannot fully exploit the international economies of scale, and this may also reduce the size of the spill-over effects. Second, high tariffs reduce the probability of export-platform FDI by firms from developed countries.

The first policy implication of the paper, therefore, is that multilateralism may increase the motivation of developing countries to reform their economies; this is because FDI is more likely to occur if the developing country enters a PTA with the developed country, as a reduction of the bilateral tariffs increases the profitability of export platform FDI, and the probability of receiving FDI.

Therefore, as multilateralism proceeds, the number of developing countries wishing to sign a PTA and undertake reforms increases (a reform-creation effect). Economic reforms induce firms to invest in certain developing countries, generating an investment creation effect. However, other developing countries, despite their reforms, may not succeed in attracting FDI and lose out as a consequence of an investment diversion effect. Finally, countries which are likely to be left out from FDI in any case may not even begin to consider reforms (a reform destruction effect).

Overall, the results of the paper by Ethier (1998) have a number of interesting implications for the relationship between regionalism and multilateralism. In this framework, the main role of regionalism is to facilitate reforms in developing countries; second, there is a positive relationship between multilateralism and regionalism, as the latter is the consequence of the success, rather than of the failure, of the former; third, regional agreements are a way in which developing countries undergoing a process of reform compete with each other to attract FDI; fourth, as global welfare is assumed to increase with the number of reforming countries, then regionalism, by inducing competition between developing countries for FDI, increases global welfare as it induces a more dispersed pattern of FDI.

When compared with the other papers discussed so far, there are several important additional insights. This paper takes into account the fact that regional agreements frequently include other arrangements as well, such as investment liberalisation and commitments to economic reform; and this is an important issue, as the trade effects of a PTA may also depend on other

arrangements included in the agreement.²⁴ Furthermore, the paper considers the economy-wide effects of FDI on the host economy, i.e. technological spill-overs and a rise in local employment, benefits likely to be expected by governments of small developing countries.

The paper by Ludema (2002) develops a model that combines two branches of the literature: the one that explains international agreements on the basis of repeated games, where cooperation is determined by the balance between the one-off incentive for a country to deviate from the agreement, and the discounted benefits of avoiding a future trade war; and general equilibrium models with multinational firms which explain the pattern of FDI on the basis of the balance between proximity factors (i.e. trade barriers and transportation costs) inducing firms to locate production close to the market and concentration factors, such as economies of scale, inducing firms to set up in a single location, from which they serve all the markets.²⁵

The idea is that PTAs are more likely to be formed between countries among which transport costs are very low, as this reduces the motivation for FDI and also the incentive for governments to deviate from the agreement. The assumption is that FDI is welfare improving and that governments may find it in their interest, under certain conditions, to deviate from the agreement by increasing the tariff to attract FDI. As the probability of tariff-jumping is positively correlated with transport costs, the paper argues that the higher the transport costs, the greater will be the incentive for governments to deviate from a trade agreement.

In this framework, each country has an incentive to establish unilaterally a higher tariff than the critical one, that is, the level above which foreign firms shift from exports to FDI. A trade agreement is feasible only if the balance between enforcement forces (i.e. losses due to a tariff war in all future periods) and temptation forces (i.e. gains arising from deviating from the agreement, by setting a tariff above the critical one and attracting FDI) is positive. This balance depends upon the values of transport costs, fixed costs and discount factors. High transport costs increase the temptation to deviate (decrease enforcement), as there is a greater probability of attracting FDI; on the contrary, high fixed costs and discount factors reduce the temptation to deviate and increase enforcement.

The paper examines feasible trade agreements in a three country framework, with two countries geographically close, and a distant third one. The first finding of the paper is that

²⁴ Markusen (1997), who examined a trade liberalisation *versus* an investment liberalisation, showed that the trade effects of the two policy reforms may be different.

²⁵ A proximity-concentration explanation of FDI was first formally developed and tested by Brainard (1993, 1997).

free trade is not an equilibrium, because the third country has a strong incentive to deviate: with no tariffs, all firms set one plant at home and export to the other markets; the distant country is worse off, because its firms have lower profits than their rivals, and consumers pay higher prices because of the higher transport costs. This increases the temptation to deviate.

The second prediction of the model is that a FTA between contiguous countries is an equilibrium if internal transport costs are sufficiently low. Firms from member countries have one plant inside and locate a plant in the distant country to jump tariffs and transport costs; the firm of the distant country makes export-platform FDI within the area and benefits from the internal free trade, without incurring trade and transportation costs. If internal costs are sufficiently low, enforcement forces are higher for all countries than the temptation to deviate. However, as internal transport costs increase temptation may counterbalance enforcement for the two member countries, that may have an incentive to deviate in order to attract FDI.

The third finding is that a hub-and-spoke agreement, with one of the contiguous countries being the hub, is an equilibrium not only if internal transport costs are sufficiently low, but also if transport costs with the distant country are sufficiently low. In this case, firms from the hub export to the other markets, and benefit from free trade; firms from the nearby country invest in the distant country and export to the hub; finally, firms from the distant country makes export platform FDI in one of the contiguous countries. The hub is clearly better off and has less incentive to deviate with respect to the two spokes. As transport costs with the distant countries increase, consumer surplus decreases and the distant country has a strong incentive to deviate.

Thus, the main implications of the model are the following: i) if transport costs are very high, the only feasible equilibrium is a tariff war; ii) if transport costs are sufficiently low, then a FTA between neighbouring countries or a hub-and-spoke agreement are both feasible; iii) with high transport costs between distant countries, the only feasible arrangement is an FTA between contiguous countries.

5. Main findings and concluding remarks

The relationship between regional integration and the location of economic activity is an important research issue, especially because of its potentially significant implications for policy making. This paper has shown that international trade theories and, more specifically, theories of preferential trade, have begun to devote more attention to these issues only

recently. Nevertheless, despite the limited number of papers, this literature provides a number of interesting findings which may help to answer the questions raised in the introduction.

The first two questions deal with the effects of PTAs on where inside and outside firms choose to locate and, consequently, on trade. The literature emphasizes that a PTA increases economic activity within the integrating area - i.e. in the presence of economies of scale there is a production-shifting effect of PTA – but also may significantly influence the distribution of economic activity within the area. NEG models conclude that concentration of economic activity in the core is likely to occur when agglomeration forces are stronger than centrifugal forces. This happens in the BPV model when economies of scale and input-output links are high enough, and in the footloose capital model when there are large differences between the market size of member countries. FDI models deal with changes in both the geographical location and ownership of production plants and conclude that the former are likely to be more pronounced when the forces determining FDI creation are stronger; on the contrary, the latter will be larger when the investment diversion effect is stronger.

These effects present a “discontinuity”. There is a critical tariff level below which agglomeration occurs in NEG models and, in the models with FDI, firms reorganise their production within the area. Therefore, the effects of PTA crucially depend on the starting and finishing points, i.e. whether regional integration leads countries to “cross” that critical level or not. In the former case, we should expect relevant location effects, while in the latter the impact is likely to be less important. In NEG models, this means that a low level of integration (i.e. integration not “crossing” the critical value) does not affect the internal geographical distribution of industrial activity, while intermediate integration (i.e. tariffs being just below the critical level) leads to an agglomeration in the core; only deep integration - a wide distance between the starting and finishing point - may spread industrial activity to the peripheral country in the BPV model, while the footloose capital model predicts that this may occur only with a “big bang” liberalisation. In models with FDI, a low level of integration may not induce any investment diversion or creation effect, while deep integration considerably changes the way multinational firms locate plants, in most cases leading to a prevalence of export platform FDI within the area, by both, inside and outside firms.

The effects of a PTA between similar countries are clearly different compared to when countries are dissimilar. Most partial equilibrium models depict, in a three country framework, this dissimilarity as a gap in production costs – in most cases this is represented as a wage gap - with the aim of capturing the phenomenon of a widespread delocalization in low-cost

developing countries. If one of the member countries has cost advantages, then regional integration may trigger delocalization and induce export platform FDI by both inside and outside firms. In multi-country general equilibrium models, this dissimilarity is represented as an asymmetric industrial development. Both NEG models and models with FDI (Ethier, 1998) assume less developed countries produce only a non-tradable rudimentary good, while the industrialised sector is located in the developed countries. General equilibrium models predict, by and large, that regional integration may speed up industrialization in less developed countries, even though this may happen in some developing countries and not in others; thus, the main conclusion is that regional integration may lead to an increase of divergences between less developed countries

Finally, the effects of a PTA obviously depend upon the kind of agreement involved. The first distinction to be made is between an agreement implying only a reduction of internal tariffs, from one which also increases the external tariff.²⁶ In the NEG models, an increase in the external tariff has the effect of changing the critical value of the internal tariff below which agglomeration occurs; this means that the direction of changes is the same but the “point” at which changes occur may be different.

The effect of an increase in the external tariff in models with FDI may be more relevant. If the initial external tariff is higher than the “critical value” above which outside firms invest in member countries to “jump the tariff”, then an increase in the external tariff does not affect outside firms. However, if the pre-PTA external tariff is lower than the critical one, then outside firms will change their strategy by substituting exports with FDI.

The second distinction is between FTA/CU *versus* hub-and-spoke agreements. NEG models predict that the location of firms may change significantly with these kinds of agreements; concentration will also occur in the early stages of integration (the hub-effect) and deep integration will create divergences between the spokes. The only paper within the FDI literature addressing this issue concludes that, while with a simple FTA firms from member countries will make FDI in the third country, with a hub-and-spoke agreement firms of the hub will export to all the spokes (Ludema, 2002).

The third distinction should be made between PTA including only trade arrangements, from those including other commitments, such as investment liberalization and economic reform. The only paper addressing this issue is by Ethier (1998) who argues that the commitments to

²⁶ The former may be an FTA, or a CU with external tariffs not higher than those before the PTA. The latter is a CU which has the overall effect of increasing external tariffs of member countries.

economic reform in the agreements makes a shift of industrial production to some of the less developed countries possible; in other words, a “pure” trade agreement (i.e. a reduction of internal tariffs only) may not be sufficient to induce firms to locate plants in the less developed country.

Turning to the third question, that is, the welfare effects of a PTA, partial equilibrium models with FDI provide contradictory findings, depending mainly on the underlying assumptions in the models. As already mentioned, the first critical assumption is whether models take into account the effects of an increase in internal competition on insider firms’ profits. Raff (2004) assumes no internal firms and eliminates by assumption one component of the welfare of PTA member countries; therefore, regional integration leading to an increase of inward FDI is always welfare improving. Most papers consider the presence of internal firms and the effects of regional integration on insiders’ profits; as a result, welfare implications are not so clear-cut and depend upon other assumptions. Among these, a key assumption is the inclusion of tariff revenues in the welfare of the PTA countries; a PTA inducing FDI which substitutes previous exports is welfare improving in models ignoring tariff revenues (e.g., Motta and Norman, 1996), but in models which take tariff revenues into account the welfare of PTA countries declines (e.g., Donnenfeld, 2003). The third issue is whether models consider other policies affecting location, for example, tax policies. Raff (2004) shows that the welfare of PTA countries may increase only if countries do not engage in tax competition to attract FDI, since in that case tax revenue plus consumer gains are not large enough to offset losses in tariff revenue.

Welfare implications in NEG models are straightforward, as they are closely linked to the country’s share of industrial activity: therefore, a low level of regional integration improves the welfare of all member countries, as there is a shift of production from third countries to member countries; with an intermediate level of integration, the core will be better off while welfare at the periphery worsens.

In the two papers using general equilibrium models with FDI, the welfare of PTA countries increases with the increase in FDI; however, while in Ethier (1998) the main effect of regional integration is the creation of new FDI in developing countries, in Ludema (2002) regional integration diverts FDI from some member countries to others, and hence decreases the welfare in some of the PTA countries. In the model by Ethier, FDI is welfare improving mainly because of the technological spill-overs in the developing countries, but only some developing countries will benefit from regional integration, i.e. those succeeding in attracting

FDI. In Ludema FDI is welfare improving as, by eliminating losses due to transport costs, prices will fall and consumer welfare increase; as a consequence, regional integration is welfare improving only among contiguous countries (the lower transport costs, the smaller the investment-diversion effect).

Overall, this paper has shown that one of the main shortcomings of the literature surveyed is that most papers deal with positive analysis; very few address normative issues and this results in a knowledge deficit on the welfare effects of regional integration when location effects are included. Several partial equilibrium models with FDI do not include welfare analysis; the NEG models also deal essentially with positive issues, even though some welfare implications are drawn. General equilibrium models are those that more closely deal with normative issues but, to the best of our knowledge, there are only two.

Further, the few papers including welfare analyses often provide contradictory findings; in some papers FDI induced by a PTA is welfare improving, while in others FDI worsens the member country's welfare; as a result, the optimal (trade, tax, investment) policy in some cases is to encourage FDI and in others to prevent it. This is due also to the fact that the modelling of the impact of location changes on the economy is too simplified. In partial equilibrium models with FDI and in the NEG models, the welfare effects are essentially due to changes in prices, and thus in consumer surplus and profits. This appears to be a limited perspective as it fails to capture the economy-wide effects of an expansion of the production plants in a country and of a change in ownership, which are both likely to be important. General equilibrium models are obviously more suited to dealing with economy-wide location effects; however, to our knowledge, only the paper by Ethier (1998) has included economy-wide effects, i.e. technological spill-over, in the model.

Finally, findings of many of the surveyed papers rely on numerical simulations, rather than on analytical solutions, and thus predictions may depend on the choice made on the values of the parameters; nevertheless, it should be noted that this is common to many new trade theory papers. Clearly, there is a trade-off in these kinds of models between complexity and tractability. Papers solving analytically for equilibrium are often forced into simplistic assumptions to reduce the number of parameters; their findings are, therefore, more general, but less realistic. Papers assuming less strong hypotheses are forced to derive equilibriums by mean of numerical simulations, thereby losing generality.

On the whole, the deficit of knowledge on the effects of regional integration when location effects take place emphasizes the need for further research on this issue; further findings from theoretical models would be important, especially for small countries joining preferential trade areas with the expectation of benefiting from attracting economic activity in their territory.

References

- Baldwin, R., Venables, A.J., (1995) Regional Economic Integration, in G. Grossman and K. Rogoff, (eds) *Handbook of International Economics*, vol. III; Elsevier Science;
- Baldwin, R., Forslid, R., Martin, P., Ottaviano, G., Robert-Nicoud, F. (2003) *Economic Geography and Public Policy*, Princeton University Press, Princeton;
- Barba Navaretti, G., Venables A.J., (2004) *Multinational Firms in the World Economy*, Princeton University Press.
- Blomström, M., Kokko, A., (1997) Regional Integration and Foreign Direct Investment, NBER working paper 6019;
- Brainard, S.L., (1993) A simple theory of multinational corporations and trade with a trade-off between proximity and concentration, NBER Working paper, 4269;
- Brainard, S.L., (1997) An empirical assessment of the proximity-concentration trade-off between multinational sales and trade, *American Economic Review*, 87 (4), pp. 521-544;
- Caves, R., (1996) *Multinational Enterprise and Economic Analysis*, second edition, Cambridge University Press;
- Corden, W.M., (1972) Economies of Scale and Custom Union Theory, *Journal of Political Economy*, 80 (3), pp. 465-475;
- Choi, J., Yu, E., (1984) Customs Unions under increasing returns to scale, *Economica*, 51 (202), pp.195-203
- Donnenfeld, S., (2003) Regional Blocs and Foreign Direct Investment, *Review of International Economics*, 11 (5), pp. 770-788;
- Dunning, J., (1993) *Multinational Enterprises and the Global Economy*, Addison Wesley, MA;
- Dunning, J., (1997a) "The European Internal Market Programme and Inbound Foreign Direct Investment: Part I," *Journal of Common Market Studies*, 35, pp.1-30.
- Dunning, J., (1997b) "The European Internal Market Programme and Inbound Foreign Direct Investment: Part II," *Journal of Common Market Studies*, 35, pp.189-223.
- Ekholm, K., Forslid R., Markusen J. R. (2003) Export-Platform Foreign Direct Investment, NBER working paper 9517;
- El-Agraa, A.M. (1999) *Regional integration. Experience, Theory and Measurement* Barnes and Noble, Lanham;
- Ethier, W. J.(1998) Regionalism in a Multilateral World, *Journal of Political Economy*, 106 (6), pp. 1214-45;

- Gao, T., (1999) Economic geography and the department of vertical multinational production, *Journal of International Economics*, 48, pp.301-320;
- Horstman, I., Markusen, J., (1992) Endogeneous Market Structures in International Trade, *Journal of International Economics*, 32, pp.109-129;
- Ludema, R. D., (2002) Increasing returns, multinationals and geography of preferential trade agreements, *Journal of International Economics*, 56 (2), pp. 329-358;
- Kindleberger, C.P. (1966) *European Integration and the International Corporation*, *Columbia Journal of World Business*, 1, pp.65-73;
- Krishna, P. (2005) The economics of preferential trade agreements in Choi, E., Hartigan, J., (eds) *Handbook of international trade. Volume 2. Economic and legal analyses of trade policy and institutions*, Malden, Mass. Oxford and Carlton;
- Krugman, P.R. (1980) Scale economies, product differentiation, and the pattern of trade, *American Economic Review*, 70, pp.950-959.
- Krugman P.R., (1991) Increasing returns and Economic Geography, *Journal of Political Economy*, 99, pp.483-489;
- Krugman, P.R. (1993) The hub effect: or, threeness in interregional trade.' In Wilfred J. Ethier, Elhanan Helpman, and J. Peter Neary (eds.). *Theory, Policy and Dynamics in International Trade*. Cambridge: Cambridge University Press, pp. 29–37.
- Krugman, P. R., Venables, A.J., (1995) Globalization and the inequality of nations, *Quarterly Journal of Economics*, 110, pp. 857-880.
- Montout, S., Zitouna, H., (2005) Does North-South Integration Affect Multinational Firms' Strategies? *Review of International Economics*, 13 (3) pp. 485-500;
- Motta M., (1992), *Multinational Firms and Tariff-Jumping*, *European Economy Review*, 36, pp.1557-1571;
- Motta, M., Norman, G., (1996) Does economic integration cause foreign direct investments? *International Economic Review*, 37, pp. 757-783;
- Markusen, J. R., (1997) *Trade versus Investment Liberalization*, NBER Working paper 6231;
- Markusen, J.R., (2002) *Multinational Firms and the Theory of International Trade*, The MIT Press, Cambridge (MA);
- Neary, J. P. (2002) *Foreign Direct Investment and the Single Market*, The Manchester School, 70(3), pp. 291-314.
- Pangariya, A., (2000) Preferential Trade Liberalization: the Traditional Theory and New Developments, *Journal of Economic Literature*, June, pp. 287-331;
- Puga, D., Venables, A., (1997) Preferential Trading Agreement and Industrial Location, *Journal of International Economics* , 43,(3-4), pp. 347-368;
- Puga, D., Venables, A., (1999) *Preferential Trading Arrangements and Industrial Development*, The World Bank, Policy Research Working Paper, 1787;
- Raff, H. (2004) Preferential trade agreements and tax competition for foreign direct investment, *Journal of Public Economics*, 88 (12) pp. 2745-2763;
- Smith, A. (1987) *Strategic Investment, Multinational Corporations and Trade Policy*, *European Economic Review*, 31, pp. 89-96;

Yannopoulos,G., (1990) Foreign Direct Investment and European Integration: the Evidence from the Formative Years of the European Community, *Journal of Common Market Studies*, 28, pp. 235–59.

Table 1: A classification of the models

		NEG models	Models with FDI	
			Partial Equilibrium	General Equilibrium
Positive analysis	Symmetry between countries	Baldwin, Venables (1995) Puga, Venables (1997) Gao (1999)	Motta, Norman (1996) Neary (2002)	
	Asymmetry between countries	Puga, Venables (1999) Baldwin <i>et al</i> (2003)	Mountout, Zitouna (2005) Ekholm <i>et al</i> (2003)	
Normative analysis	Symmetry between countries		Donnenfeld (2003)	Ludema (2002)
	Asymmetry between countries		Raff (2004)	Ethier (1998)

Figure 1: Preferential agreements with economies of scale and perfect competition

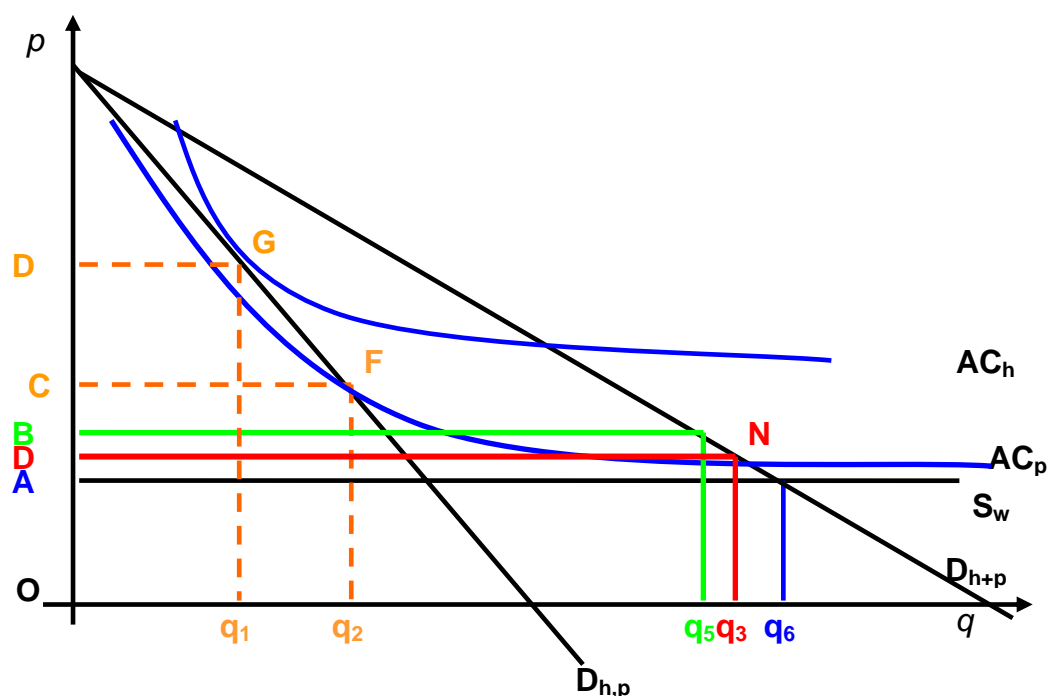


Figure 2. The Baldwin-Puga-Venables model

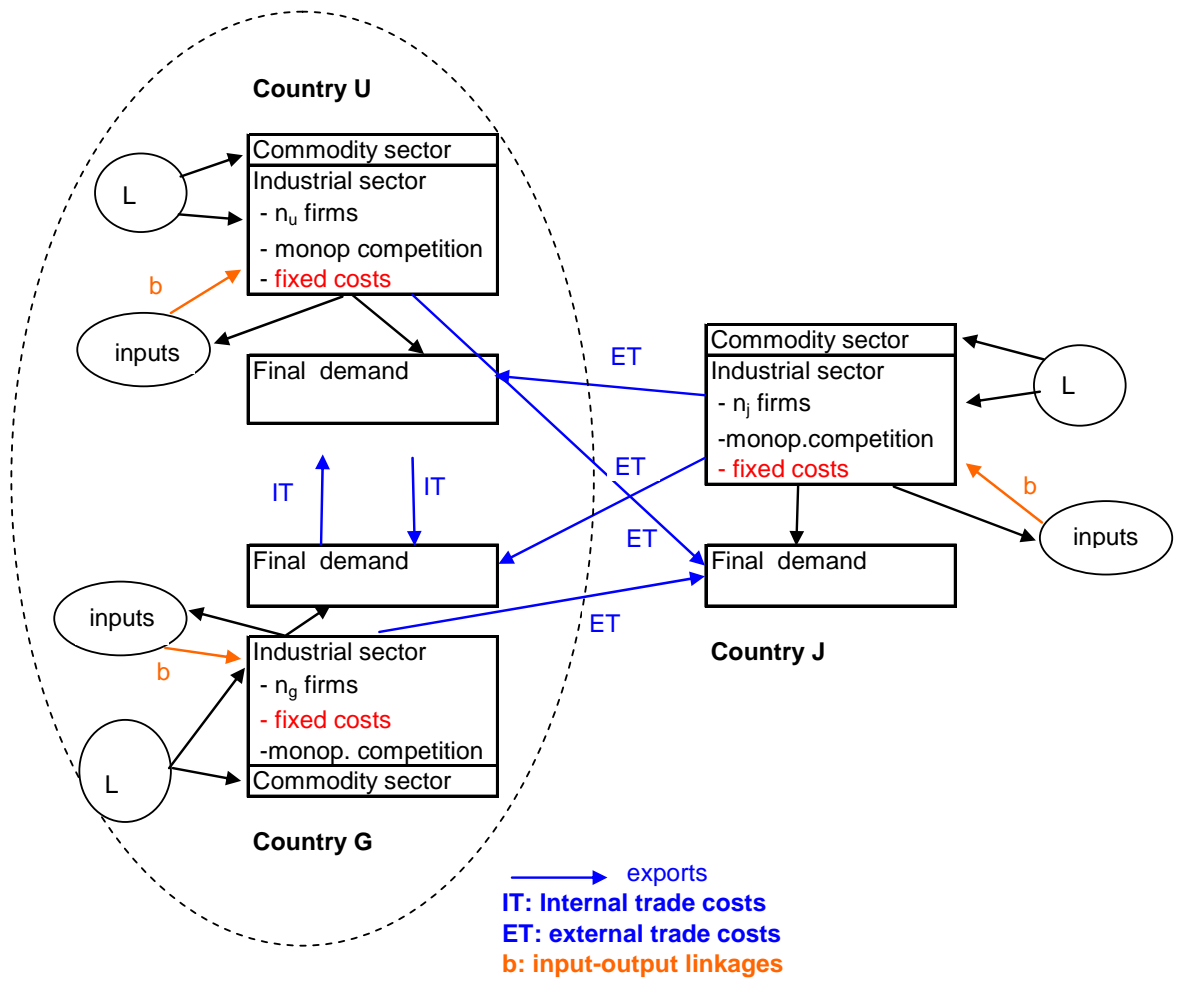
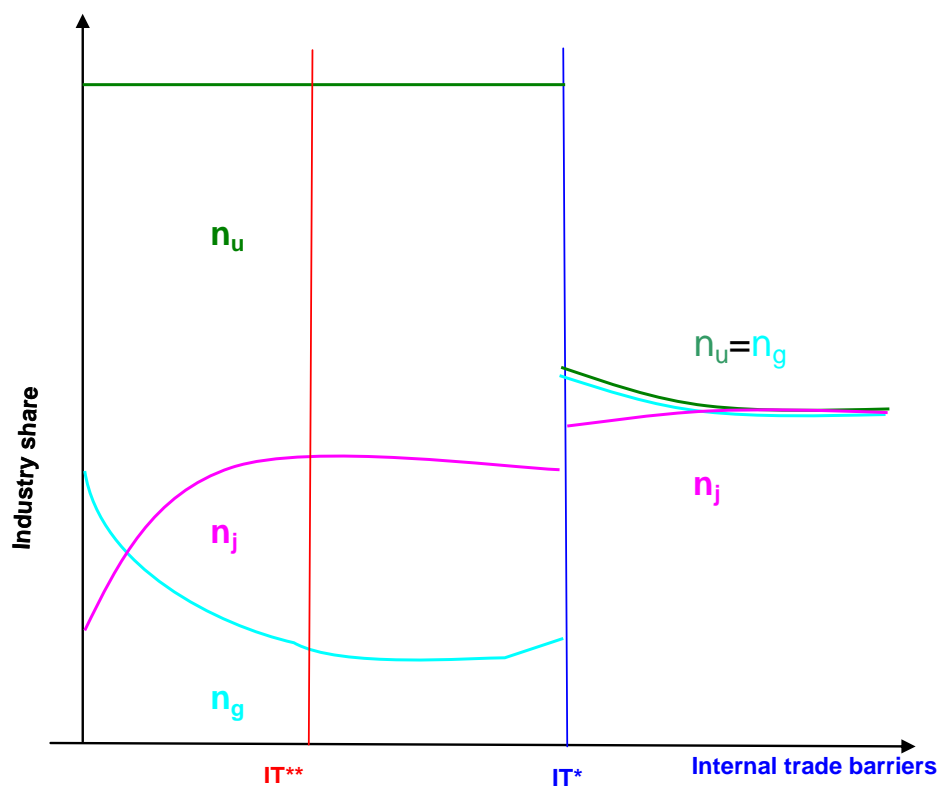
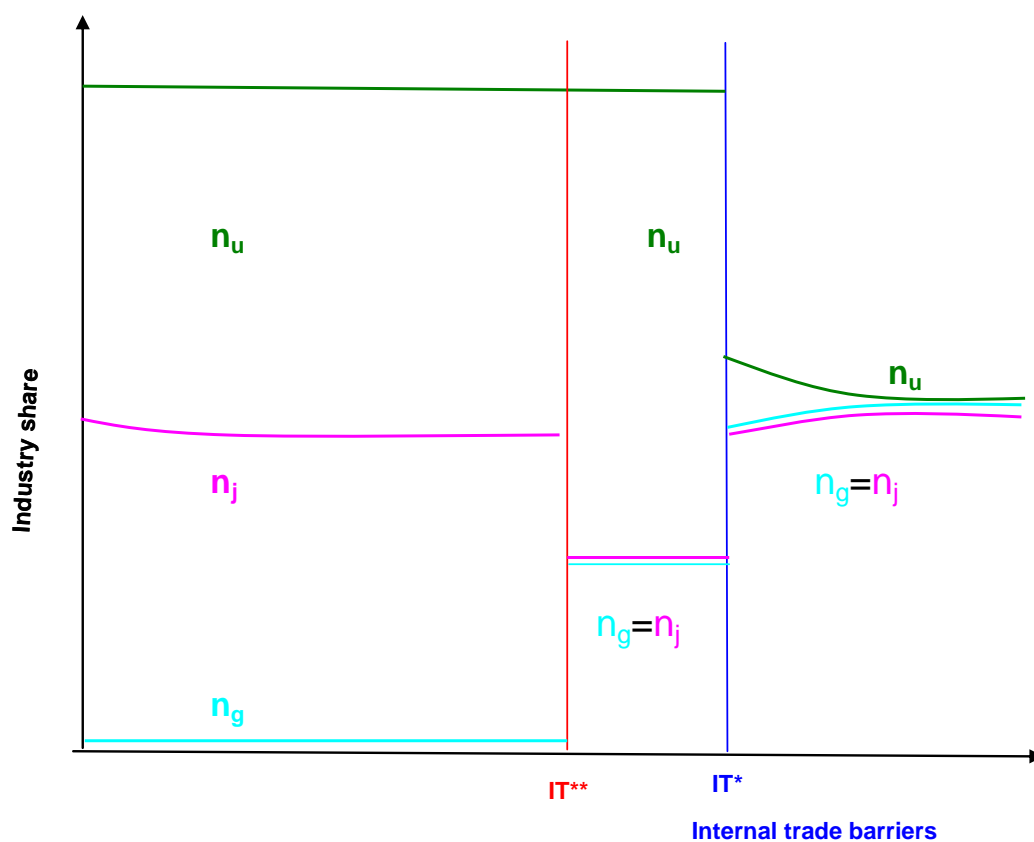


Figure 3: Location effects of a PTA in the BPV model with initial symmetry



Source: Puga, Venables (1997)

Figure 4:
Effects of a a Hub-and-spoke agreement in the BPV model with initial symmetry



Source: Puga, Venables (1997)

Figure 5: Partial equilibrium models with FDI: the basic framework

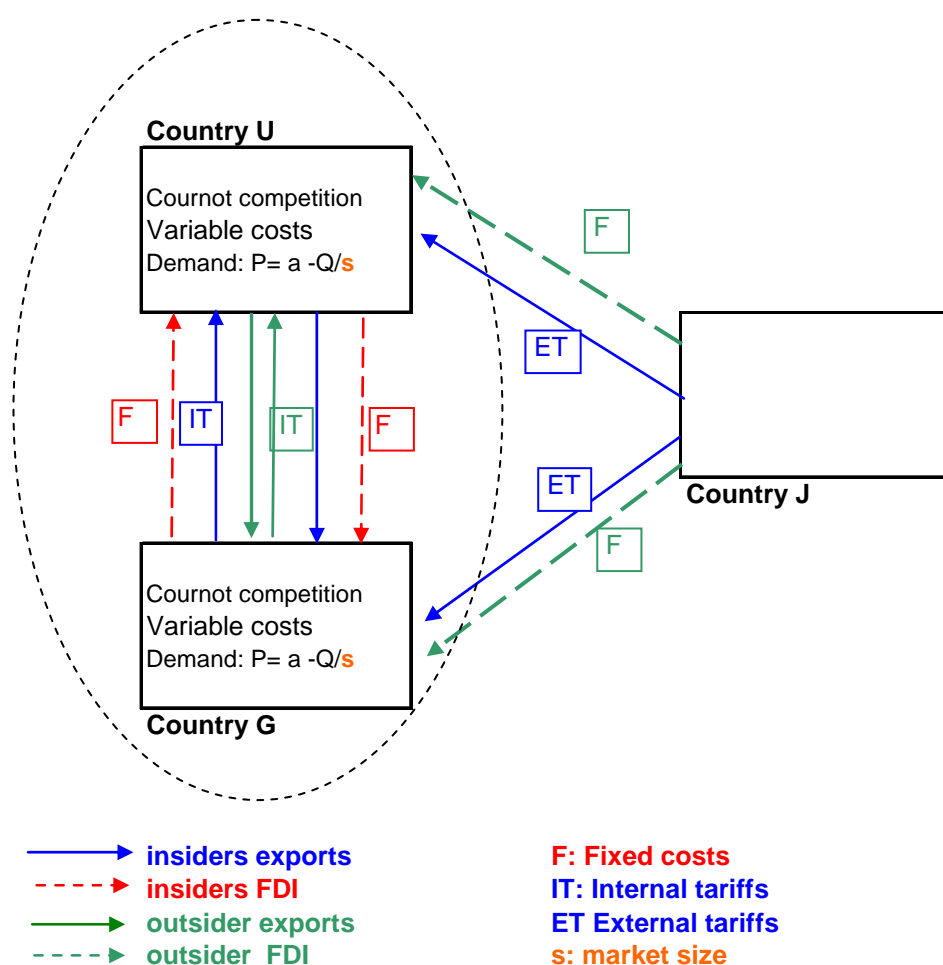


Figure 6:
The effects of regional integration on FDI among symmetric countries: the Motta-Norman results

