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Trading Arrangements and Industrial Development

A new approach to analyzing
the role of trade in promoting
industrial development.

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Summary findings

How do different trading arrangements influence the industrialization process of developing countries? Can preferential trading arrangements (PTAs) be superior to multilateral liberalization, or at least an alternative when multilateral liberalization proceeds slowly? If so, what form should the PTAs take? Are developing countries better advised to seek PTAs with industrial countries or among themselves?

Traditional analysis of these issues has been based on the ideas of trade creation and trade diversion. The problem with this analysis is that it starts from assuming a pattern of comparative advantage. This stands in sharp contrast to the apparently changing comparative advantage of newly industrialized countries. The experience of these countries suggests the need for an analysis in which the pattern of comparative advantage is not set in stone but is potentially flexible, and in which less developed countries can develop and converge in both income and economic structure to industrial economies.

Puga and Venables outline an alternative approach for analyzing the role of trade in promoting industrial development. There are few fundamental differences between countries that generate immutable patterns of comparative advantage. Instead the pattern of trade and development in the world economy is determined mainly by history. Cumulative causation has created concentrations of industrial activity in particular locations (industrial countries) and left other areas more dependent on primary activities. Economic development can be thought of as the spread of these concentrations from country to country. Different trading arrangements may have a major impact on this development process.

By changing the attractiveness of countries as a base for manufacturing production they can potentially trigger or postpone industrial development.

This approach explains why firms are reluctant to move to economies that have lower wages and labor costs, and shows how trade liberalization can change the incentives to become established in developing countries. It provides a mechanism through which import liberalization can have a powerful effect in promoting industrialization. And it suggests that import liberalization may create or amplify differences between liberalizing countries with the possible political tensions this may create. While these features are consistent with the world economy, they fall short of providing convincing empirical support for the approach.

Using the approach, the authors derive a number of conclusions about the effects of trade liberalization. First, that unilaterally liberalizing imports of manufactures can promote development of the local manufacturing industry. The mechanism is forward linkages from imported intermediates, but this may be interpreted as part of a wider package of linkages coming from these imports. Second, the gains from liberalization through PTA membership are likely to exceed those obtained from unilateral action. South-South PTAs will be sensitive to the market size of member states, and North-South PTAs seem to offer better prospects for participating Southern economies, if not for North and excluded countries. Third, the effects of particular schemes (such as the division of benefits between Southern economies) will depend on the characteristics of the countries and cross-country differences in these characteristics.

Trading Arrangements and Industrial Development[*]

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Foreword

As regional trading arrangements (RTAs) have spread, enlarged and deepened over the last decade, they have posed challenges to economists on both intellectual and policy levels. On the former, do RTAs stimulate growth and investment, facilitate technology transfer, shift comparative advantage towards high value-added activities, provide credibility to reform programs, or induce political stability and cooperation? Or do they, on the other hand, divert trade in inefficient directions and undermine the multilateral trading system?

The answer is probably "all of these things, in different proportions according to the particular circumstances of each RTA." This then poses the policy challenge of how best to manage RTAs in order to get the best balance of benefits and costs. For example, should technical standards be harmonized and, if so, how; do direct or indirect taxes need to be equalized; how should RTAs manage their international trade policies in an outward-looking fashion?

Addressing these issues is one important focus of the research program of the International Trade Division of the World Bank. It has produced a number of methodological innovations in the traditional area of trade effects of RTAs and tackled four new areas of research: the dynamics of regionalism (e.g., convergence, growth, investment, industrial location and migration), deep integration (standards, tax harmonization), regionalism and the rest of the world (including its effects on the multilateral trading system), and certain political economy dimensions of regionalism (e.g., credibility and the use of RTAs as tools of diplomacy).

In addition to thematic work, the program includes a number of studies of specific regional arrangements, conducted in collaboration with the Regional Vice Presidencies of the Bank. Several EU-Mediterranean Association Agreements have been studied and a joint program with the staff of the Latin American and Caribbean Region entitled "**Making the Most of Mercosur**" is under way. Future work is planned on African and Asian regional integration schemes.

Regionalism and Development findings have been and will, in future, be released in a number of outlets. Recent World Bank Policy Research Working Papers concerning these issues include:

Glenn Harrison, Tom Rutherford and David Tarr, "Economic Implications for Turkey of a Customs Union with the European Union," (WPS 1599, May 1996).

Maurice Schiff, "Small is Beautiful, Preferential Trade Agreements and the Impact of Country Size, Market Share, Efficiency and Trade Policy," (WPS 1668, October 1996).

L. Alan Winters, "Regionalism versus Multilateralism," (WPS 1687, November 1996).

Magnus Blomström and Ari Kokko, "How Foreign Investment Affects Host Countries" (WPS1745, March 1997)

Eric Bond, "Using Tariff Indices to Evaluate Preferential Trading Arrangements: An Application to Chile" (WPS1751, April 1997)

Magnus Blomström and Ari Kokko, "Regional Integration and Foreign Direct Investment: A Conceptual Framework and Three Cases" (WPS1750, April 1997)

Glenn Harrison, Thomas Rutherford and David Tarr, "Trade Policy Options for Chile: A Quantitative Evaluation" (forthcoming)

Planned future issues in this series include:

Pier Carlo Padoan, "Technology Accumulation and Diffusion: Is There a Regional Dimension?"

Sherry Stephenson, "Standards, Conformity Assessments and Developing Countries"

Maurice Schiff and L. Alan Winters, "Regional Integration as Diplomacy"

Other papers on regionalism produced by IECIT include:

Ahmed Galal and Bernard Hoekman (eds), Regional Partners in Global Markets: Limits and Possibilities of the Euro-Med Initiative. CEPR 1997.

Bernard Hoekman and Simeon Djankov, "Imports of Inputs, Foreign Investment and Reorientation of East European Trade," World Bank Economic Review (forthcoming)

Bernard Hoekman and Simeon Djankov, "The EU's Mediterranean Free Trade Initiative," World Economy

Bernard Hoekman and Simeon Djankov, "Effective Protection in Jordan and Egypt in the Transition to Free Trade with Europe," World Development.

Bartlomiej Kaminski, "Establishing Economic Foundations for a Viable State of Bosnia and Hercegovina: Issues and Policies".

In addition, **Making the Most of Mercosur** issued the following papers:

Alexander J. Yeats, "Does Mercosur's Trade Performance Raise Concerns About the Effects of Regional Trade Arrangements?" (WPS1729, February 1997))

Azita Amjadi and L. Alan Winters, "Transport Costs and 'Natural' Integration in Mercosur" (WPS1742, March 1997)

Claudio Frischtak, Danny M. Leipziger and John F. Normand, "Industrial Policy in Mercosur: Issues and Lessons"

Sam Laird (WTO), "Mercosur Trade Policy: Towards Greater Integration"

Margaret Miller and Jerry Caprio, "Empirical Evidence on the Role of Credit for SME Exports in Mercosur"

Malcom Rowat, "Competition Policy within Mercosur"

For copies of these papers or information about these programs contact Maurice Schiff, The World Bank, 1818 H Street NW, Washington, D.C. 20433.

An additional major outlet for World Bank-sponsored research on regionalism will be the Annual Bank Conference on Development in Latin America, 1997, Montevideo, June 30-July 2, 1997, organized by the Office of the Chief Economist and the Technical Department for Latin America and the Caribbean Region, with the support of the International Trade Division and the Economic Development Institute.

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1. Introduction

How do different trading arrangements influence the industrialisation process of developing countries? Can preferential trading arrangements (PTAs) be superior to multilateral liberalisation, or at least an alternative when multilateral liberalisation proceeds slowly? If so, what form should the PTAs take? Are developing countries better advised to seek PTAs with developed countries or amongst themselves?

Traditional analysis of these issues has been based on the ideas of trade creation and trade diversion. For example, consider a pair of less developed countries (LDCs) whose comparative advantage is such that each produces agricultural products and a different manufactured good, and exports only agriculture, importing manufactures from a developed country. Can a PTA between the LDCs promote industrialisation? The answer is yes —they will trade their manufactures instead of importing them from the developed country. This will lead to increased production of manufactures, but the basis of this is trade diversion. As such it may be welfare reducing —essentially the PTA and consequent trade diversion act as a way of creating regional import substitution.

The problem with this analysis is that it starts from assuming a pattern of comparative advantage. The initial situation is one in which the LDCs import manufactures only because the developed country is assumed to have a comparative advantage in manufactures, and given this assumption, the conclusion that PTAs promote industrialisation in the LDCs by working against their comparative advantage is hardly surprising. The assumption certainly stands in sharp contrast to the apparently changing comparative advantage of newly industrialised countries. The experience of these countries suggests the need for an analysis in which the pattern of comparative advantage is not set in stone but is potentially flexible, and in which LDCs can develop and converge —in both income and economic structure— to developed economies.

How can the analysis be extended to allow for the dramatic changes in relative income and in industrial structure that we have seen in some developing countries? One way is to build a model of trade and growth, and then see how trading arrangements change the incentives for factor accumulation and countries' rates of

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growth and relative factor endowments. While there is a small literature on the growth effects of PTAs (see Baldwin and Venables, 1995, for a survey), papers in this area do not yet have sufficient micro-foundations to be able to convincingly discriminate between different types of trading arrangement.

An alternative direction is to suppose that there are few fundamental differences between countries which generate immutable patterns of comparative advantage. Instead the pattern of trade and development we see in the world economy is determined mainly by history. Cumulative causation has created concentrations of industrial activity in particular locations (developed countries) and left other areas more dependent on primary activities. Economic development can be thought of as the spread of these concentrations from country to country. Different trading arrangements may have a major impact on this development process. By changing the attractiveness of countries as a base for manufacturing production they can potentially trigger —or postpone— industrial development.

In this paper we develop this approach, and illustrate how trading arrangements can shape economic development. The building blocks for our approach are familiar from new trade theory, and from somewhat older development economics. As in new trade theory we focus on the location decisions of firms with increasing returns technologies operating in imperfectly competitive environments. From development economics we take the ideas of forward and backward linkages between firms. Combining these linkages with imperfect competition creates pecuniary externalities between firms, and it is this that provides the mechanism for cumulative causation. The pecuniary externalities support existing agglomerations of industrial activity, and also provide a mechanism for the 'take-off' of newly industrialising economies.

Throughout the paper we shall concentrate exclusively on the trade flows generated by these agglomeration forces, and assume that countries have no underlying differences in technology or relative factor endowments that generate traditional comparative advantage. This is clearly an extreme position, and one which neglects some of the implications of trade liberalization. Nevertheless, we think that the forces we illuminate provide significant insights into the effects of trade on economic development.

The paper is organised as follows. In the next section we provide an overview of the analytical framework that we shall use throughout the paper, which is presented in more detail in the appendix. In section 3 we run through a series of experiments, simulating the effects of different trading arrangements on the industrialisation process, and showing how alternative arrangements can lead to quite different patterns of development. It also turns out that trade liberalisation may have dissimilar impacts on similar member economies, creating internal tensions within a PTA. In section 4 we draw out the policy implications of our findings, discussing some evidence of the empirical relevance of the forces captured by this framework, and relating our results to the recent experiences of different LDCs. A final section summarises the main conclusions.

2. An analytical framework

Details of our model are given in the appendix, and here we only give an informal overview of the its key features.

We shall assume that each country has —or may have— two sectors. One is a perfectly competitive commodity sector which, in line with most of the literature, we shall call agriculture. It produces its output using a sector specific factor (land) and a sectorally mobile factor (labour). For simplicity we assume that this product is freely traded.[1] We focus the analysis on the other sector, industry, although the two sectors interact in general equilibrium. As industry relocates, so agriculture adjusts to release or absorb labour and to maintain payments balance; land use in agriculture means that the wage in a country will be higher the smaller is that country's agricultural employment.

The industrial sector takes the form of a monopolistically competitive industry in which firms produce differentiated products. This is modelled as 'Dixit-Stiglitz' monopolistic competition, in the form applied to international economics by Helpman

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[1] A more realistic modelling of the agricultural sector, with positive trade costs and different crops, would not alter the main results of the paper but would shift the focus away from our main concern here, which is the effects of trade policy on industrialisation.

and Krugman (1985) and others. We generalise this model to include intermediate goods, along the lines of Krugman and Venables (1995) and Puga and Venables (forthcoming a, forthcoming b). That is, each firm's output is used both as a final good and as an intermediate good, and each firm uses as inputs both labour and the output of other firms. The presence of intermediate goods, when combined with imperfect competition, generates the forward and backwards linkages which are central to our approach. Rather than working with a full input-output structure (as in Puga and Venables, forthcoming b) we work with a single aggregate sector that uses its own output as input.

Firms enter and exit in response to profit opportunities, giving a long run zero profit equilibrium. It is this that determines the level of industrial activity in each country and to understand it, it is helpful to think of there being four forces determining the profitability of firms in a particular country. The first is factor market competition. A country that has a lot of industry will have higher wages, this reducing firms' profitability. The second is product market competition. Given some trade barriers a country with more industry will, other things being equal, have lower output prices, this also reducing profitability. These are standard 'neoclassical' forces, working for the dispersion of activity —encouraging firms to locate where labour is cheap and where there is little supply from other firms.

Working in the other direction are cost (forward) and demand (backwards) linkages. Cost linkages come from the fact that having more firms in a location means that more intermediate inputs are locally available, this reducing costs and raising profits. Demand linkages arise as having more firms in a location creates intermediate demands, this raising the sales and profitability of other firms. Both these forces mean that firms want to set up in the same country as existing firms —they are therefore 'centripetal' forces, working towards the concentration of industry in a single location.

It is tension between these four forces that determines the equilibrium pattern of location. If the first two are more powerful than the last two then it will generally be the case that industry operates in all locations and we are then in a standard 'new trade theory' world. This means that there is no dichotomy between developed and less developed countries —if we assume that countries all have the same relative

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endowments, technologies, and preferences, then they will all have similar industrial structures and patterns of trade.[2]

But if the last two forces are powerful enough compared to the first two, then equilibrium will involve agglomeration of manufacturing in a subset of countries. Without assuming differences in underlying comparative advantage the world will nevertheless be organised into some countries with industry, and other countries without. The countries with industry will be richer, for two reasons; the demand for labour in industry raises wages, and the local supply of manufactures reduces the consumer price index. They will also have a larger market, arising both from consumer and intermediate demands. And they will have a better supply of intermediate goods, showing up as a lower price index for these goods. At this equilibrium there may be quite large differences in wages and unit labour costs between the developed and less developed countries, but despite this it is not profitable for a firm to relocate to an LDC. If a firm were to do so it would benefit from lower wages, and from being the only local supplier in this market (our factor market and product market competition effects). But it would forego the benefits of proximity to its suppliers and its industrial customers (the forward and backward linkages).

How does trade liberalisation affect this? There are three main mechanisms. First, if the barriers incurred in exporting from an LDC are reduced, then this reduces one of the disadvantages of being in an LDC; it will now be cheaper to export from the LDC to the large developed country market. This means that we expect to see reductions in developed country import barriers facilitating the spread of industry to LDCs. What about LDC import barriers? There are two mechanisms here, pulling in opposite directions. First, opening markets to increased product market competition from foreign firms reduces the potential profitability of local firms. But second, lower import barriers mean that intermediate goods can be imported more cheaply, and this will raise potential profitability. Combining these mechanisms we shall often see an

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[2] Although there may be net trade arising from market size differences alone, see for example Krugman (1980).

effect which is, in some sense, greater than the sum of the parts. Cumulative causation can be triggered, leading to quite large changes in levels of industrial activity.[3]

Different PTAs offer a variety of combinations of reductions in trade barriers, which affect differently countries with different amounts of established industry, different wage rates, and markets of different sizes. In the next section we look at how the balance between market access, import competition, wage differentials, and linkages is affected by different PTAs. We study whether trade policy can make industry spread to LDCs, and if so what trading arrangements are most conducive to this spread.

3. Trading arrangements

Throughout this section we shall work with four countries, all of which are assumed to be the same size (i.e. have the same factor endowments). We assume values for parameters such that there is an initial equilibrium in which manufacturing is concentrated in just two of the countries. Within the formal structure of the model *which* two countries is indeterminate. We simply label the two countries that have industry North, and the two that do not, South.[4]

We set the following structure of trade barriers between economies. All trade flows in manufactures have an equal level of real trade costs per unit, which can be thought of a set of costs incurred when doing business at a distance. In addition, there are ad valorem tariffs. In the initial equilibrium we assume that these are zero between the two Northern economies, and positive and equal on all other manufactured trade flows. The experiments we report in this section are reductions in some or all of the tariff barriers, corresponding to different trade liberalisation packages. In all the experiments we undertake we assume that the two Northern economies follow

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[3] We do not allow trade liberalisation to change the technology in use, or to change the price mark-ups through strategic interaction between firms.

[4] We choose four countries because for the questions we want to address we need two Southern economies, and there are some benefits from having a structure which allows for symmetry between regions.

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identical policies, and keep identical economic structures (the reason for this is simply to focus on South). We shall consequently refer to North as a single policy maker.

In this section we go fairly rapidly through a set of experiments, based on numerical simulation, and draw out the way in which the spread of industry differs between cases. In section 4 we have a fuller discussion of policy issues, and look in greater detail at questions raised by the potentially unequal distribution of the benefits between Southern economies.

We shall illustrate outcomes by presenting a series of figures with the level of tariffs, denoted T, on the horizontal axis ($\bar{T} = 1$ is free trade, $\bar{T} - 1$ the ad valorem tariff rate). The initial value, $\bar{T}$, is the same for all manufacturing trade flows involving a Southern economy, and liberalisation will reduce some (or, in the case of multilateral liberalisation, all) of these tariffs, with those not affected by the liberalisation held at $\bar{T}$. In each sub-section below two figures are presented. The vertical axis in the a figure is the share of world industry in each of the two Southern economies (the Northern share obviously given by one minus the sum of Southern shares), and we shall use these figures to demonstrate the way in which liberalisation causes industry to relocate. The b figures give real wages inclusive of tariff revenue (distributed to workers in a lump sum manner) for the two Southern countries and for North. These change because of changes in demand for labour, because of changes in the consumer price indices in each country, and because of changes in levels of tariff revenue.[5]

3.1. Multilateral liberalisation

We take as benchmark case multilateral trade liberalisation between all countries. Figure 1a shows that with the initial tariff barriers, $\bar{T} = 1.15$ (for all North-South and South-South trade, while there is free North-North trade), the whole of industry is agglomerated in North —the lines S_1 and S_2 giving the share of each of the Southern economies are at zero. At this equilibrium Southern real wages are approximately 65% of Northern (despite the fact that there are no differences in technology, labour skills

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[5] The evolution of real wages *exclusive* of tariff revenue is not dissimilar from that presented in the figures.
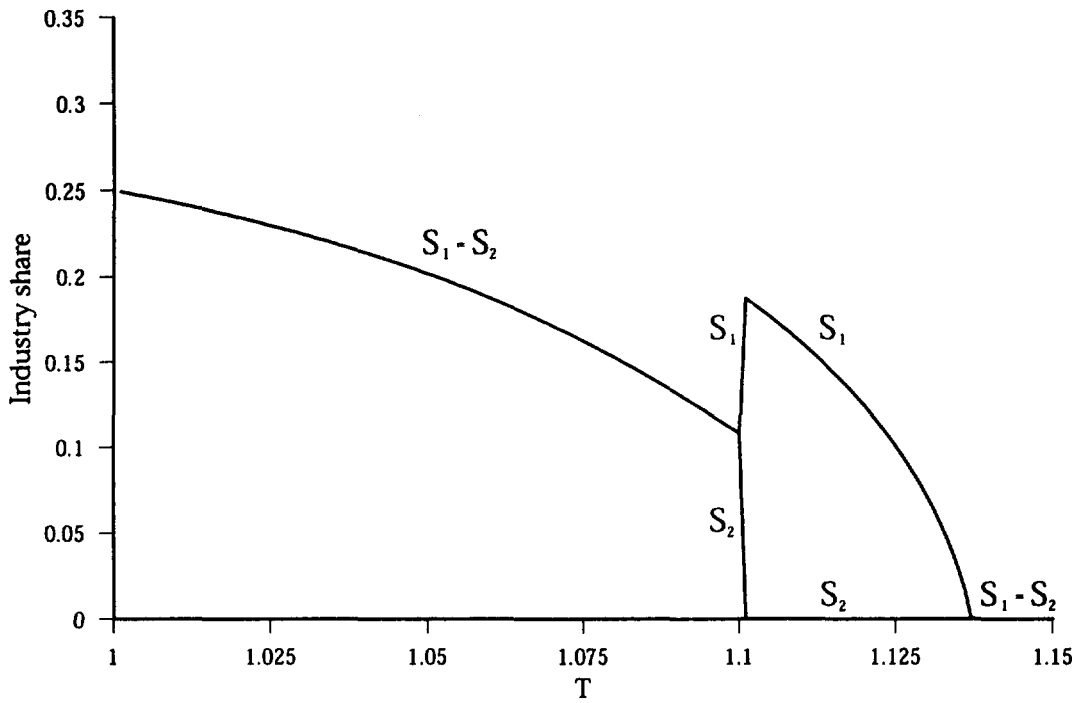
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FIGURE 1a

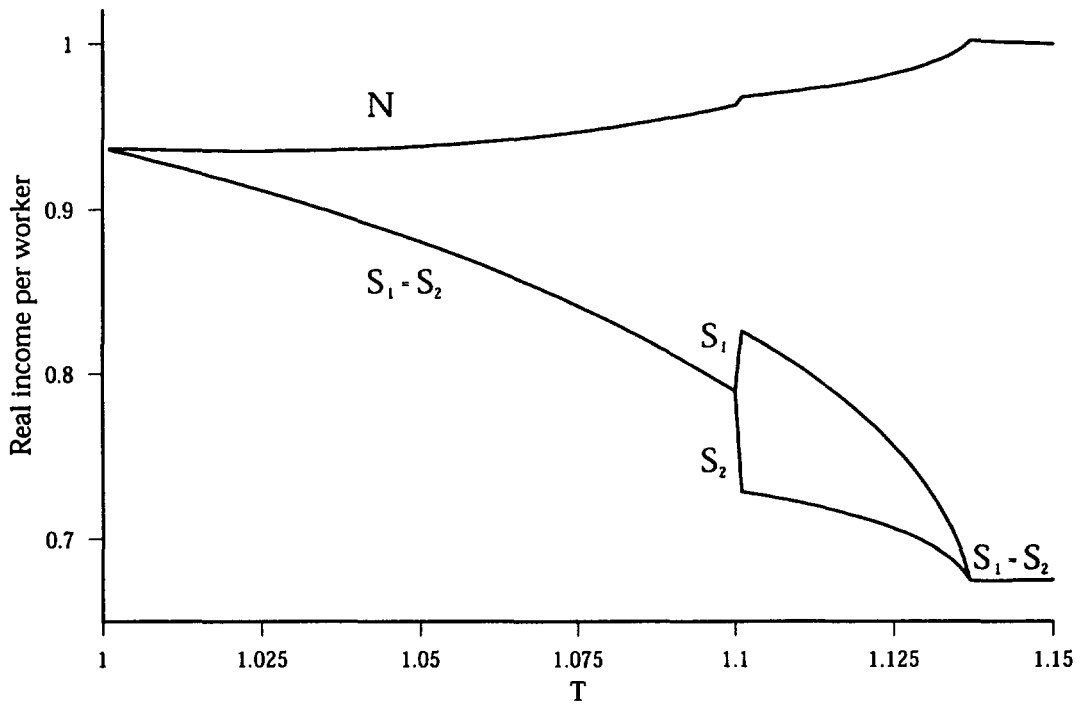Multilateral liberalisation: Share of industry in each country

FIGURE 1b

Multilateral liberalisation: Real income per worker

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or relative endowments). As global tariffs T fall there comes a point, (around 1.14), at which it becomes profitable for some firms to relocate South. We have already outlined the forces driving this. Profitability of Southern firms (potential, if not yet actual firms) is reduced by having a more open market. But it is increased by the fall in the price of imported intermediate goods, and by easier access to the large Northern market. These last two forces —combined with the large initial wage difference— are bound to dominate, causing industry to move South. Notice however that industry initially only starts operating in one of the Southern countries. If the two Southern countries are identical, the choice of which is entirely a matter of chance —we shall label it S_1. The reason for this uneven spread is that the first firms to set up create cost and demand linkages to other firms in the same country. They also raise wages, but the linkage effects are stronger, so what we see is a second industrial agglomeration forming in just one of the LDCs.[6]

The range of tariffs from around 1.14 to 1.10 is therefore one in which industry has spread to one Southern country, but not the other. As tariffs are reduced below this point it becomes profitable for manufacturing firms to become established in the other LDC, S_2. We see that this process is very abrupt, and partly at the expense of S_1, which suffers a small fall in its share of world industry. At tariffs below this point the two Southern economies are identical, and further reductions in T bring a steady relocation of industry to these economies. At completely free trade each of the now developed Southern countries has 25% of world industry (equal to its share of the world endowment).

The corresponding real wage picture is $1b$. Although welfare effects are not directly caused by the evolution in country shares of industry they are closely related with it. Countries with more industry have higher labour demand and have to import fewer varieties subject to trade barriers, both effects supporting the real income differences in figure $1b$. This comes through clearly in the increase in Southern economies' wages. Northern real wages decline, although this result is not general. The combined effect of changing labour demand and price indices on Northern wages is ambiguous, with the balance of decline and increase depending quite sensitively on parameter values.

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[6] There may be other mechanisms which reinforce this result —most obviously a confidence factor created by early entrants' success.
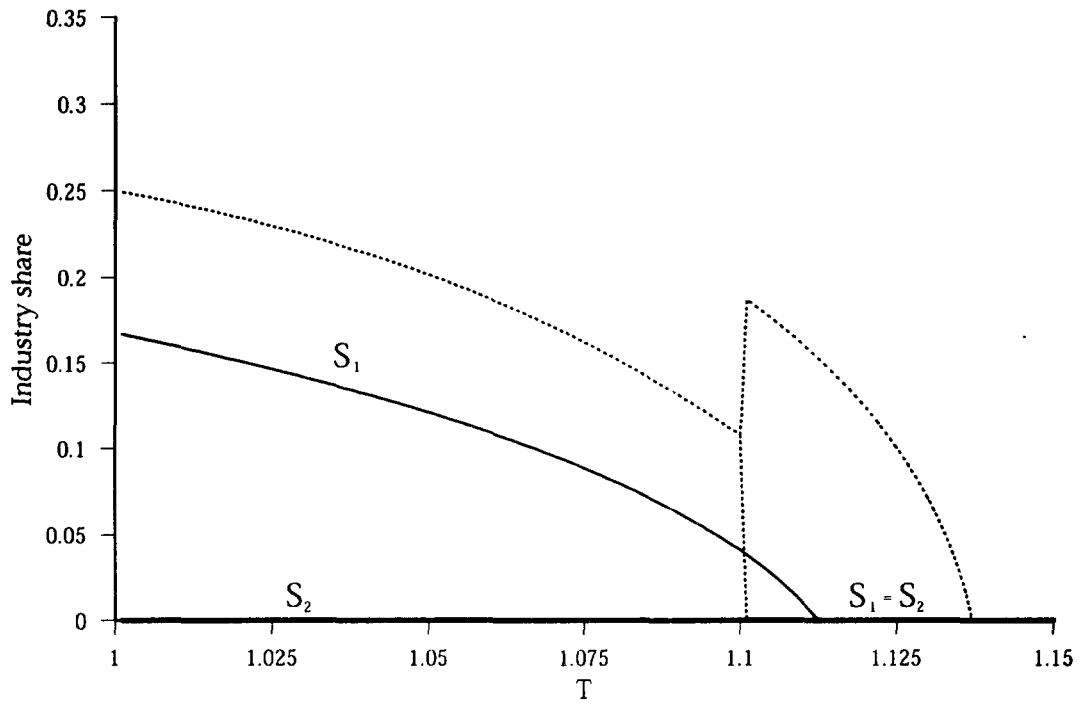
FIGURE 2a

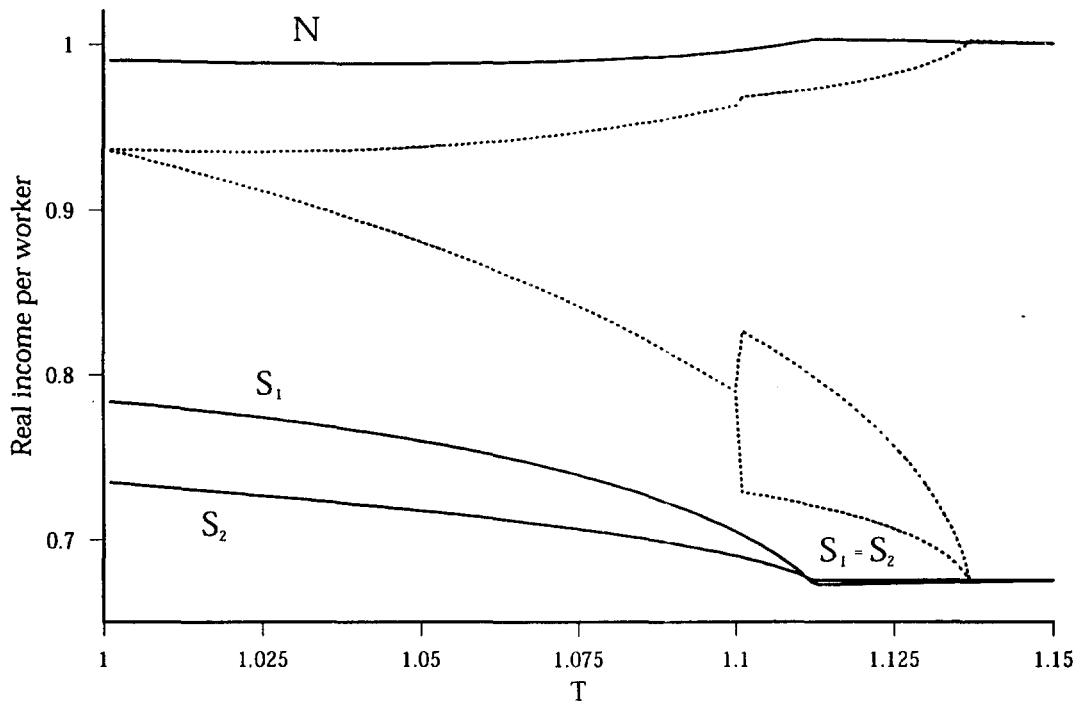Unilateral liberalisation: Share of industry in each country

FIGURE 2b

Unilateral liberalisation: Real income per worker

There are two main messages from these figures. First, trade liberalisation breaks down existing agglomerations of activity. As trade costs are reduced firms become more footloose and more sensitive to international differences in factor prices, and it is this that drives the convergence in the figures. Second, the benefits will not necessarily be equally divided between the Southern economies.[7] It follows directly from the presence of agglomeration forces in the model that as the Northern agglomeration starts to break down, so new agglomerations may develop.

3.2. Unilateral

We now turn from multilateral to unilateral liberalisation. A single Southern economy (S_1) engages in unilateral import tariff liberalisation, with all other barriers held constant (at value $\bar{T} = 1.15$). The solid lines in figures 2a and 2b tell the story, with the dashed lines on this and all remaining figures giving multilateral liberalisation as a reference case.

The striking point to note about the figure is that openness to imports of manufactures causes manufacturing production to start. Import competition obviously has a negative effect through the product market, and access to the Northern market is not liberalised. But the cheaper supply of imported intermediate goods becomes the dominant force, enabling industry to become established.[8] Industry will develop sooner and at larger scale (i.e., the S_1 curve will be higher) the greater is the share of intermediates in production, and the larger is the market in the liberalising economy. Furthermore, the unilateral reduction unambiguously raises wages in the liberalising country.[9] Only if all of the Southern economy's trading partners had sufficiently high tariffs could its industrialisation be prevented. But providing this is not the case, we find that the combination of low wages and low cost intermediates (due to import

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[7] The extent and form of divergence between Southern economies depend on model specifications. If a full input-output structure is considered and not all sectors are tightly linked to each other, each Southern economy may get agglomerations of different sectors, although there is always a tendency for unequal development on the aggregate.

[8] For fuller development of this argument in a somewhat different model see Venables (1996).

[9] Before industrialisation takes off there is a slight real wage decrease in the liberalising economy because of falling tariff revenue, but as soon as it starts to attract some industrial production real wages inclusive of tariff revenue rise unambiguously.
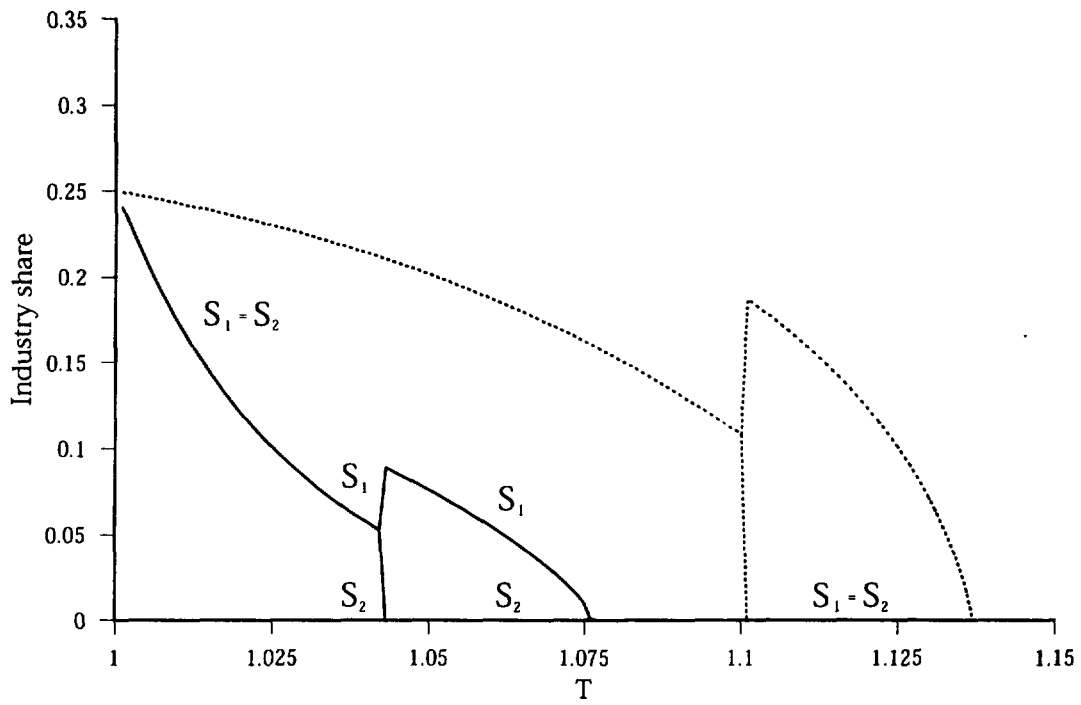
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FIGURE 3a

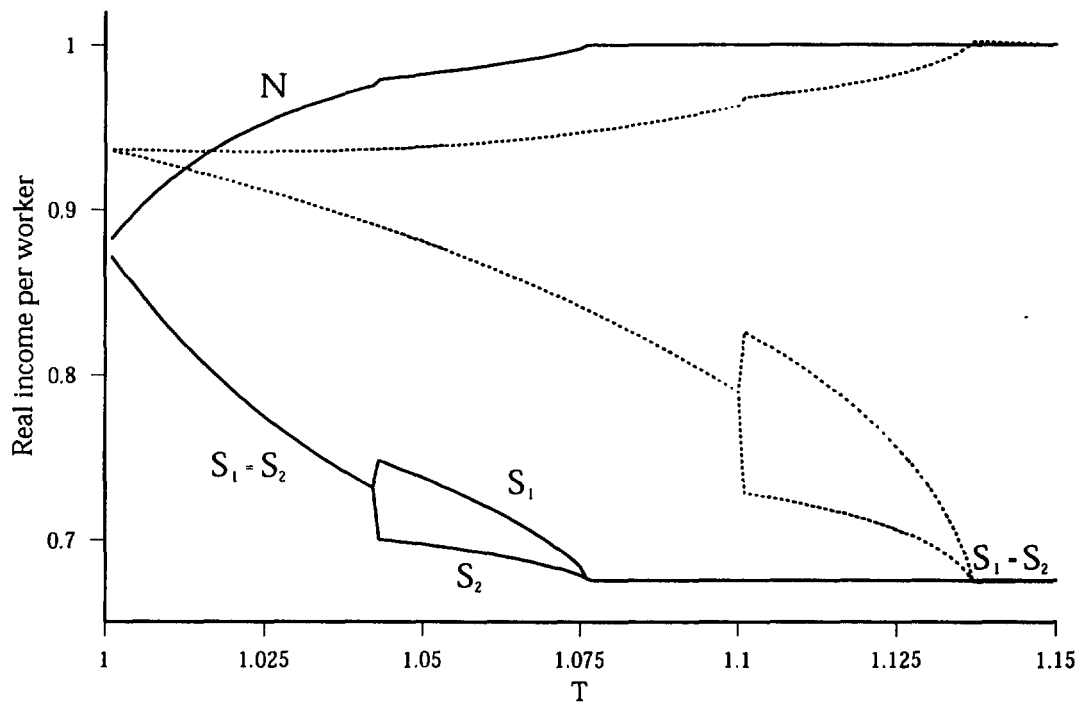South-South FTA: Share of industry in each country

FIGURE 3b

South-South FTA: Real income per worker

liberalisation) are sufficient to lead to industrialisation. The policy has no direct effect on the other Southern economy (it has no industry to benefit from S_1's liberalisation), but it does experience a slight real wage increase —a terms of trade improvement due to the increased world supply of manufactures.

Comparing unilateral with multilateral, the continuing barriers to LDC's exports means both that it takes a lower tariff rate to start industrialisation and that, once started, S_1 has a lower share of manufacturing than in the multilateral case. Associated with this, real wages are lower in S_1 than in the case of multilateral liberalisation.

3.3. South-South PTA

In a South-South PTA the two Southern economies reduce trade barriers between each other, with import barriers to and from North held constant. The results are illustrated in figures 3a and 3b.

Once again, the trade liberalisation is sufficient to cause industry to become established in the LDCs, but the mechanism is completely different from the previous case of unilateral tariff reductions. In that case industry started in response to cheaper intermediate inputs —a force which cannot operate here as in the initial position no intermediates are affected by the tariff reduction. Instead, the driving force is the effective market enlargement caused by reducing intra-South barriers. Like the multilateral case, the spread of industry to LDCs is uneven, initially developing in one of the countries and only at lower trade barriers spreading to the second.

What can be said by way of comparison with the previous cases? Looking at industrial activity levels, both the Southern economies attract less industry than with multilateral, as they do not benefit from better access to Northern markets nor to Northern-produced intermediates. Compared to unilateral liberalization we see that with the South-South arrangement industry is attracted later, although as tariffs become very small the gain is larger. Comparison of Southern real wage movements is similar.

Although the ranking of South-South and multilateral is general, the ranking of South-South with unilateral is not. As we have pointed out, quite different mechanisms trigger industrialisation in the two cases. With South-South industrialisation is triggered by local demand, and will be earlier the higher is this
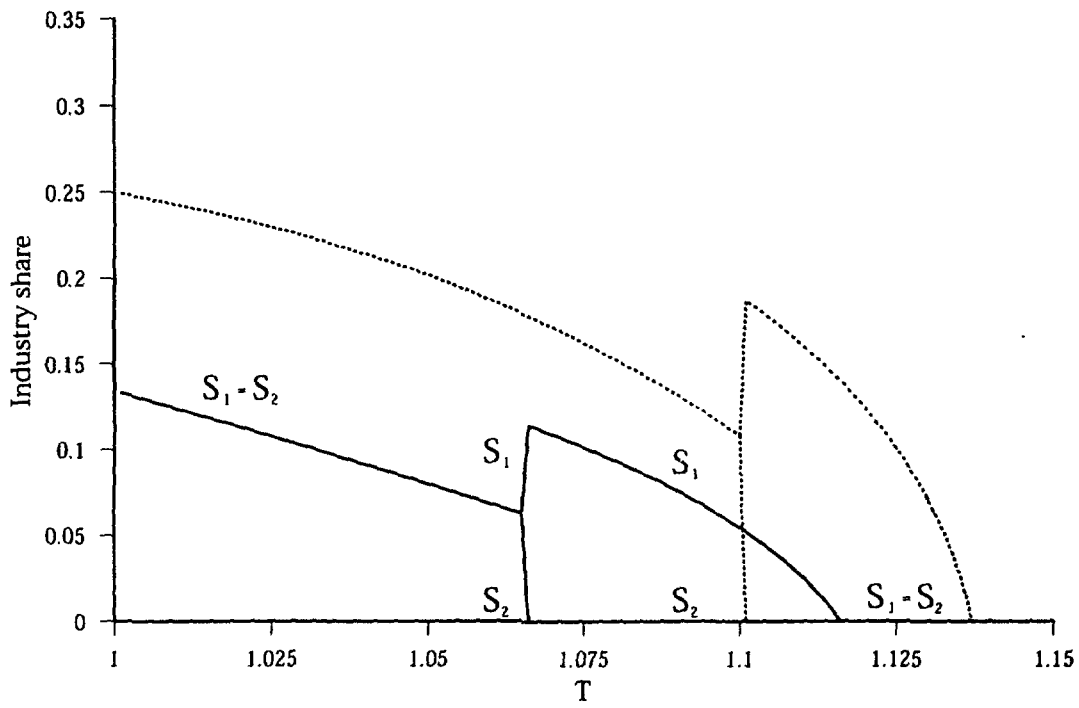
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FIGURE 4a

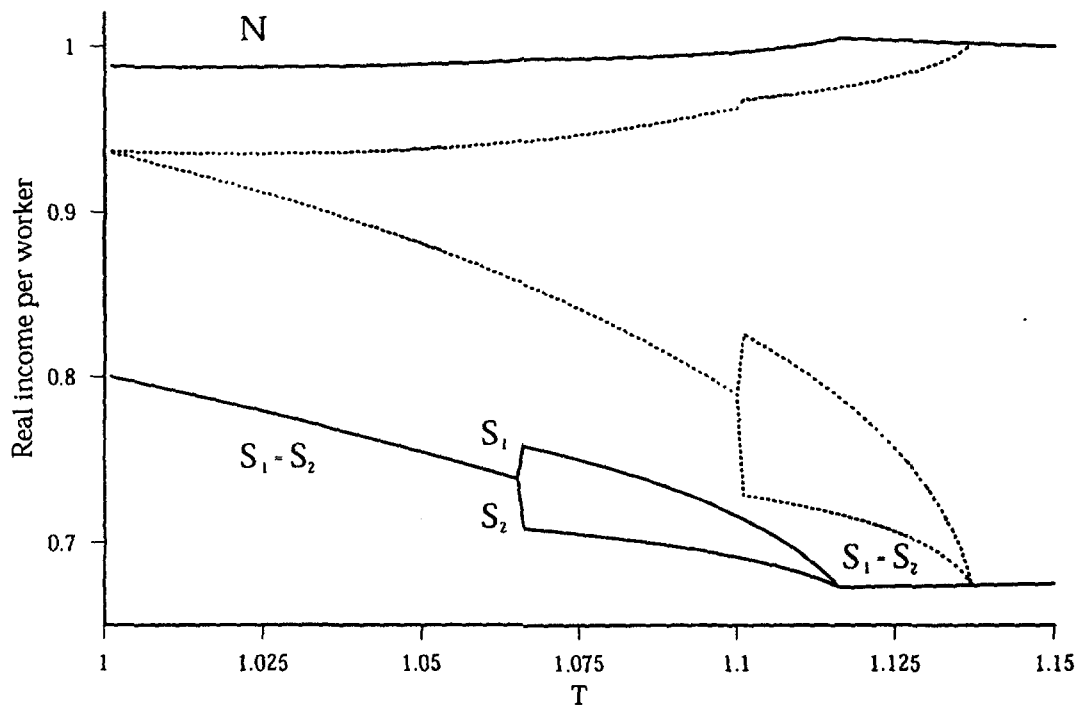Open regionalism: Share of industry in each country

FIGURE 4b

Open regionalism: Real income per worker

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demand. With unilateral, it is triggered by forward linkages from imports, and its timing depends on the strength of these linkages. It is possible that if linkages are weak and Southern demand large then a South-South PTA may attract industry at a higher value of T than does a unilateral liberalization.

3.4. Southern Open Regionalism

We know look at the effects of 'open regionalism', or unilateral liberalisation by both Southern economies. As in a South-South PTA bilateral tariffs between the two Southern economies are reduced, but now imports from the Northern economy are liberalised as well. Figures 4a and 4b illustrate the results.

The evolution of industry is similar to that of a South-South PTA. Industrialisation starts first in one Southern country, then in the other. The process of industrialisation certainly starts sooner (at higher levels of T) in one of the countries than is the case with unilateral liberalisation; this is because the relationship with North is the same, and in addition there are the benefits of Southern liberalisation. Comparing open regionalism with a South-South PTA we see in the example illustrated that open regionalism leads to earlier industrialisation. However, this is not general —liberalization with North brings benefits from forward linkages and disadvantages from import competition, the net effect of which is ambiguous.

At low levels of tariffs open regionalism gives a higher level of real income than unilateral liberalisation, but lower than both South-South and multilateral. This is because of the asymmetry in North-South trading arrangements. Southern exports to North still face a tariff barrier, while Northern imports to South are untaxed.

3.5. North-South PTA

What if, instead of liberalising bilaterally with the other Southern economy, one of the Southern countries forms a PTA with North?[10] Figures 5a and 5b summarise the results.

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[10] Recall that North is assumed to be a single policy making agent, so the PTA is with both Northern economies.
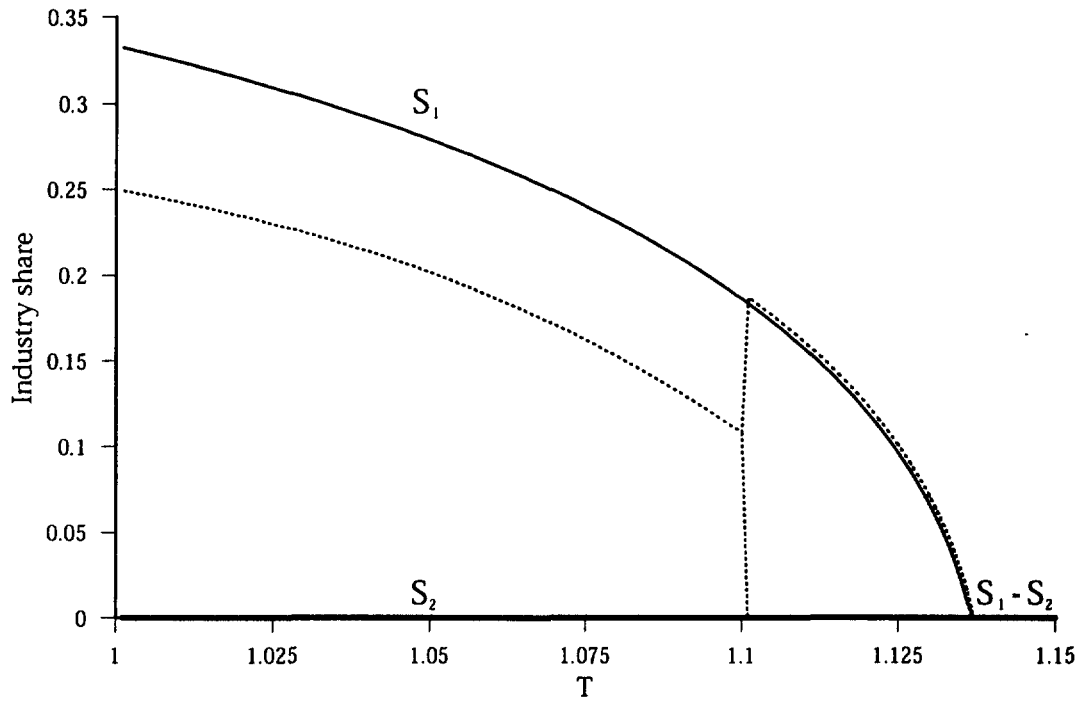
FIGURE 5a

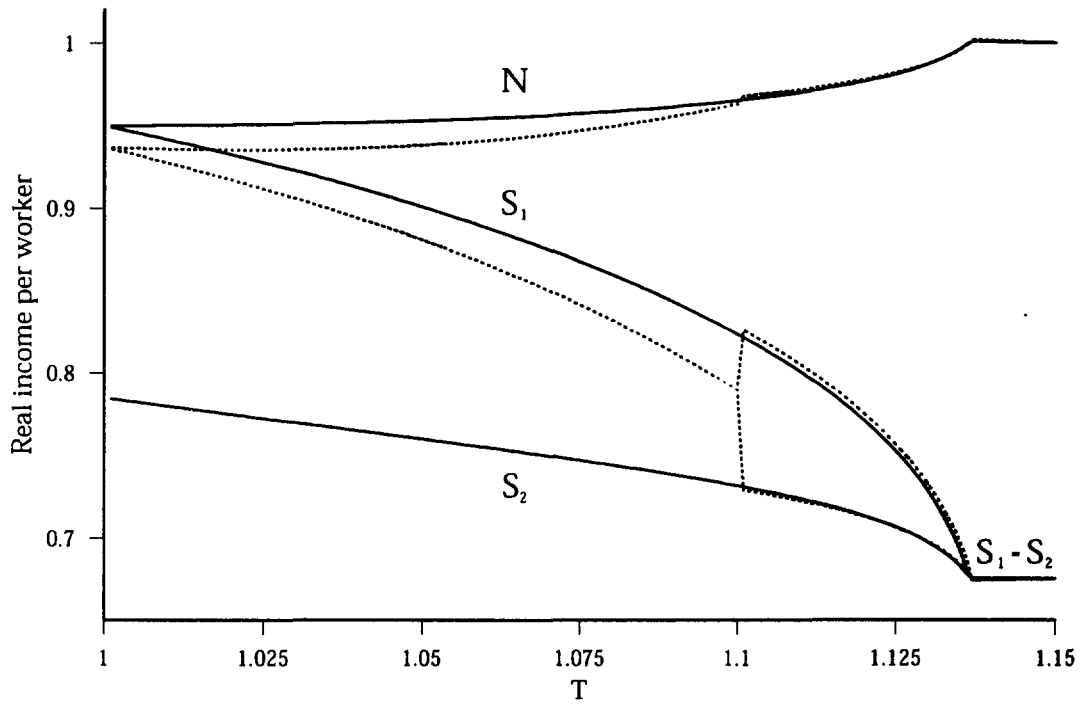North-South FTA: Share of industry in each country

FIGURE 5b

North-South FTA: Real income per worker

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Bilateral North-South liberalisation spreads a larger share of industry to the liberalising Southern economy, and gives this economy higher real wages, than any of the other arrangements we have considered (compare it with the multilateral case given by the dashed lines). This is because a PTA with North gives a Southern economy the benefits of both improved access to the large Northern market and low cost availability of Northern intermediates. The liberalising Southern economy suffers from more competition from Northern firms but, because Southern wages are lower, the balance of better reciprocal market access flips in favour of South. This spread of industry comes at the expense of a large fall in Northern's share of industry (and also a fall in Northern real wages). The loser (compared to other arrangements) is of course the other Southern economy which does not attract any industry and only experiences a slight increase in real wages through the rise in world industrial production.

3.6. Hub-and-spoke

The previous experiment assumed that North formed a free trade area (FTA) with just one Southern economy. An interesting alternative is that in which North forms a bilateral FTA with each of the Southern economies, but these keep barriers between them unchanged. This kind of trade policy arrangement turns North (that is, both Northern economies jointly) into the 'hub' of this hub-and-spoke arrangement.

Figures 6a and 6b represent such a case. It brings relatively rapid and strong industrialisation to South, for the same reasons that applied in the case of a bilateral North-South FTA. The effects now affect both the Southern economies (after the initial phase of divergence between them). The spread of industry to South is however less pronounced than under multilateral liberalisation because location in each of the Southern economies is penalised by the barriers between the Southern economies. It is this which enables North to maintain a higher real wage in this case than in either of the other two experiments involving Northern liberalisation.
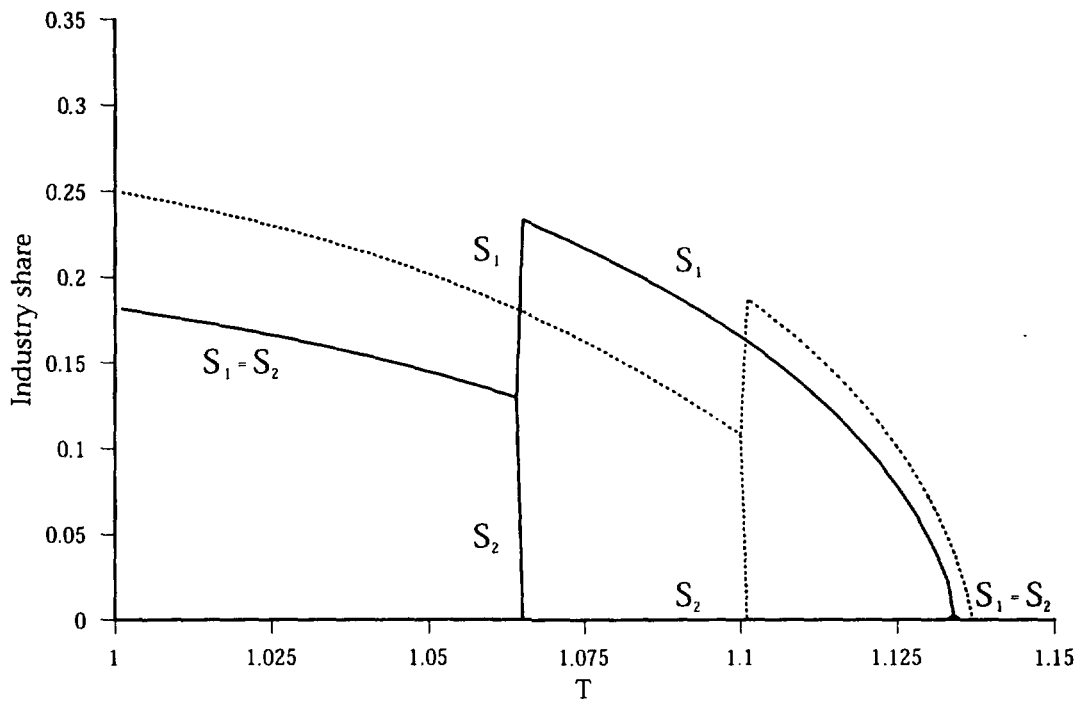
FIGURE 6a

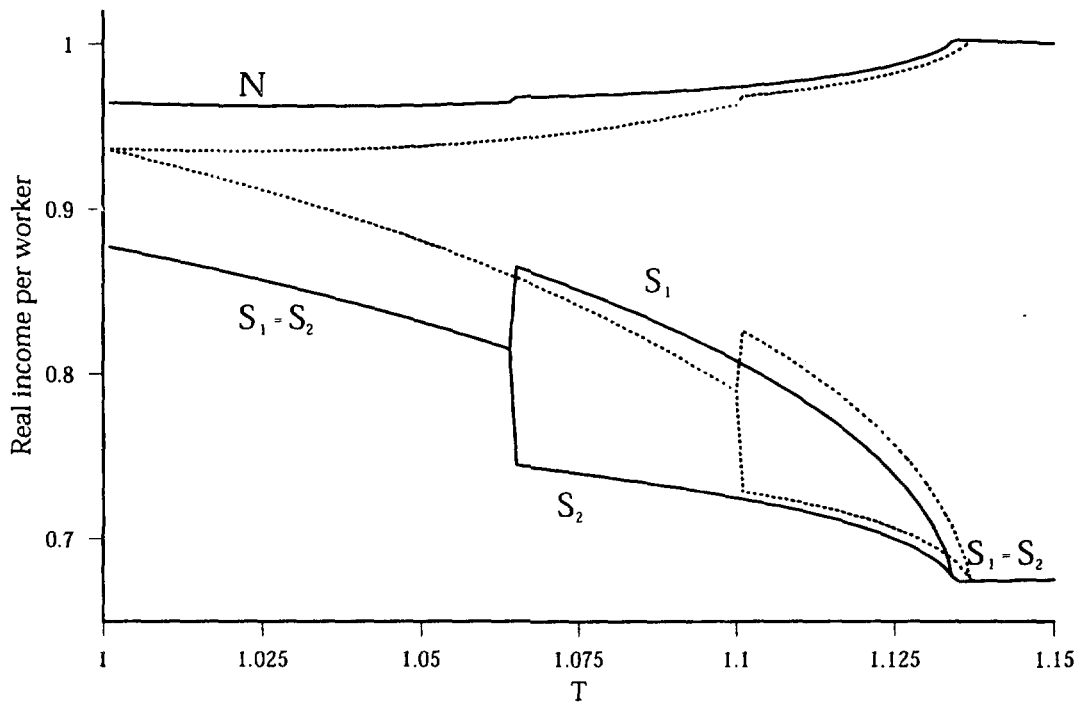Hub-and-spoke: Share of industry in each country

FIGURE 6b

Hub-and-spoke: Real income per worker

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4. Policy issues

How relevant in practice are the forces captured in this framework? How much evidence is there to support the argument that PTAS cause such changes in the production structure of nations? The only study of which we are aware that directly addresses these issues is Hanson's work on Mexico. Hanson (1994), using data on Mexico, finds support for the hypothesis that agglomeration is associated with increasing returns. He also shows (Hanson, forthcoming) that integration with the US has had strong effects on industry location in Mexico. Industry has shifted towards states with good access to the US market (demand linkages). At the same time, employment growth has been higher in regions that have larger agglomerations of industries with buyer/supplier relationships (cost linkages).

While there is support for the relevance of this forces, we are not aware of any empirical work on their importance under specific trading arrangements. Nevertheless we believe the experiments of the previous section can shed some light on some of the trade policy choices currently faced by LDCs. The remainder of this section discusses the main implications.

4.1. Unilateral or concerted liberalisation

Recent years have seen many LDCs (in particular East Asian economies) undertake unilateral trade liberalisation. However, others (including some of the partners East Asian countries have gathered with in the Asia-Pacific Economic Cooperation process, APEC) have been reluctant to lower their tariffs without receiving reciprocal concessions. What are the benefits of unilateral liberalisation, and can countries expect to do better by concerted action?

The answer to the first part of this is, as we have seen (3.2), that unilateral liberalisation can attract industry and bring a real income gain. Although more intense import competition has an adverse effect on profitability in the liberalising economy, import supply creates beneficial forward linkages to domestic production and promotes industrialisation. While in the model such linkages arise just from the use of these goods as inputs, in reality we might think of these linkages coming through several channels. As a recent World Bank (1994) study argues:

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'By opening their economies, countries gain access to more affordable consumer goods and to technologies and intermediate goods that help reduce production costs. Thus, by improving the climate for investment, liberalization also helps to attract foreign capital. Foreign investment, in turn, can provide the technology and financing required to establish a more efficient production structure.'

Tybout and Westbrook (1994) find that trade liberalisation in Mexico has reduced average costs in most industries. In more export-oriented industries these cost reductions were due mainly to the type of forces captured by our model (falling prices of intermediates), while in sectors with higher import penetration these cost effects appeared to be combined with relative productivity improvements. At the same time they find that increased import penetration has shifted downwards the demand for domestic products.

In our analysis we find that the balance between import competition and cost linkages, combined with low initial wages, tends to work out in favour of the liberalising economy, leading to industrialisation, as in figure 2. However, the benefits of unilateral liberalisation alone, may be relatively small; in our examples full unilateral liberalisation gave a lower real income than any of the other experiments considered. What can LDCs do to better promote industrialisation through trade policy?

Our analysis suggests the strong likelihood of gains from concerted action, but two reservations have to be made. The first is that the gains from concerted action may not be divided equally between the members. Even in the case of open regionalism —which in our modelling is no more than simultaneous liberalisation by both Southern economies— there may be an interval in which one country does worse than it would if it were the only country to liberalise. We return to these issues of division of the gains in section 4.4. The second qualification is that, even though all our simulations give greater gains from concerted action than from unilateral, we have no general theorems —all results are sensitive to specification of the model and of the experiment. In particular, North-South and South-South PTAs operate in quite different ways, and we now turn to comparison of these two cases.

4.2. South-South or North-South?

Should countries with highly developed industrial systems be part of the concerted liberalisation, or excluded from it? We address this by comparing South-South arrangements involving North.

South-South PTAs work essentially by enlarging market size, and their success is dependent on the combined market size being large enough to attract industry. Analysis indicates that the smaller are the Southern countries then the later and less is the industrialisation (in terms of the figures we have presented, the curves S_1 and S_2 are pushed down and to the left). The mechanism is a form of trade diversion but —unlike the traditional analysis outlined in the introduction— the diversion may be successful in bringing about a 'critical mass' of activity from which a viable, and welfare improving, industrial base is created. Evidently, the market size of the group must reach a certain minimum size for this to work. The failure of many South-South PTAs can perhaps be attributed to inadequate scale. As Corden (1993) puts it:

> 'It is far better for Argentina to go for the world market —i.e., to liberalise unilaterally and in a non-discriminatory fashion, as she has been doing— than just go for the Brazilian market. Brazil has the largest economy in the Third World, and yet it is smaller than Canada's (as measured by the dollar value of GDP). And this applies even more to Brazil.'

North-South PTAs work quite differently, on the basis of improved access to the large Northern market and improved supply of intermediate goods, offset by increased import competition in domestic markets. In all cases we have examined North-South arrangements are, from the point of view of the participating Southern economies, better than South-South agreements. The reasons for the success of these North-South agreements merits some thought. In many new trade models the argument is made that liberalisation between economies of different sizes will draw industry into the country with the large market (the 'centre') and away from smaller ('peripheral') countries. However, the strength of these forces is greatest at intermediate levels of trade barrier, and at very low barriers factor price differences can overturn these effects. How does this relate to our findings that liberalisation will move industry out of the large economy to the small? Centripetal forces are certainly present in the model we have developed —indeed, they are amplified by forward and backward linkages. But these forces are precisely those that make for the North-South

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divide in the initial equilibrium —they create the initial wage differentials. Given this initial position, in particular the wage differences, further liberalisation then moves industry out of the large and developed region, to the less developed. The circumstances that are most conducive to South benefitting from a North-South agreement of this type are, therefore, low remaining barriers to the Northern market (secured, for example, by proximity, as in NAFTA or the EU's Southern regions and prospective Eastern regions), combined with low unit labour costs.

What about North? The flip side of Southern gains is that, in this framework, North may lose. As the industrial agglomeration in the Northern economy breaks down, so there may be a decline in Northern real income. These losses are greatest for South-South liberalisation. Of the arrangements where North reduces barriers to Southern imports, multilateral liberalisation causes larger losses than hub-and-spoke arrangements. This may be one of the reasons that has induced the European Union to choose a bilateral rather than multilateral approach to trade liberalisation with its neighbours. The set of bilateral association agreements that the European Union has established both in Central and Eastern Europe and in the Mediterranean have in effect turned it into the hub of a large web of trading arrangements.

Does this imply that North would be better off by not reducing its barriers to Southern imports? Not necessarily. In fact, our analysis suggests three reasons why not liberalising may be a worse option.

First, Northern losses in this context are not general. All our experiments start from an equilibrium in which South has no industry, so Northern has no manufacturing imports and there are large differences in unit labour costs. With higher initial development levels in South and smaller initial differences in unit labour costs, real wages in North tend to rise instead (see Krugman and Venables, 1995, for an elaboration of this point).[11]

Second, even if North were to lose from opening its market to Southern imports, it would lose more from remaining closed while Southern economies liberalise amongst themselves. Comparison of South-South vs. multilateral liberalisation shows that in either case industry spreads to Southern countries, but under South-South

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[11]   Recall also that we have excluded any gains from trade through comparative advantage, which in practice are likely to bring further benefits to Northern consumers.

liberalisation Northern firms and consumers have to pay higher prices on the increasing number of goods produced in South, so real wages are lower.

Third, falling real wage differences between North and South may help reduce migration pressures. One of the main arguments in favour of NAFTA in the United States was reducing illegal migration from Mexico (and, in fact, Hanson and Spilinbergo, 1996, show that illegal migration from Mexico to the US is very responsive to changes in relative wages).

4.3. Open regionalism vs. Southern trading blocs

The APEC process has raised hopes that integration in the Asia-Pacific region may develop in a less inward-looking way than in other geographical areas, and perhaps even catalyse deeper global trade liberalisation. Calls for the formation of a regional trading bloc in Asia have received little support. The amount of trade covered by ASEAN, the Association of Southeast Asian Nations, remains small. The East Asian Economic Group (EAEG) has so far lacked the necessary backing to take off. Instead, inward-looking regional integration is giving way to APEC's vision of 'open regionalism'.

In the report presented at APEC's 1994 annual summit in Bogor, the APEC Eminent Persons Group explained APEC's vision of open regionalism as follows. First, APEC members should liberalise intra-APEC trade flows on a non-discriminatory basis. Second, APEC should, as a group, treat nonmembers as it does members, provided that nonmembers make reciprocal offers. Third, any individual APEC member should have the choice to unilaterally waive such reciprocity requirement and extend its APEC liberalisation to all nonmembers.

APEC's members have so far been divided over this last point. While East Asian countries have favoured openness towards non-members, the US President, Bill Clinton, made clear before APEC's Bogor summit that any trade concessions would be reciprocal, and that there would be 'no free-riders'. One year later at the Osaka summit Australia's trade minister, Bob McMullan, stressed that they would also give 'nothing for nothing'.

Outside Asia other countries have also seen the need to reciprocally open their markets. The main argument was highlighted by the Economist (29 June 1996) after

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Chile signed its FTA with Mercosur: '[d]espite continued protectionist pressure from their weaker industries, Mercosur's leaders all know that, to attract investment they need to compete in the wider world, their firms want a bigger home market'. However, in the case of Mercosur unilateral liberalisation is not even on the agenda. Instead its member countries are advancing towards a regional FTA that will liberalise trade flows between members but not imports from outsiders. What can we say on the basis of our analysis on the comparison between 'open regionalism' and a South-South FTA?

We have already discussed the trade-off. 'Open regionalism' brings beneficial cost linkages, but also more intense competition from outsiders. Comparison of figures 3 and 4 show that the former effect is most important in the early stages of industrialisation, and the latter in determining real income once industry is established. Open regionalism brings earlier industrialisation than South-South, but at very low tariff levels South-South leads to more Southern industry. These results are quite sensitive to parameter values. In particular, if Southern economies are small 'open regionalism' works better for them (a small country size reduces the effects of trade liberalisation, but weakens market access considerations by more). This is because with a small home market most of their sales will take place abroad, so protective tariffs are of little help to them, but extending liberalisation unilaterally to non-members lowers the cost of intermediates and helps industrialisation take off. Given this, it is not surprising what we have observed in Asia: smaller countries pushing for unilateral liberalisation while larger ones insist on reciprocal concessions.[12]

4.4. Southern disparities

In all the cases in which the two Southern economies follow symmetric policies we have seen that the outcome is, for some interval of tariffs, asymmetric. One country industrialises before the other, followed at a lower tariff rate by rapid convergence

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[12] The fact that more small than large countries have liberalised unilaterally can also be explained by smaller countries having less bargaining power to extract reciprocal concessions. What is striking is that smaller Asian countries not only tend to have more open regimes, but have also generally expressed their preference for a more open approach to trade liberalisation even if larger countries in APEC were not to do the same.

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which restores symmetry between the economies. This period of uneven development occurs because of the agglomeration forces in the model. Forward and backward linkages are strong enough that firms in the Southern countries choose to locate close to each other, in a single country.

In the theoretical model the two Southern countries are assumed to be identical, so there is no basis for deciding which country is the first to industrialise —it is simply a matter of chance. In practice, differences between the two countries will decide the issue (possibly quite small differences). The mix of factors obviously includes institutional, political, and geographical considerations. To highlight a few, geographical proximity to the existing industrial centre will be beneficial, in so far as closeness is associated with lower natural trade barriers. (This, we think, provides an interesting way of thinking about the spread of industry from Japan through the newly industrialising economies). Low unit labour costs and a larger home market will also pull in this direction — unsurprisingly, cheaper efficiency units of labour and a larger home market, other things being equal, increases the attraction of a country as a base for industry.

These differences may however be dominated by the policy regime of the government, and this creates scope for policy action to obtain a 'first mover advantage' and attract industry before it becomes established elsewhere. In the trade policy context this creates the following incentives. First, LDCs will have an incentive to establish trade links with developed countries. As we have seen, North-South FTAs may be effective in attracting industry to South. More generally, links with developed countries may give a particular LDC the margin that is needed to ensure that it becomes the first to industrialise in a South-South trading arrangement. The second trade policy incentive arises in a multi-country setting. Countries which are late entrants to an FTA will certainly not be the ones that first attract industry, so there is an incentive to be amongst the founding group.

In addition to creating incentives for countries to attract industry, the possibility that industry will agglomerate in a subset of member countries may also create real tensions within the PTA. The history of Southern PTAs is littered with schemes that have failed, often because of internal disputes over the location of industry and the design of compensation schemes for perceived losers in the arrangement (a typical

example is the Treaty of Brazzaville, which was intended to create a customs union and a common currency area with the former French Central African countries —see Foroutan, 1993). One message from this paper is that the differences between countries *may* only be transitional —in our figures the differences disappear as tariffs are reduced low enough. However, there is no guarantee that the final liberalisation will necessarily go far enough to iron out differences and secure the spread of industry to all participating Southern economies, particularly if there are substantial underlying differences between these economies.

5. Conclusions

In this paper we have outlined a new approach for analysing the role of trade in promoting industrial development. Interactions between imperfect competition, trade costs, and an input-output structure create incentives for firms to locate close to supplier and customer firms. Clustering of firms then occurs, so that even if countries are identical in underlying structure, only a few countries are industrialised. These countries have high wages, but the positive pecuniary externalities created by inter-firm linkages compensate for the higher wage costs. Trade liberalisation changes the attractiveness of countries as a base for manufacturing production, and can trigger —or postpone— industrial development.

The process we describe abstract from many important aspects of reality. We have no capital accumulation (physical or human), and no interregional or international differences in technology. Although we look at the consequences of changes in policy variables (in particular, of changes in the barriers to trade), there is no explicit modelling of the political process that leads to a particular choice of policy. Even within its framework the model we employ is simple. For example, firms are modelled as single plant operations, so multinationality and foreign direct investment are not considered. Also, firms are footloose and atomistic, which is helpful for focusing on long-run outcomes but abstracts from the costs of relocation and strategic interaction. Nevertheless, we think the approach captures a number of features of the world economy which seem to be important, and provides some new insights on the effects of trading arrangements on industrial development.

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It offers an explanation as to why firms are reluctant to move to economies that have lower wages and labour costs, and shows how trade liberalisation can change the incentives to become established in developing countries. It provides a mechanism through which import liberalisation can have a powerful effect in promoting industrialisation. And it suggests that import liberalisation may create or amplify differences between liberalising countries with the possible political tensions this may create. While these features are consistent with the world economy, they of course fall far short of providing convincing empirical support for the approach.

Using the approach we derive a number of conclusions about the effects of trade liberalisation. The first is that unilaterally liberalising imports of manufactures can promote development of local manufacturing industry. The mechanism is forward linkages from imported intermediates, but this may be interpreted as part of a wider package of linkages coming from these imports. Second, the gains from liberalisation through PTA membership are likely to exceed those that can be obtained from unilateral action. South-South PTAs will be sensitive to the market size of member states, and North-South PTAs seem to offer better prospects —for participating Southern economies, if not for North and excluded countries. Third, the effects of particular schemes (on, for example, the division of benefits between Southern economies) will depend on the characteristics of the countries, and cross-country differences in these characteristics. We have not yet conducted systematic investigation of the sensitivity of our results to such differences.

Appendix

We consider a world with 4 regions, two Northern and two Southern, N_1, N_2, S_1 and S_2. Each region is endowed with L workers and K units of arable land, and can produce agricultural and industrial output. Both primary factors are immobile between regions. Arable land is used only by the agricultural sector, while labour is used both by agriculture and by industry, and is perfectly mobile between sectors.

Agriculture

Agriculture is perfectly competitive. It produces under constant returns to scale a homogenous output, which we assume costlessly tradeable and choose as *numéraire*. In each region the agricultural production function is Cobb-Douglas in land and labour, with labour share θ. If L_i^A denotes agricultural employment, agricultural output is $(L_i^A)^\theta K_i^{(1-\theta)}$, and the local wage is

$$w_i = \theta (L_i^A)^{(\theta-1)} K_i^{(1-\theta)}. \tag{1}$$

Industry

The industrial sector has imperfectly competitive firms, producing differentiated goods under increasing returns to scale. Production of a quantity $x_i(k)$ of any variety k in any country i requires the same fixed (α) and variable $(\beta x_i(k))$ quantities of the production input. That production input is a Cobb-Douglas composite of labour and a constant elasticity of substitution (CES) aggregate of the differentiated industrial goods. The cost function of a firm producing variety k in country i is

$$C_i(k) = q_i^\mu w_i^{(1-\mu)} \left(\alpha + \beta x_i(k) \right), \tag{2}$$

where q_i is the price index of the aggregate, defined by

$$q_i \equiv \left[\sum_{j=1}^{4} \int_{h \in N_j} \left(p_{j,i}(h) (T_{j,i} \tau) \right)^{(1-\sigma)} dh \right]^{1/(1-\sigma)}. \tag{3}$$

The price index in each country depends on the local prices of individual varieties, which in turn are a function of the free on board (FOB) prices, real trade costs, and tariffs. The elasticity of substitution between varieties, σ (> 1), is assumed to be the same in all countries. N_j is the set of varieties produced in location j, and $p_{j,i}(h)$ is the FOB price of variety h shipped from country j to country i. Real trade costs for the industrial goods take Samuelson's 'iceberg' form: τ units have to be shipped so that one unit arrives in another region. Industrial goods exported from j to i are also subject to an ad valorem tariff $T_{j,i} - 1$.

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Preferences

Turning to the demand side, consumers have Cobb-Douglas preferences over the agricultural good and a CES aggregate of industrial goods. All industrial varieties produced enter consumers' utility function with the same constant elasticity of substitution with which they enter firms' technology. The indirect utility function of a worker in region i is then given by

$$V_i = q_i^{-\gamma} 1^{-(1-\gamma)} w_i . \tag{4}$$

Landowners have the same preferences as workers, but are assumed to be tied to their land.

General equilibrium

Expenditure on manufactures in each region can be derived from (2), (3) and (4) as

$$e_i = \gamma \left[w_i L_i + (1-\theta)(L_i^A)^\theta K_i^{(1-\theta)} + \int_{h \in N_i} \pi_i(h)\,dh + R_i \right] + \mu \int_{h \in N_i} C_i(h)\,dh . \tag{5}$$

The first term is the value of consumer expenditure (including tariff revenue, denoted by R_i), and the second the value of intermediate demand, since consumers spend a fraction γ of their income and firms a fraction μ of their costs on manufactures.

The division of consumers' and producers' expenditure on each industry between individual varieties of industrial goods can be found by differentiation of the price index with respect to the price of the variety. Total demand for a single variety produced in i, x_i, is

$$x_i(k) = \tau^{(1-\sigma)} \sum_{j=1}^{4} \left(p_{i,j}(k)\, T_{i,j} \right)^{-\sigma} q_j^{(\sigma-1)} e_j . \tag{6}$$

Since the producer of an individual good faces an elasticity of demand σ, firms mark up price over marginal cost by the factor $\sigma/(\sigma-1)$:

$$p_i = \frac{\sigma \beta}{\sigma - 1} q_i^{\mu} w_i^{(1-\mu)} . \tag{7}$$

The value of tariff revenue is

$$R_i = \sum_{j=1}^{4} (T_{j,i} - 1) n_j p_j x_j . \tag{8}$$

The profits of an individual manufacturing firm are, from expressions (2) and (7),

$$\pi_i = \frac{p_i}{\sigma} (x_i - x) . \tag{9}$$

where

$$x = \frac{\alpha (\sigma - 1)}{\beta} \tag{10}$$

is the unique level of output giving firms zero profits.

Turning to the labour market, we can write the labour market clearing condition as

$$L_i = (1 - \mu) n_i \frac{C_i}{w_i} - L_i^A , \tag{11}$$

where $n_i \equiv \#N_i$ denotes the mass of firms in region i (to which we refer as the number of firms in region i). The first term on the right hand side of (12) is labour demand in manufacturing, obtained by application of Shephard's lemma to (2), and the second term is labour demand in agriculture.

This completes the description of equilibrium. At any instant we think of the economy as having a predetermined number of firms in each region. To this pair corresponds a short-run equilibrium defined as a set of wages, and price indices solution to the following eight equations. The first four equations are the price indices of manufactures in each of the four regions, obtained by substitution of (7) into (3). The other four equations come from substituting (1), (2), and (5)–(10) into (11), which gives the labour market clearing condition in each region. We can then express profits

at the short-run equilibrium in terms of the number of firms by substituting equations (1)-(2), (5)-(8), and (10), and the short-run equilibrium values of wages and price indices into (9).

We define a long-run equilibrium as a situation in which the numbers of firms are such that there are zero profits in each country where there is a positive number of firms and negative profits (for potential, if not for actual, firms) wherever the number of firms is zero:

$$\pi_i n_i = 0 \ , \quad \pi_i \leq 0 \ , \quad n_i \geq 0 \ , \tag{12}$$

The experiments

At the starting point in all our experiments there are real trade costs of $\tau = 1.1$ between all four regions, there is an ad valorem tariff of 15% ($\bar{T} = 1.15$) for all North-South and South-South trade, while there is free trade between the two Northern economies ($T = 1$), which keep a common trade policy throughout the experiments. Values of parameters are $\gamma = 0.5$, $\theta = 0.8$, $\mu = 0.55$, and $\sigma = 4$. These are such that at the initial level of tariff barriers there is a stable equilibrium in which all industry is split between the two Northern economies. The experiments look at the evolution of this equilibrium as some (or, in the case of multilateral liberalisation, all) of these tariffs are brought down to zero ($T = 1$), with those not affected by the liberalisation held at $\bar{T}$.

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