

**THE FALLACY OF COMPOSITION:
A REVIEW OF THE LITERATURE**

Jörg Mayer

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THE FALLACY OF COMPOSITION: A REVIEW OF THE LITERATURE

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Abstract

The paper reviews the literature on the fallacy of composition with an emphasis on labour-intensive manufactures. It briefly addresses the protectionist and the partial-equilibrium versions of the argument before focusing on general-equilibrium considerations and the debate on the manufactures terms of trade of developing countries. The review indicates a potential fallacy of composition problem in labour-intensive manufactures, where competition among different groups of developing countries for export market shares may constitute a new form of the fallacy of composition. The likelihood of a country that exports labour-intensive manufactures to become subject to the fallacy of composition rises with the increasing integration of several strongly populated low-income countries into world markets, while it declines with continuous structural change and favourable aggregate demand conditions particularly in developed and the advanced developing countries.

INTRODUCTION

The rapid economic development of the newly industrialized economies (NIEs) in East Asia over three decades was associated with rapid growth in exports of manufactures to developed countries. Some commentators have recommended that other developing countries follow the development path pioneered by these countries and direct their economies towards large-scale exports, in particular of labour-intensive manufactures, to developed countries.

Others have dismissed this recommendation as a feasible strategy only for a limited number of small economies arguing that it is a fallacy of composition to generalize from a part to the whole. The fallacy of composition – sometimes also called “adding-up problem” – means that what is viable for one small exporter acting in isolation may not be viable for a group of exporters acting at the same time: if all, in particular large, developing countries try to substantially increase exports of labour-intensive manufactures, there will be a risk that they encounter rising protective resistance from developed countries and/or that the terms of trade decline to such an extent that the benefits of any increased volume of exports is more than offset by losses due to lower export prices. Concern in this regard has become particularly acute by two events, first, the shift since the mid-1980s of several strongly populated low-income countries, notably in South Asia, towards more export-oriented strategies, which has strongly increased competition in world markets for labour-intensive manufactures, and second, China’s entry into the World Trade Organization (WTO), which is likely to give additional impetus to the strong rise in the exports of labour-intensive manufactures – in particular clothing, as well as parts and components in the electronics sector – that China has experienced over the past few years. Based on a review of the literature, the objective of this paper is

to discuss the implications of these two events on the fallacy of composition in labour-intensive manufactures.¹

Bhagwati (1958) first discussed the fallacy of composition in the context of immiserizing growth. Since then, at least four distinct versions of the fallacy of composition have been presented in the literature, namely (i) an early version pioneered by Cline (1982) who emphasizes protectionist tendencies in developed countries – beyond some critical level of import penetration, exports from developing countries will face rapid escalation of protective barriers in developed countries, (ii) a more recent version used by Faini, Clavijo and Senhadji-Semlali (1992) who focus on the elasticity of export demand from a partial equilibrium point of view – the elasticity of export demand for a group of countries is smaller in absolute value than the corresponding elasticity for an individual country, and (iii) a version identified by Havrylyshyn (1990) and first tested by Martin (1993) that highlights the general equilibrium nature of the fallacy of composition. Studies of the first or the second version have usually found evidence supporting the hypothesis that there is a fallacy of composition, while studies adopting the third approach have come to mixed results as far as overall exports for developing countries are concerned, but have often found support for the fallacy of composition argument with respect to labour-intensive manufactures.

The general equilibrium approach treats all products the same way. While this is justified from a balance-of-payments perspective, it constitutes a serious shortcoming from a developmental point of view because different products have different developmental potential. The process of structural change, which is central to the development process, is characterized by a decline of the agricultural sector – first as a share of GDP and then in absolute terms – brought about by a combination of three effects: Engel effects (the relatively low income elasticity of demand for food which, *ceteris paribus*, causes the price of food to decline in the world as a whole); Rybczynski effects (with relative commodity prices constant, changing relative factor supplies away from land and labour towards capital and skills increase output in sectors that use capital and skills intensely and reduce output in sectors that use other factors intensely), and differential rates of technical change (it is generally believed that productivity growth rates in agriculture are lower than in manufacturing).² Thus, manufactures can be considered as having dynamic properties that give them greater development potential than primary commodities. As a matter of fact, over the past few decades countries have not succeeded in growing rich by focusing exclusively on primary commodities (diamond-rich Botswana being the important exception). The catching-up of the NIEs to the income levels of developed countries, for example, has been closely linked to a continuous upgrading in their product and export structure beyond primary commodities, basic apparel and low-grade assembly.

Accordingly, the concern of a further (iv) version of the fallacy of composition argument is whether manufactured exports – both on aggregate and from specific manufacturing sectors – from

¹ Several studies, such as Bleaney (1993), Akiyama and Larson (1994) and Schiff (1995), have analysed the fallacy of composition argument for exports of primary commodities. They have generally found support for this argument with respect to a number of agricultural commodities, in particular bananas, cocoa, coffee, cotton, tea, and tobacco (World Bank, 1996:55), and for some other commodities (e.g. copper and petroleum). Export earnings from these commodities are of vital importance to a wide range of developing countries and the fallacy of composition has involved substantial revenue losses for them over recent decades.

² Martin and Mitra (2001) dispute the latter point arguing that at all levels of development technical progress appears to have been faster in agriculture than in manufacturing. However, as they note themselves (p. 417) it is not clear to what degree their finding is sensitive to the sample period (1967–1992) beginning very shortly after the establishment of a large-scale system for international agricultural research. Moreover, given that within their sample of developing countries, those economies which experienced rapid economic growth (e.g. the Republic of Korea and Taiwan Province of China) also experienced vastly higher productivity growth in manufacturing than in agriculture, this finding may just reflect the developmental failure of most of the other countries.

developing countries have been falling in price compared to those of developed countries. There is no conclusive evidence on how the manufactures terms of trade of developing countries as a group have moved. By contrast, it appears that different groups of developing countries have experienced considerably different developments in their manufactures terms of trade with the adverse effect being most pronounced for developing countries whose manufactured exports are composed largely of labour intensive goods. This might indicate that the fallacy of composition has moved, at least in part, from being an issue between developed and developing countries to one between different groups of developing countries.

The next four sections of this paper review the four versions of the fallacy of composition argument, while section five concludes and discusses policy implications. Appendix 1 briefly discusses the model of the Global Trade Analysis Project (GTAP) which is the framework frequently used in the general equilibrium version of the fallacy of composition argument, while Appendix 2 addresses some more technical issues in the statistical debate on measuring changes in the terms of trade.

I. THE PROTECTIONIST VERSION OF THE FALLACY OF COMPOSITION ARGUMENT

The protectionist version of the fallacy of composition argument was numerically elaborated in a comparative static analysis by Cline (1982). He simulates hypothetical developing country exports to developed countries on the assumption that all developing countries experience the same GDP-ratio of exports as was experienced by Hong Kong (China), the Republic of Korea, Singapore and Taiwan Province of China, i.e. the NIEs. The simulations take account of inter-country differences associated with the size and level of development as suggested by the Chenery and Syrquin (1975) 'norm' for the manufactured export share of a country. Cline computes the deviation of the NIEs from this norm and estimates on the basis of this benchmark by how much higher export-output ratios will need to be for other developing countries to achieve this same intensity. He calculates that this multiplication factor would be about twenty for some Latin American countries and nearly ten for the other developing countries. On these assumptions, developing country exports would have captured 61 per cent of the developed country import market in 1976, compared to the actual 17 per cent. According to Cline, such an outcome was precluded by protectionist reactions at the sectoral level, as import-penetration ratios exceeded the presumed acceptable threshold level of 15 per cent. The ensuing policy conclusion is that developing countries cannot replicate the export-promoting policies of the NIEs. If they did, they would stimulate protectionism in particular in product areas such as apparel, textiles, simple consumer goods, electrical household goods, etc.

Havrylyshyn (1990) presents the most elaborate criticism of Cline (1982). His main criticism regards the neglect of the fact that an increase in exports by developing countries is generally associated with an increase in their imports that in turn are exports by developed countries or by other developing countries. Havrylyshyn (1990:357) argues that during the 1970s, "exports of developed countries to developing countries have expanded *pari passu* with imports from developing countries." Given that higher developed country exports raise their level of income, the simulated import-penetration ratio declines. Following Ranis (1985), he also stresses that Cline (1982) incorrectly dismissed the fact that economic development is accompanied by a change in relative factor supplies, which gradually alters a country's production and export structure. As a result, different developing

countries will achieve a substantial manufactured goods export capacity at different points in time and produce goods with different attributes, even if they should all adopt export orientation at the same time. This would imply (i) a reduction in the number of products in which high import penetration may arise, (ii) greater room for new developing country exporters, and (iii) better opportunities for trade among developing countries. Havrylyshyn (1990) concludes that each of these three mechanisms is likely to reduce protectionist sentiments in developed countries to a considerable extent.

Rowthorn (1997) takes an approach similar to that of Cline (1982) but aims at addressing Havrylyshyn's (1990) main criticisms. Rowthorn uses a sample consisting of three Central European countries and 50 developing countries, which do not include the NIEs, and calculates the 'cross-country norm' for the GDP-ratio of manufactured exports from developing countries. This calculation is done for 1990 and based on the assumption that a country's GDP-ratio of manufactured exports is a function of its *per capita* income. By comparing the actual ratios with those that are predicted on the basis of the norm, it can be estimated by how much developing countries' manufactured exports will need to expand in order to replicate the performance of the NIEs, controlling for the effects of *per capita* income. The result suggests that total manufactured exports from developing countries, excluding the NIEs, to developed countries would have been three times their actual level in 1990.

In order to make the calculations dynamic, Rowthorn (1997) assumes in a second step that the *per capita* GDP of developing countries double and that in developed countries both GDP and apparent consumption of manufactures increase by 40 per cent. On these assumptions, manufactured exports from developing countries, excluding the NIEs, to developed countries would have exceeded their actual level in 1990 more than eight-fold, their share in the GDP of developed countries would have risen from 1.1 per cent to 6.5 per cent, and their share in developed countries' apparent consumption of manufactures would have increased from 2.1 per cent to 11.9 per cent. Rowthorn (1997) emphasizes that developed countries raise their exports of other types of manufactures and of services as a counterpart to the absorption of the additional imports from developing countries. This softens the impact of increased developing country exports on the economies of developed countries overall. However, additional imports from developing countries also entail substantial structural change in developed countries which is likely to be smooth only in an expansionary environment, with high investment and rising output in developed countries, and that protectionist tendencies in developed countries are likely to be thwarted only in such an expansionary environment.

II. THE VERSION EMPHASIZING THE ELASTICITY OF EXPORT DEMAND FROM A PARTIAL EQUILIBRIUM POINT OF VIEW

This version of the fallacy of composition argument is represented by Faini, Clavijo and Senhadji-Semlali (1992). Their paper has not been as influential as, for example, that by Cline (1982) which is probably mainly due to the fact that their analysis remains within the partial equilibrium framework, while the general equilibrium character of the fallacy of composition problem had been recognized at least since Havrylyshyn (1990).

Faini, Clavijo and Senhadji-Semlali (1992) estimate price and income elasticities of demand for a sample of 23 developing countries. Regarding the fallacy of composition, their main objective is to examine whether manufactured exports from developing countries compete mostly with products from

developed or from other developing countries. They analyse the existing pattern of competition and substitution possibilities between manufactured exports from developed and those from developing countries. Their results suggest that prices affect export demand to a significant extent but that the pattern of competition matters considerably for South and East Asia for which competitiveness with respect to other developing countries appear to have been paramount in determining export success. They conclude that the export success of some Asian countries may be predicated on the failure of other developing countries to compete effectively in world markets.

III. THE VERSION EMPHASIZING GENERAL EQUILIBRIUM CONSIDERATIONS

This version is based on Havrylyshyn's (1990) criticism of the protectionist version of the fallacy of composition, which was discussed in section I. But the step from the first and second to the third version of the fallacy of composition argument also involves a considerable change in methodology. Before, a large part of the dispute regarded Cline's multiplication factor whose size was determined by giving more or less importance to the potential for South-South trade and the fact that individual developing countries achieve a substantial manufactured goods export capacity at different points in time. This step was followed by a basically arbitrary assessment of whether or not the resulting penetration of developed countries' markets by imports from developing countries would trigger a protectionist response in developed countries. Now, most quantitative studies of the effects of trade liberalization on production and trade rely on computable general equilibrium (CGE) models whose main advantage is that they allow simulating the many interdependencies within an economy.

The remainder of this section concentrates on a review of studies which apply CGE-models and from which insight can be gained on the fallacy of composition problem.³ The discussed studies are based on different applied general equilibrium models, including different versions of the Global Trade Analysis Project (GTAP) model and models based on social accounting matrices. Given that most CGE-models share the same assumptions and that the vast majority of the studies reviewed in this section are either a direct application of the GTAP-model or an adaptation thereof, the GTAP-model is presented and discussed in Appendix 1.⁴

A. The early study by Martin

Martin (1993:160) criticizes earlier studies, based on a partial equilibrium view, for ignoring that (i) "successful increases in exports increase income levels which, in turn, increase the demand for imports", (ii) "increases in the supply of exports from one group of countries typically require a lowering in their export prices, [but] this also implies a lowering of the prices paid for imports by their trading partners", and (iii) the "presence of intra-industry trade makes it possible for developing countries to be both importers and exporters of a wide range of manufactured goods. In this situation, developing countries can directly benefit from each others' export expansion even when they are exporting the same good".

³ Given the large number of, sometimes very similar, papers, the review is not comprehensive. Preference was given to studies that have been published in leading international journals and to other recent papers that contribute important insights in particular areas.

⁴ For a discussion of a model based on a social accounting matrix see Wang (1997).

Martin (1993) uses data for 1987 in a global general-equilibrium model with three product groups (manufactured exports, other goods and services, and non-traded goods) and thirteen regions. He specifies the degree of substitutability between the products of different regions using a single elasticity of substitution assumed to be at a constant level of 3, and sets both the elasticity of transformation in production and the elasticity of substitution between composite commodities in consumption at a constant level of 1.5.

Martin (1993) undertakes a number of simulations which relate export expansion in developing countries to, first, trade liberalization and, second, investment or improvements in technology, and compares the consequences of an export expansion in one developing region alone with the outcome when all developing countries expand exports. The results suggest that the static gains from trade liberalization are small; they are even negative where terms of trade losses outweigh the efficiency gains obtained from trade liberalization. By contrast, if export growth is caused by investment or technological advance, increases in exports from developing countries will be mutually reinforcing rather than competitive. On the basis of this finding, Martin rejects the fallacy of composition argument.

Martin's (1993) analysis improves on earlier studies particularly in two respects. He emphasizes that trade liberalization leads to an increase of trade in both directions between developed and developing countries, thereby stimulating developed countries' exports and raising their per capita income levels. The former creates employment in export industries, whilst the latter increases the demand for labour in the non-traded sector, thereby helping to offset the loss of jobs in import-competing activities. Both these effects are likely to reduce protectionist tendencies in developed countries. Moreover, he stresses the potential for increased trade among developing countries. On the other hand, his analysis has important shortcomings in particular regarding the very broad product classification, the high and constant elasticities of substitution between products from different regions, and the lack of taking account of adjustment costs in developed countries. As Martin's (1993) paper shares these shortcomings with other studies based on general-equilibrium models, they will be discussed in more detail in section III.C below.

B. Recent studies with particular attention to China

This section reviews studies that simulate the effects of China's accession to the WTO on world trade patterns. China's entry into the multilateral trading regime is of particular importance for the potential fallacy of composition in labour-intensive manufactures because – over and above the effects coming from structural change associated with economic growth and unilateral trade liberalization – WTO-accession will allow China to take advantage of the phasing out of the quota regime that has regulated trade in textiles and clothing for over two decades. This, in turn, may lead to a substantial rise in China's share in world clothing exports.

1. Studies using comparative static analysis

Ianchovichina, Martin and Fukase (2000) and Ianchovichina and Martin (2001) use a GTAP model for simulations over the period 1995–2005 of a baseline scenario in which China does not enter the WTO, and a scenario which includes China's accession to the WTO. Projections for overall output growth are based on projections of factor input growth (physical capital, unskilled labour, and skilled

labour, with the latter being those qualified for employment as professional and technical workers) and growth of total factor productivity which is calculated as a residual. China's output structure is expected to change sharply even in the baseline scenario because (i) China's growth rates of physical capital and skilled labour are expected to be very high, (ii) the growth of factor endowments within East Asia is expected to be highly unbalanced, and (iii) strongly rising income in China is likely to lead to a substantial change in the pattern of consumption towards a lower relative importance of expenditure for food.

The simulation results suggest that, even without its acceding to the WTO, China's share in world output and world exports is likely to increase strongly. Accession to the WTO is projected not to affect its share in world output further, but to lead to a substantial additional increase in China's share in world exports. At the sectoral level, the increase in exports is projected to be very substantial (in both the baseline and even more so in the accession scenario) in labour-intensive sectors, particularly clothing. Exports from more technology-intensive sectors, such as automobiles and electronics, are also projected to expand due to cost reductions following trade liberalization. Other important findings of the two studies are that (i) output will grow less under WTO-accession in all manufacturing sectors (and even fall in the automobiles sector), except electronics, textiles and (in particular) clothing, and (ii) the composition of value added will move towards electronics and (in particular) clothing at the expense of the automobiles sector and primary sectors (Ianchovichina and Martin, 2001, tables 7 and 8). This shift in comparative advantage towards labour-intensive manufactures is also reflected in a strong increase in agricultural imports, which occurs despite the fact that the authors assume China's protection of the agricultural sector to remain largely unchanged. Regarding changes in regional welfare, the results suggest that, apart from China itself, developed countries will benefit most from China's accession to WTO followed by the NIEs, while the "countries in South Asia are expected to be hurt the most, followed by Indonesia and some other Southeast Asian countries, mainly because of the removal of MFA restrictions on China's apparel exports" (Ianchovichina and Martin, 2001:28).

These results suggest that the projected rapid growth in China's exports creates a fallacy of composition problem in labour-intensive manufactures, in particular clothing. This finding might substantially gain in importance when the assumptions are lifted that (i) little liberalization of agriculture will be required in the short run, and (ii) full employment holds throughout the simulation period. Wang (1999), for example, argues that agricultural liberalization and reform of state owned-enterprises will lead to substantial unemployment. While it remains unclear how China would handle such a problem, it is likely that wages will be subject to downward pressure. This might considerably strengthen the competitive position of China's clothing industry and make the fallacy of composition even more acute. On the other hand, competitiveness for clothing other than low-quality and standardized goods is likely to depend on factors such as appropriate physical and commercial infrastructure and the capacity to meet tight just-in-time deadlines, in addition to low wages. But given that the simulation model aggregates all segments of the apparel sector into the same product group, it cannot take account of such considerations (see also section III.C below).

Yang and Vines (2000) use a GTAP model and conduct a counterfactual analysis to see what the economic situation in developing countries would have been in 1995 if they had kept their share in world production, as well as their GDP-ratio of exports to developed countries, unchanged during the 1975–1995 period. In a first experiment, they reduce the production and trade shares of all developing countries from the level in 1995 to that in 1975, while in a second experiment they do so only for China. The objective of the first experiment is to examine if there is a fallacy of composition in the export expansion in developing countries, while that of the second experiment is to gauge the impact

of China's expansion on the terms of trade of the other developing countries. The explicit consideration of product differentiation allows modelling the fact that countries complement each other through two-way trade, while they compete with each other in third markets. This contrasts with the traditional set-up of partial equilibrium exercises, which concentrate on homogenous products and, assuming that all exporters compete in the same market, show that their collective action worsens the terms of trade for all exporters.

The results of the first experiment suggest that economic growth of developing countries during 1975–1995 has reduced their terms of trade but that this has not led to immiserizing growth for at least two reasons. First, the adverse terms of trade effect was relatively small because (i) the penetration ratio of developing country exports in developed country markets is still low so that the demand elasticity of these exports is still large, and (ii) in spite of some concentration of their exports in labour-intensive products, there is considerable product differentiation among developing countries. Second, developing countries have increased their imports from developed countries which in turn have improved their export opportunities to developed countries.

The results of Yang and Vines' (2000) second experiment suggest that China's rapid export growth has a negative effect on the other developing countries' terms of trade because of increased competition on third markets. However, this effect is small and it is compensated by the complementary demand effect. The latter effect is higher the more a developing country trades with China and the more the two countries' production structures complement each other. This is the case in particular for the NIEs, while for all other developing regions the competition effect in third markets outweighs the positive effects from increased exports to China. This supports the findings in Ianchovichina, Martin and Fukase (2000) and Ianchovichina and Martin (2001).

2. *Studies based on recursive dynamic general equilibrium models*⁵

Walmsley and Hertel (2000) use the recursive dynamic GTAP model⁶ to examine the effects of alternative target dates for the elimination of quota restrictions on imports of clothing by North America and the European Union from China. The safeguards included in the Uruguay Round Agreement on Textiles and Clothing (ATC) – targeted to prevent “serious damage” to domestic industry – might allow North America and the European Union to delay the removal of all quotas on China's exports of textiles and clothing until 2008 or even 2012. Accordingly, Walmsley and Hertel

⁵ In addition to the two models discussed in this section, McKibbin and Tang (2000) present a study based on the G-Cubed model. The G-Cubed model is a dynamic intertemporal general equilibrium model whose specific feature is that it incorporates financial markets and thus the interdependence between physical capital accumulation and portfolio investment. Capital flows are composed of portfolio investment, direct investment and other capital flows. These alternative forms of capital flows are assumed to be perfect substitutes *ex ante*, adjusting to the expected rates of return across economies and across sectors (for a detailed discussion of the G-Cubed model, see McKibbin and Wilcoxon, 1999). Perhaps the major contribution of McKibbin and Tang (2000:1002) is that they show that the “greater integration of global capital markets changes the nature of the adjustment process to economic reform in emerging economies that tends to be captured in standard CGE models of trade reform. A better understanding of this adjustment process is essential if global capital is to be used to enhance the reform process rather than to de-rail it by policy mistakes.” However, they focus on the effects on OECD countries and on China itself, as well as on the aggregate rather than sectoral level, so that their findings will not be further discussed here.

⁶ The main difference between the standard (comparative static) GTAP model and the recursive dynamic GTAP model is that the latter extends the standard model to incorporate international capital mobility, international asset ownership, and a disequilibrium theory of investment. The model assumes that perfect capital mobility occurs only in the very long run. Investment is modelled as being determined by the gradual movement of rates of return to equality across regions. International asset ownership is introduced to allow regional capital to be owned by both domestic and foreign households via a global trust, whereby the shares of domestic and foreign investment are held constant. For a detailed discussion see Ianchovichina and McDougall (2001).

(2000) compare the effects of such a delay until 2010 and full implementation of the ATC by 2005 (treating China as a developed country).

The simulation results suggest that North America and Europe have an interest in delaying full ATC-implementation when the sectoral adjustment required in the textiles and clothing sectors in the importing countries are taken into account. They also suggest that developing countries in South-East and South Asia, which compete with China in the markets for clothing and other manufactured goods, will suffer – “primarily due to a worsening of their terms of trade” (Walmsley and Hertel, 2000:12) – as a result of increased competition following China’s accession to the WTO. This effect occurs irrespective of whether or not ATC-implementation is delayed: delayed implementation will allow competitors to maintain higher employment and production in the clothing sector but – assuming high mobility of production factors across sectors – it will lead to increased production by China of other manufactures and electronics which means more competition and reduced employment and production by competitors in these sectors. The sectoral results of the simulation are of particular interest because they take explicit account of (i) the substantial resource shifts and sectoral adjustment costs implied by the downsizing in the textiles and clothing sectors in North America and the European Union, and (ii) the strong increase in competitive pressure in labour-intensive sectors that will occur independently of whether or not China will join the WTO: if China does join the WTO this pressure will occur in the textiles and clothing sectors, if it does not, competitive pressure will rise in labour-intensive activities in the electronics and other manufacturing sectors. In any case, China’s competitors in labour-intensive exports are likely to face lower export prices and experience employment problems in labour-intensive manufactures. These results support the fallacy of composition hypothesis in terms of both the competition effect regarding other developing countries and the potential protectionist response in developed countries.

Wang (1999) uses a recursive dynamic general equilibrium model of world production and trade – based on a social accounting matrix – to simulate the impact of China’s accession to the WTO on world labour-intensive exports. The analysis refers to the period 1995–2010. One of the interesting features of Wang’s model is the inclusion of six primary factor of production, i.e. agricultural land, natural resources, physical capital, agricultural labour (those who have little or no education and work only in the farm sectors), unskilled labour, and skilled labour, compared with the GTAP model which does not include agricultural labour. Agricultural and unskilled labour are not substitutable in production, but linked by rural-urban migration flows, which are endogenous in the model and driven by the rural-urban wage differential and structural changes in production and trade. According to Wang (1999:393) transferring this huge amount of redundant agricultural labour will be the most difficult task of China’s industrialization.

Wang (1999) analyses two scenarios, one simulating the path of world economic growth with the implementation of the Uruguay Round trade liberalization, but without China’s and Taiwan Province of China’s participation, and another with both China and Taiwan Province of China joining the multilateral trade liberalization process. The simulation results for labour-intensive consumer goods that are not subject to the quota restrictions of the Multi-Fibre Arrangement (MFA) differ substantially from those for textiles and clothing. Regarding the former, China’s exports outperform those from both ASEAN and South Asia by a large margin, and this is the case during the entire simulation period and whether or not China joins the WTO. Regarding the latter, China’s world market share will decline slightly if it does not accede WTO, while if China accedes and can benefit from the elimination of MFA quota regulations, its world market share will strongly rise.

The simulated changes in the composition of China's exports also affect the composition of its imports. Even in the absence of WTO-accession, China's net imports of agricultural products will rise because of its rapid industrialization. This will push up world prices for agricultural products leading to an improvement in the terms of trade of those countries that are net exporters of agricultural products. China's accession to WTO will accelerate this process because (assuming high inter-sectoral factor mobility) resources will move more rapidly from agriculture to labour-intensive manufacturing. Increased competition in world markets for clothing will depress prices and lead to an improvement in the terms of trade of those countries that are net importers of clothing. Supporting the results of Walmsley and Hertel (2000), the additional push that China's WTO-accession will give to its production and exports of clothing will absorb resources that otherwise would be employed in more-capital- and technology-intensive manufacturing sector, thereby raising China's net imports of such products. The resulting increase in world prices of these products will improve the terms of trade of those countries that are net exporters of these products.

These changes in net trade flows are also reflected in Wang's (1999) findings regarding changes in regional welfare: developed countries and the NIEs are the main beneficiaries of China's and Taiwan Province of China's joining the multilateral trade liberalization process because their comparative advantage significantly differs from that of China. By contrast, exporters of labour-intensive products will suffer as their competitive position in the world export market for these products will be adversely affected, and provided that they do not have the necessary production capacity to benefit from China's rising import demand for other products. However, the net welfare impacts are likely to be small in either case.

C. Conclusions

The different findings of the general-equilibrium simulations regarding China's WTO-accession are sometimes difficult to interpret for several reasons. First, high quality data on import protection is often lacking, in particular regarding tariff exemptions with respect to intermediate inputs, indirect subsidies and non-tariff barriers. This adversely affects the accuracy of modelling changes in relative tariffs across sectors and thus has a crucial impact on sector-specific effects of trade liberalization.

Second, the high degree of product aggregation also negatively affects the accuracy of sector-specific results. Bach, Martin and Stevens (1996), for example, argue that a change in relative tariffs across sectors (as well as cross-sectoral differences in the application of administrative trade practices such as tariff exemptions and indirect subsidies) may have a much larger impact on the results than across-the-board tariff changes. This means that the extent of sectoral dis-aggregation – and, hence, tariff variation across sectors – is likely to be crucial in the modelling exercise.⁷

More recent studies improve on Martin's (1993) very broadly defined product groups but nonetheless ignore the fact that developing country exports in sectors such as clothing span across a

⁷ Regarding China, this applies for example to the textiles sector. Yang (1996) and Bach, Martin and Stevens (1996), for example, share the same model, data set, calibration year, specification of elasticities, technology and market structure, and projection of growth of labour, capital and population, but Yang's results suggest that China's joining WTO would make the textiles sector the second largest source of gains after the clothing sector, whereas Bach, Martin and Stevens (1996) find the textiles sector to be the second largest source of losses. On this issue see also Lejour (2000) in whose model China's accession to the WTO leads to declining production in its textiles sector when tariff exceptions are not introduced, but expanding production when they are.

wide range of products including very cheap and low-quality as well as medium-cost and mid-quality goods. Exporters from China have been present in both market segments but regarding other producers in Asia compete more intensively with exporters from South Asia in the former and more intensively with exporters from South-East and East Asia in the latter segment. Therefore, the export opportunities of which group of exporters are more severely affected by an expansion of China's apparel exports crucially depends on the segment on which the bulk of the expansion falls. Strongly rising wage and land costs in the areas bordering Hong Kong (China) combined with the lack of appropriate physical and commercial infrastructure in inland areas make it less likely that a substantial expansion of China's apparel exports will be based on low-cost standardized goods. To the extent that this is the case, the competitive pressure on exporters from South Asia – and the risk of a fallacy of composition problem in low-cost standardized apparel – will be substantially lower than the results of the modelling simulations suggest.

Third, within the framework of the GTAP-model the size of the elasticities between domestic goods and imports can have a crucial impact on the results, whereby smaller values (implying lower homogeneity between domestic goods and imports) give stronger terms of trade effects and lower welfare gains, while larger ones give larger gains from liberalization. This also means that using high elasticities helps to magnify the effect on trade volumes in order to compensate negative terms-of-trade effects. Bach, Martin and Stevens (1996:418) explain that it has become common practice in GTAP-simulations of the effects of China's accession to the WTO to use double the elasticities normally used in static policy scenarios. This is because a backcasting exercise using the GTAP model revealed that in the absence of such high elasticities it was difficult to reproduce the actual trade shares for many Asian economies. They also note that "this seems appropriate as China, despite the tremendous growth in foreign trade, is still a relatively small player in most markets".

Fourth, GTAP-models also assume the elasticities of substitution between the products from different regions to be the same under all circumstances. This ensures that no matter how much developing countries have already exported, the price elasticity of demand in developed countries for the exports of a single region, or for developing countries as a group will remain high. Thus, no matter how much clothing developing countries export to developed countries, a modest reduction in prices suffices to obtain a further substantial increase in exports.

Fifth, with the exception of Walmsley and Hertel (2000) the simulations ignore that a strong increase in imports from developing countries results in substantial structural changes and displacement of human and material resources in developed countries. It is precisely these costs, which such changes involve and whose impact is unevenly spread, that account for the potential opposition to trade liberalization in developed countries and that underlie the warnings of authors such as Cline (1982) that large-scale imports from developing countries might strengthen protectionist tendencies in developed countries. These protectionist tendencies are the result of actual or potential unemployment, increased wage dispersion and poverty for many, especially the unskilled workers, in the developed countries. The simulations are able to ignore these dangers because they assume that full employment is maintained at all times and that the benefits of trade are uniformly spread throughout the population.

Leaving these issues aside, a common theme of the reviewed papers is that the impact of China's WTO-accession on world trade patterns will come in addition to changes in China's comparative advantage related to the effect on structural change of both economic growth and unilateral trade liberalization. This effect implies a shift in China's comparative advantage further

away from agriculture towards labour-intensive and other light manufactures. With China not acceding WTO, continued market access constraints (such as quotas for exports of textiles and clothing) will limit its growth potential in labour-intensive manufactures and divert part of its production resources to other manufacturing activities, including capital- and skill-intensive sectors, and agriculture provided that there is high factor mobility across sectors. The major effect of WTO accession will be to lift these constraints and to expand China's clothing exports further, which will be accompanied by a rise in net imports of both agricultural and capital- and skill-intensive goods, and possibly followed by a rise in world market prices for such products. Accordingly, the effect of China's WTO-accession on other countries will depend on whether they produce goods of which China's import demand is likely to expand (agricultural products, textiles, and capital- and skill-intensive manufactures), or goods of which China's export supply is likely to expand (clothing and other light manufactures). Concentrating on the manufacturing sector, this implies that those countries whose relative factor supplies make them to be China's competitors in third markets are likely to experience deteriorating manufactures terms of trade. While the above regards simulations of future developments, it is of interest to see how developing countries' manufactures terms of trade have changed over the past few years. This is the focus of the next section.

IV. THE VERSION LOOKING AT THE TERMS OF TRADE FOR MANUFACTURED EXPORTS FROM DEVELOPING COUNTRIES

Following the work of Prebisch and Singer, it has frequently been argued that the terms of trade between non-oil primary commodities and manufactures – most often measured by the relative movements in the price of non-oil commodities and the unit value of manufactures exported by developed countries – are on a downward trend.⁸ Countries wishing to boost their export earnings have been advised, therefore, to diversify away from primary products into manufactures, for which income and price elasticities of demand are considered to be comparatively high. The development of the commodity terms of trade surely remains a crucial concern for the great majority of developing countries regarding their capacity to import essential goods for their development. However, a number of developing countries in Asia and Latin America have experienced rapid growth in manufactured exports. Regarding merchandise trade flows from developing to developed countries at the aggregate level, the value of manufactured exports has indeed exceeded that of commodity exports since the early 1990s. As a consequence, the debate on the terms of trade has increasingly turned towards the relative movements in the prices (or unit values) of manufactures exported by developing countries and manufactures exported by developed countries.

This shift in the debate from the terms of trade between primary products and manufactures to the manufactures-manufactures terms of trade has been accompanied by a shift in the explanation for deteriorating terms of trade. The debate on the Prebisch-Singer hypothesis relates to the characteristics of commodities (primary products versus manufactures), while the more recent debate relates to characteristics of countries (developed versus developing countries), emphasizing their different level of technological capacity, different organization of labour markets, presence or absence of surplus labour, etc. In other words, the types of manufactures exported by developing countries compared to those exported by developed countries are said to share some of the disadvantages which were

⁸ See Sapsford (1990) for a detailed review of this literature.

originally highlighted in the Prebisch-Singer hypothesis as being characteristic for the relationship between primary products and manufactures. This change in focus has important implications for policy advice because, to the extent that the manufactures terms of trade of developing countries are declining, an export-oriented industrialization strategy designed to diversify exports from primary products to manufactures will fail to solve the terms of trade problem of developing countries.

Early contributions to the debate on the manufactures terms of trade of developing countries include Keesing (1979) and Cline (1984) who provide some conflicting evidence based on simple time-series comparisons for the 1960s and the 1970s. Keesing (1979) compares the unit-value indices for manufactured exports from developing countries and from developed countries for selected years between 1960 and 1976. He finds a large drop in the former series in 1975, which he attributes to the inclusion of non-ferrous metals whose price movements tended to be significantly different from those of standard manufactured goods.⁹ But his analysis of disaggregated wholesale price indices of manufactured goods in the United States also show a declining trend of prices for textiles, clothing, electronics and other labour-intensive exports of developing countries relative to the prices of other manufactures.

Cline (1984) analyses the relative price behaviour of developed country imports of manufactures¹⁰ from developing countries based on unit-value indices compiled from import data for the seven major developed countries for 1969, 1970, 1976, and 1978. Regarding the indices based on total trade in manufactures, Cline (1984) finds mixed results: comparing the unit-value index for total imports from developing countries with that for imports from all countries, he finds a slight gain in the net barter terms of trade for developing countries between 1970 and 1978; making the same comparison on the basis of manufactured exports from developed countries, a mild opposite trend becomes apparent. By contrast, at the disaggregated (4-digit) level there is no clear trend, apart from a substantial rise in the terms of trade of developing countries for footwear and a severe loss in the terms of trade for non-ferrous metals. As a result, Cline (1984:165) concludes that there was “no significant change in the terms of trade of manufactured goods between industrial and developing countries over the 1970s”.

Sarkar and Singer (1991) initiate the econometrically-based debate on the manufactures terms of trade of developing countries. They measure net barter terms of trade for developing countries as the ratio of the unit value of manufactured exports from developing countries to the unit value of manufactured exports from developed countries. Using standard regression analysis they estimate that, over the period 1970–1987, the price of manufactured exports from developing countries fell by an average of 1 per cent a year relative to the price of manufactured exports from developed countries. However, allowing for the sharp expansion in the volume of manufactures exported by developing countries, their income terms of trade increased annually on average by 10 per cent. The results of the analysis of trends in the manufactures terms of trade for about 30 individual developing countries over the period 1965–1985 was inconclusive: they were not statistically significant for about half the countries, while among the other countries there were some with a positive and some with a negative trend.

⁹ On this issue, see also the discussion below regarding the “SITC-68 dispute” between Sarkar and Singer (1991) and Athukorala (1993).

¹⁰ Rather unusual for a trade analysis, Cline (1984) defines manufactures on the basis of the International Standard Industry Classification (ISIC) and thereby includes a number of processed primary commodities into his category ‘manufactures’.

Athukorala (1993) disputes the finding of Sarkar and Singer (1991) that the manufactures barter terms of trade of developing countries are trending downwards. He argues that, through rapid expansion of manufactured exports, developing countries have achieved significant gains in import purchasing power *without* generating any adverse impact on the net barter terms of trade. Apart from a number of other statistical issues (see Appendix 2), the dispute between Sarkar and Singer (1991) and Athukorala (1993) relates to the question as to whether non-ferrous metals (SITC 68) should be treated as manufactures.¹¹ Sarkar and Singer (1991) do this despite the fact that it does not accord well with normal practice of trade economists. Non-ferrous metals are usually treated as primary commodities because their manufacturing value-added component is small and because variations in their price mainly reflect changes in the price of metalliferous ores. Treating non-ferrous metals as manufactures can seriously bias the results of the terms of trade analysis because the price of non-ferrous metals fell sharply over the period in question. In fact, Athukorala shows that the apparent deterioration in the manufactures terms of trade of developing countries virtually disappears when the analysis is done on data that excludes non-ferrous metals.

Rowthorn (1997), however, argues that Athukorala's regression analysis picks up the effect of an unusually large fall in the relative price of non-ferrous metals in the early 1970s, when these metals were of great importance in developing country exports. Just looking at the period from 1975 onwards, Athukorala's adjustment makes little difference, and there is clear evidence of a decline in the manufactures terms of trade of developing countries whichever series is used. Minford, Riley and Nowell (1997) support this argument by comparing a price index of manufactured exports from developing countries with a price index for the combined exports of services and complex manufactures from developed countries. Non-ferrous metals are not included in the group of manufactured exports. The comparison indicates a large although irregular deterioration in the terms of trade of developing countries since 1960. Most of it occurred in the 1960s, but there was a renewed fall between 1985 and 1990. Interestingly, this period roughly corresponds to China's sustained entry into world manufacturing trade.

Lücke (1993) examines the development of the net barter terms of trade, relating only to resource-free manufactures,¹² of 37 developed and developing countries from 1967 to 1987. He uses United Nations data on import and export values and price data which relate to the United States and are taken from the Bureau of Labor Statistics. In order to determine whether the movements of the terms of trade were related to the level of development, he regresses the terms of trade on real *per capita* GDP. The results indicate a relative decline in the prices of goods exported predominantly by developing countries which Lücke (1993) explains by the fact that market entry by developing country producers implies an expansion of supply, as well as intensified competition.

Maizels, Palaskas and Crowe (1998) provide further support to the hypothesis of a deterioration of developing countries' manufactures terms of trade. They analyse the unit values of imports by the European Union (EU) of manufactures from developing countries and of the EU's exports of manufactures to developing countries for the period 1979–1994. Their results point to a deterioration in the manufactures-manufactures terms of trade of developing countries. However, the sharp

¹¹ Athukorala (1993) also criticizes Sarkar and Singer (1991) for using the unit value of manufactured exports for developed countries to all countries, rather than just to developing countries. Given that developing countries account only for about 20 per cent of manufactured exports from developed countries, the results may be biased. However, Maizels, Palaskas and Crowe (1998) show that the unit value of manufactured exports from the European Union (EU) to all countries has moved very similarly to that of that EU's manufactured exports to developing countries. Assuming that the EU is representative of the group of all developed countries implies that there is little reason to expect Sarkar and Singer's results to be biased.

¹² Lücke (1993) does not give a definition of 'resource-free' manufactures.

expansion in the volume of the EU's imports of manufactures from developing countries more than offset the deterioration in the net barter terms of trade so that developing countries' income terms of trade improved.

Maizels, Palaskas and Crowe (1998) make another interesting contribution which draws on Singer's (1975) argument that scientific and technological capacities have a major impact on the development of the terms of trade in addition to the factors which were at the core of the Prebisch-Singer hypothesis in its original form, namely the lower income elasticity of demand for primary commodities compared with that for manufactures, and the upward supply bias for commodities due to the existence of a large pool of unemployed or underemployed labour in developing countries. Assuming that different groups of countries are at different stages of scientific and technological development, Maizels, Palaskas and Crowe (1998) examine the ratio between the unit-value index for imports of manufactures into the EU from selected developing country groups, as well as from Japan and the United States, relative to the unit-value index of the EU's manufactured exports. Their results for the net barter terms of trade suggest that both the United States and Japan – the world leaders in a wide range of technology-intensive manufactures – experienced a slightly favourable trend in their manufactures terms of trade. Regarding developing country groups, they found a slight negative trend for East and South-East Asia (their net barter terms of trade in manufactures deteriorated at less than 1 per cent a year), which contrasts sharply with the strongly negative trend of about 5 per cent a year for the least-developed and the ACP-countries, which are likely to be the two groups with the lowest proportion of technology-intensive manufactures and the greatest proportion of unskilled or semi-skilled labour intensive products in their manufactured exports. Latin American and Mediterranean countries are at an intermediate position regarding the deterioration of their manufactures terms of trade which is likely to reflect the fact that they are at an intermediate position also with respect to the stage of scientific and technological development.¹³

Berge and Crowe (1997) examine the development of the Republic of Korea's manufactures terms of trade with developed and developing countries over the period 1976–1995. They use existing data on value, quantity and unit values from the United Nations, and impute missing values of the unit-value series through a trend fitting exercise. Doing so allows them to obtain a data set with complete value, quantity and unit value observations which covers 61 per cent of exports and 38 of imports regarding trade in manufactures with developing countries, and 69 per cent of exports and 59 per cent of imports with respect to trade in manufactures with developed countries. They note that the quantity data are subject to a serious measurement problem because the data refer to tonnes which clearly do not apply, for example, to computers. They use this data set to construct unit-value indices for various SITC-sections at the 1-digit level and employ an error-correction model (see Appendix 2) in order to analyse the indices.

Their findings with respect to trade in manufactures with developing countries suggest a significant increase in the Republic of Korea's net barter terms of trade in manufactures and an even greater increase in the income terms of trade. Berge and Crowe (1997) interpret this as reflecting the fact that the Republic of Korea's exports have increasingly shifted into higher-price, technologically-

¹³ The different country groups include the following countries: East and South East Asia includes the 4 NIEs (Hong Kong (China), the Republic of Korea, Singapore, Taiwan Province of China), the ASEAN 4 (Indonesia, Malaysia, the Philippines, Thailand), as well as Brunei Darussalam and Macao (China). The group of least-developed countries includes 37 low-income countries of which 27 are in sub-Saharan Africa. The composition of the ACP-group overlaps with the group of least-developed countries to a considerable extent. The group of Mediterranean countries includes Algeria, Cyprus, Egypt, Israel, Jordan, Lebanon, Malta, Morocco, Tunisia, Turkey, and the former Yugoslavia.

sophisticated manufactures, compared to the commodities and basic manufactures which other developing countries continue to export. They conclude that these results support the view that one group of developing countries might be able to improve the terms of trade it faces with respect to trade with other developing countries by shifting its exports into manufactures of an intermediate level of relatively higher-value and skill-intensity in production than the basic manufactures and commodities exported by developing countries in general, such as discussed by Maizels, Palaskas and Crowe (1998). The results regarding developed countries indicate no significant trend in the Republic of Korea's net barter terms of trade (the series tends to be pulled back towards a historical mean). Berge and Crowe (1997) interpret this finding as suggesting that the Republic of Korea's manufactured exports to developed countries has shifted towards products that can be considered more skill- and technology-intensive and are produced in less competitive markets, with less downward pressure on prices. Regarding the income terms of trade, they find a positive (though marginally significant) trend.

Athukorala (1998)¹⁴ analyses the terms of trade for India (1971–1986), the Republic of Korea (1970–1990), and Taiwan Province of China (1976–1990) for total manufactured exports and for disaggregated export categories. The data are taken from national statistics and refer to price indices in the case of the Republic of Korea and Taiwan Province of China, and unit-value indices for India. He defines manufactures as covering products classified under Section 3 of ISIC for the Republic of Korea (thereby treating a number of processed primary commodities as manufactures), while for India and Taiwan Province of China manufactures are defined as covering products classified as Sections 5 through 8 of SITC. Athukorala (1998:220; emphasis in original) notes that “given the nature of the export structures of these countries, in terms of the *actual commodity coverage* the indexes are closely comparable with indexes derived on the basis of the most widely used definition of manufactured goods of ‘SITC 5 through 8 less 68’.” The results suggest that the terms of trade for total manufactured exports of each of the three countries, as well as for exports in all sub-categories, have basically been trendless.

It is difficult to compare Athukorala's (1998) results for the Republic of Korea with those obtained by Berge and Crowe (1997) for at least two reasons: (i) Athukorala looks at the Republic of Korea's manufactures terms of trade with respect to all countries, while Berge and Crowe's analysis distinguishes between the terms of trade with respect to developed and developing countries; and (ii) given that Athukorala's sample period ends in 1990, his analysis does not fully reflect the change in the Republic of Korea's trade composition towards more skill- and technology-intensive exports, i.e. one of the features which Berge and Crowe strongly emphasize in interpreting their results.

Athukorala (2000) looks at the development of Sri Lanka's terms of trade during the period 1978 to 1998 for total manufactures (defined on the basis of the ISIC) and two sub-categories, i.e. textiles and clothing on the one hand and the remaining manufactures on the other. Looking at Sri Lanka's exports of textiles and clothing separately is of particular interest because the share of this category in the country's total exports increased from under 10 per cent to almost 50 per cent during the sample period to account for about two-thirds of the country's manufactured exports. The analysis is based on unit-value indices and volume indices compiled by the Central Bank of Sri Lanka. The results suggest that Sri Lanka's net barter terms of trade have a positive deterministic trend both for manufactured exports as a whole and for the two sub-categories separately. The positive trends for the income terms of trade are even stronger which means that the positive relative price trends have been reinforced by positive volume trends. By contrast, Sri Lanka's net barter terms of trade for agricultural

¹⁴ Athukorala (1998) also analyses the terms of trade of manufactured exports from developing countries as group. Apart from extending the period back to 1959, this basically replicates Athukorala (1993).

exports deteriorated. This means that the change in the composition of Sri Lanka's exports from agricultural commodities towards manufactures has led to a favourable trend in the barter terms of trade for total exports. Athukorala (2000) puts a caveat against generalizing these results from a single country case. As a matter of fact, even though the increase in the share of textiles and clothing in Sri Lanka's exports is remarkable it has hardly affected world supply, given that the country accounts only for about one per cent of world exports in textiles and clothing. On the other hand, the case of Sri Lanka demonstrates how the 'ladder effect' of the change in the composition of a country's exports can have a favourable impact on its terms of trade.

Maizels (2000) examines the medium-term trends (over the period 1981–1996) in the manufactures terms of trade of developing and developed countries with respect to the United States. The analysis is based on the new price series which have been compiled and published by the United States Bureau of Labour Statistics (BLS). The specificity of these new time series is that they are the result of considerable effort to ensure that the indices reflect only price changes and are not affected by quality changes. However, the BLS has compiled these series only since 1990, only for imports and only for a limited number of countries (Canada, the EU, Japan, and the first-tier NIEs; import price series for manufactured goods from Latin America have been compiled since December 1997). To provide a valid medium-term trend, Maizels (2000) calculates new price-index series for imports on the assumption that price movements for individual products would be valid for each trading region, so that the differences in aggregate price indices as between regions will reflect only differences in weighting, i.e. in the relative values of the individual products. Comparing the calculated price indices with the existing BLS-indices he finds a close relationship except for imports from Japan; he then adjusts the series calculated for Japan, in particular for exchange-rate changes, to minimize deviations from the existing BLS-series.¹⁵ Using the same calculation method, he then extends the series backwards to 1981 in order to obtain a complete data set for the period 1981 to 1996.

The two main results can be summarized as follows. First, the net barter terms of trade of developing countries deteriorated significantly in the first half of the 1980s (Maizels, 2000:12) attributes this to the strong appreciation of the dollar during this period) and have been trendless since. By contrast, the terms of trade of developed countries were trendless in the first half of the 1980s and have experienced a significant upward movement thereafter. This means that over the whole period, the trend in the terms of trade of developing countries relative to developed countries has significantly worsened. The divergent experience of the United States with regard to the terms of trade relative to other developed and to developing countries is due to the fact that, over the whole sample period, prices of the United States' manufactured imports from other developed countries rose significantly faster than those of imports from developing countries, while prices of the United States' manufactured exports to other developed countries rose more slowly than those of exports to developing countries.¹⁶ This is probably the result of differences in the composition of imports, i.e. automobiles and machinery dominate United States imports from developed countries, while clothing dominates United States imports from developing countries. Second, the change in the balance of manufacturing trade of both developed and developing countries with the United States has been driven by rapid growth in volume. The volume effect for developing countries has been offset only to a minor extent by the adverse effects of price trends.

¹⁵ For details on the method used to calculate and adjust the price-index series, see Maizels (2000:6–11; 27–36).

¹⁶ Maizels (2000:17–21) shows that the price dispersion of any of the main manufactured products traded by the United States is much higher for the United States imports than for United States exports which, as he notes, could indicate that price changes in exports are driven by domestic developments, such as growth rates in productivity and inflation rates, while price changes in imports are driven by international factors, such as changes in exchange rates, productivity and production costs across the various national sources of supply.

V. CONCLUSIONS AND POLICY IMPLICATIONS

This paper has reviewed the literature on the fallacy of composition with particular emphasis on labour-intensive manufactures. The first part of the paper focussed on the debate until the early 1990s, which most often found support for the fallacy of composition hypothesis but was marred with controversies on methodological issues, while the remainder and main part of the paper concentrated on more recent studies based either on CGE simulation models or statistical analysis of the manufactures terms of trade.

The evidence provided in the studies based on CGE simulation models suggests that competition in world markets for labour-intensive manufactures, which has risen over the past few years following the shift in the mid-1980s of several strongly populated low-income economies towards more export-oriented strategies, is likely to rise further with China's accession to WTO. The latter can be expected to complement the effects coming from structural change associated with economic growth and unilateral trade liberalization mainly by providing China the opportunity to take advantage of the phasing out of the quota regime that has regulated trade in textiles and clothing for over two decades.

The evidence provided in the studies based on an analysis of the manufactures terms of trade suggests that experience in this regard differs across different groups of developing countries. The groups of countries with the lowest proportion of skill- and technology-intensive manufactures and the greatest proportion of labour-intensive products in their manufactured exports have faced declining manufactures terms of trade. Others appear to have succeeded in improving their terms of trade with respect to other developing countries by shifting their exports into manufactures of a higher skill- and technology-intensity in production than the basic manufactures and commodities exported by the majority of developing countries.

Whereas the traditional developed-versus-developing-countries dimension of the fallacy of composition persists (for example, the concern that North America and the European Union will invoke the safeguards included in the Uruguay Round Agreement on Textiles and Clothing), a look at the findings of both types of studies together indicates that the increased competition among different groups of countries for export market shares, in particular for labour-intensive manufactures, may constitute a new form of the fallacy of composition. China's WTO-accession may reinforce the tendency towards this new form of the fallacy of composition which over the past few years has been associated mainly with the shift towards more export-oriented policies of several other strongly populated low-income countries in Asia.

However, the size, and possibly even the direction, of the change in world trade patterns following China's WTO-accession is difficult to evaluate because a combination of factors are at work, regarding both China's economy and the global economy. Regarding the former, the great variation in real wages between Chinese provinces implies that the competitiveness of China's labour-intensive exports in the medium term will depend on whether production can move to lower-cost inland areas or labour can move to the coastal areas. Provided that China continues to experience rapid economic growth, it is likely that over the long term the country will experience structural change and move up the technology ladder towards more skill- and technology-intensive exports. Combined with the probability that, over time, the quality of China's labour-intensive exports will improve, this will

preserve opportunities for export expansion in other economies with an abundant supply of low-skilled labour.

Regarding the global economy, the sectoral incidence of the impact of the likely surge in China's labour-intensive exports will be influenced by the date when the Agreement on Textiles and Clothing will be fully implemented. If North America and the European Union make recourse to the safeguards included in the Agreement and delay its full implementation, the rise in China's clothing exports will be lower but, at the same time, China's production and exports of other manufactures, such as electronics, will rise more, leading to increased competition and possibly reduced employment and production by competitors in these sectors.

Perhaps the most important issue regarding the impact on the fallacy of composition of new suppliers coming onto the global markets for labour-intensive manufactures regards structural change and aggregate demand conditions in developed countries and in the advanced developing countries. China and the other strongly populated low-income countries that have moved towards more export-oriented strategies have gained much of the market shares that were given up by the NIEs following the latter group's move towards more skill- and technology-intensive exports. This transition has occurred rather smoothly and the question is whether the NIEs can move up further such that the transition of China will occur smoothly as well. The pressure that will be exerted by China, South Asia and ASEAN combined on global production and trade of labour-intensive manufactures will greatly depend on how rapidly China will move up, while moving up of the first-tier NIEs will ease the pressure on the next higher rung. At the same time, the move in developed countries towards increased economic activity in sectors associated with modern information and communication technology, combined with favourable aggregate demand conditions, will soften the sectoral adjustment costs implied by downsizing in these countries' textiles, clothing, and electronics sectors, and hence reduce protectionist tendencies in developed countries.

On the other hand, structural change and the move towards more capital- and technology-intensive exports of, for example, the Republic of Korea and Taiwan Province of China was supported by a specific set of policies (mainly increasing incentives to exporters, combined with results-oriented and monitorable performance standards). Many commentators have argued that the rules and practices that have governed the world trading system since the conclusion of the Uruguay Round make the use of such policies impossible. To the extent that there actually is such a reduction in national policy autonomy, promoting structural change will be more difficult and the risk of the fallacy of composition in labour-intensive manufactures more acute. Other authors are less sceptical. For example, Amsden (1999:iii) argues that there is "no shortage of methods that can be used by less industrialized countries to promote their industries even under new WTO rules." Only time can tell whether this is the case and whether it will help smoothen the competition among developing countries for export shares in labour-intensive manufactures.

APPENDIX 1

The GTAP model

Empirical tests of the general equilibrium approach often rely on the Global Trade Analysis Project (GTAP) model as a modelling framework. The standard GTAP model (see Hertel and Tsigas, 1997) is a comparative-static multi-region applied general-equilibrium model which was developed by a consortium of international and national agencies coordinated through the Center for Global Trade Analysis, at Purdue University. The consortium provides a computable general equilibrium model and makes the model, its software and database available for applied general equilibrium analysis of global issues. The GTAP model is based on neo-classical trade theory: firms maximize profits, consumers maximize utility, all markets are perfectly competitive, and constant returns to scale (CES) prevail in all production and trading activities.

The standard GTAP system of equations is based on microeconomic foundations providing a detailed specification of household and firm behaviour within individual regions and trade linkages between regions. On the supply side, firms use both a composite of primary factors and a composite of intermediate inputs to produce a single output (thus there is a one-to-one relationship between producing sectors and commodities). The model assumes that technology is separable so that there is a fixed proportion between individual intermediate inputs and produced output. Market clearing conditions equate supply with demand for each factor of production. The supply of the primary factors (unskilled labour, skilled labour, capital, land and natural resources) is determined exogenously. Producers choose their optimal mix of primary factors independently of the prices for intermediate inputs, and the mix of intermediate inputs is independent of the price of primary factors. The elasticity of substitution between any individual primary factor, on the one hand, and intermediate inputs, on the other, is equal, but there is no substitution between intermediate inputs or between them and a composite primary factor.

On the demand side, each region is represented by a ‘super’ household that allocates regional income in fixed proportions to private consumption, government expenditure and savings. The specification of consumer demand allows for differences in the income responsiveness of demand in different regions, i.e. demand for various products differs as income rises, depending on both the level of development of the region and the particular consumption patterns observed in that region. The single representative household purchases domestic and foreign goods and maximizes utility, given income and prices and allowing for cross-price effects in demand. Consumption baskets of both the household and government are composed of domestically produced goods and imports, which are in turn sourced from all trading regions in the CES fashion. The model incorporates the Armington (1969) assumption in the trading sector which allows to differentiate products by country of origin. This means that both the imported commodities and imported intermediates are assumed to be separable from domestically produced goods. Both the shares between domestic and foreign goods and between goods from different foreign regions depend on trading prices, where the responsiveness to price changes is governed by the ‘Armington elasticities’. These elasticities of substitution are assumed to be identical for any product which is part of the same type of goods (types of goods usually correspond to rather broad commodity classifications) and constant in any market. The most appealing feature of the Armington methodology is that it requires relatively little information and thus provides an economical and consistent method for estimating bilateral and multilateral direct and cross-price effects of changes in traded goods prices (for details, see, Goldstein and Khan, 1988:1064). Another advantage of the Armington approach is that it is compatible with perfect competition,

making estimates of parameters measuring firms' market power and scale economies unnecessary.¹⁷ By contrast, the Armington approach requires estimates of trade substitution elasticities which can be thought of as measuring the similarity of domestic and imported goods. Such estimates may be obtained relatively easily for individual products but little is known about the price elasticities for broad commodity classifications.

Regional savings flow into a global pool of savings and are then allocated among regions for investment according to the expected regional rate of returns. Regional investment can either change proportionally so that regional returns may vary, or such returns can be equalized across regions thus giving capital greater mobility across regions. Capital stocks are fixed exogenously (i.e. they do not change in response to changes in the level of output) and capital is immobile across regions, even though it is perfectly mobile among industries in the long run, as are the two types of labour (skilled and unskilled). The other two factors of production, land and natural resources, are not perfectly mobile even in the long run. Their movement across industries is governed by a unitary elasticity of transformation.

In the context of the present paper, the most serious limitation of the GTAP model probably regards the Armington approach to modelling import demand. Assuming that products are homogeneous across regions and that the country of origin is the only difference between competing goods neglects the fact that quality-related factors often prevail over pure price-related factors in decisions on import demand. Higher income households are usually more quality conscious (e.g. because the budget constraint is less binding) and the failure to account for this fact causes estimates related to income effects to be biased. Hu and Ma (1999), for example, have shown that quality is a vital factor in explaining China's bilateral intra-industry trade with its major trading partners. Moreover, product differentiation can occur endogenously given the correlation between income increases with the entry of new exporters and the subsequent increase in import varieties.

Another limitation of the GTAP model regards the fact that land enters the production function with equal pairwise elasticities of substitution with respect to capital and labour. Such specification tends to make the results of model simulations regarding agriculture to be less accurate – to say the least – compared to simulations regarding other sectors for which land use is less important. It would appear that this is a serious shortcoming in particular regarding applications of the model to China, given that many observers have noted that China's agricultural sector is likely to be seriously affected by the country's joining of the WTO. Being aware of this limitation, some studies (e.g. Ianchovichina, Martin and Fukase, 2000:33) 'deal' with this issue by omitting agriculture and arguing that "little short-run liberalization of agriculture will be required, but we feel that much more work is needed before any confidence could be placed in this conclusion". Perhaps the most controversial parameters in the application of the GTAP model to China's accession to the WTO are the high Armington elasticities of substitution between domestic goods and imports and between imports from different sources, as discussed in section III.C.

¹⁷ Doing so would be required in alternative specifications relying on monopolistic competition where products differ between firms in addition to between countries.

APPENDIX 2

The statistical debate on the terms of trade

1. *Trend-stationary, difference-stationary or error-correction models*

Until the beginning of the 1990s, the standard empirical approach to measuring the trend development of the terms of trade was based on a trend-stationary model (such as in Sarkar and Singer, 1991) of the form

$$NBTT_t = \alpha + \beta T + \mu_t \quad (1)$$

where $NBTT$ is the logarithmic value of the net barter terms of trade time series, T represents a time trend, μ is a random error term, α and β are parameters to be estimated, and t denotes time. The parameter β indicates the average compound rate of improvement ($\beta > 0$) or deterioration ($\beta < 0$) of the terms of trade. However, the estimate of β is valid only if $NBTT$ is stationary around a deterministic trend. If it is non-stationary, i.e. fluctuates widely around a mean level which itself changes, the results based on a simple trend fitting exercise are potentially biased. This problem can be addressed by using a difference-stationary model (such as in Athukorala, 1993) of the form

$$NBTT_t - NBTT_{t-1} = \beta + \mu_t \quad (2)$$

where β is the mean of the differences between the terms of trade at time t and at time $t-1$. This means that a given $NBTT$ time series should be tested (for example, using a Dickey-Fuller or a Johansen test) to see whether it is trend stationary or difference stationary, before deciding whether to apply equation (1) or (2) in the estimation of the trend rate.

Instead of equation (1) or (2) an error-correction model can be estimated, which encompasses both the trend-stationary and the difference-stationary model and allows for possible dynamics involved in the determination of the trend rate (see Bleaney and Greenaway, 1993). Consider the following autoregressive model with time trend:

$$NBTT_t = \alpha + \beta T + \gamma NBTT_{t-1} + \mu_t \quad (3)$$

which can be rearranged to read:

$$NBTT_t - NBTT_{t-1} = \alpha + \beta T + \sigma NBTT_{t-1} + \mu \quad \text{with } \sigma = \gamma - 1 \quad (4)$$

If $\sigma < 0$, the equation describes an error-correction model in which the change in $NBTT$ is negatively related to its current level with the result that $NBTT$ is pulled back to its long-run trend. By contrast, if $\sigma = 0$, this pull effect does not operate and $NBTT$ describes a random walk with increasing variance over time. This results in an unpredictable path which may be characterized by apparent shifts in trend or intercept. Including more than one lagged dependent variable term on the right-hand side of the equation allows to pick up possible serial correlation. The long-run equilibrium solution to equation (3) takes the form

$$NBTT_t = \alpha_c + \Phi T; \quad \alpha_c = \text{constant} \quad NBTT_t - NBTT_{t-1} = \Phi \quad (5)$$

Substituting from equation (5) into equation (3) and ignoring the error term generates the long-run solution as

$$\Phi = -\beta\sigma^{-1}; \quad \alpha_c = -\sigma^{-2} [\beta(\sigma+1) + \alpha\sigma] \quad (6)$$

If $\sigma = 0$, the long-run solution is not defined, while if $\sigma = -1$, the solution reverts back to equation (1).

Four possibilities exist in the estimation of equation (4): if $\beta = 0$ and $\sigma = 0$, *NBTT* performs a random walk with zero mean, i.e. its history gives no indication of its future path; if $\beta = 0$ and $\sigma < 0$, *NBTT* has no long-term trend but tends to be pulled back towards its historical mean; if $\beta \neq 0$ and $\sigma = 0$, *NBTT* performs a random walk with drift, meaning that if β is positive (negative) it is more probable that *NBTT* will be greater (less) than its current value in the future; if $\beta \neq 0$ and $\sigma < 0$, *NBTT* reverts to a non-zero long-run trend. Accordingly, the hypothesis of deteriorating terms of trade are supported if $\beta < 0$ and $\sigma = 0$, or if $\beta < 0$ and $\sigma < 0$. But it will be a methodological mistake to apply the trend-stationary model (equation 1) if in reality the time series of *NBTT* is characterized by $\beta > 0$ and $\sigma = 0$, or $\beta = 0$ and $\sigma = 0$.

The above pure time-series models can be used to analyse the direction and extent of changes in the terms of trade over a period of time but they cannot reveal the forces lying behind the trend movement. A number of authors (see, for example, Bloch and Sapsford (2000) and the literature cited there) have put forward structural models to model and empirically test various hypotheses regarding the economic factors which determine the trend movement in the terms of trade. Structural models have so far been applied only to the commodity terms of trade but given the alleged ‘commodization’ of labour-intensive manufactures there is scope for broadening the field of research. In addition to a time trend which is interpreted to reflect the combined impact of differences in technical progress and capital accumulation between the primary and manufacturing sectors, structural models usually include measures of differences in the competitive structure and in real wage growth between the two sectors, and a measure reflecting the impact of growth in manufacturing output together with diminishing returns to labour in primary production.

2. *Prices indices versus unit-value indices*

Empirical evidence about whether the fallacy of composition effect might exist in its pure form would require genuine price indices relating to goods with unchanged quality and technical properties. However, price indices are usually available only for a specific, and often limited, list of statistical headings, selected so as to constitute a reasonably representative sample. Where they are available, they are calculated with fixed base weights, meaning that index changes exclude the influence of changes in quality and in the product mix of a statistical heading.

By contrast, as pointed out by Maizels (2000), unit-value indices usually cover all statistical headings used in the foreign trade accounts. Missing quantity observations are imputed by assuming them to be the same as for a closely related item or items for which both value and quantity figures are recorded. The problem of quality changes is considerably more worrisome for unit-value than for price indices because the latter often reflect quotations on organized markets which take account of quality distinctions. Another problem arises when the chosen quantity unit for trade is inappropriate, such as for products which fall under the heading ‘information technology’ and which are recorded in tonnes.

It is, therefore, very likely that for information technology products unit-value indices and price indices considerably differ.

Given that unit-value indices are usually computed with current weights, year-on-year changes reflect changes in the quality of individual products and in the composition of the product group covered by a statistical heading, in addition to price changes. The presence of this compositional effect also means that it is not possible to infer changes in the quality of a traded good by looking at changes over time in the relationship between the price and unit-value indices for any given statistical heading in foreign trade statistics. This means that an analysis based on unit-value indices cannot provide conclusive evidence on the fallacy of composition problem. Using unit-value indices it is, however, possible to examine whether adverse price implications of the fallacy of composition is more than offset by compositional shifts in the export basket towards more capital- and skill-intensive products. This is clearly a useful exercise from a policy point of view.

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