ECONOMIC EFFECTS OF GLOBALISATION: LESSONS FROM TRADE MODELS*

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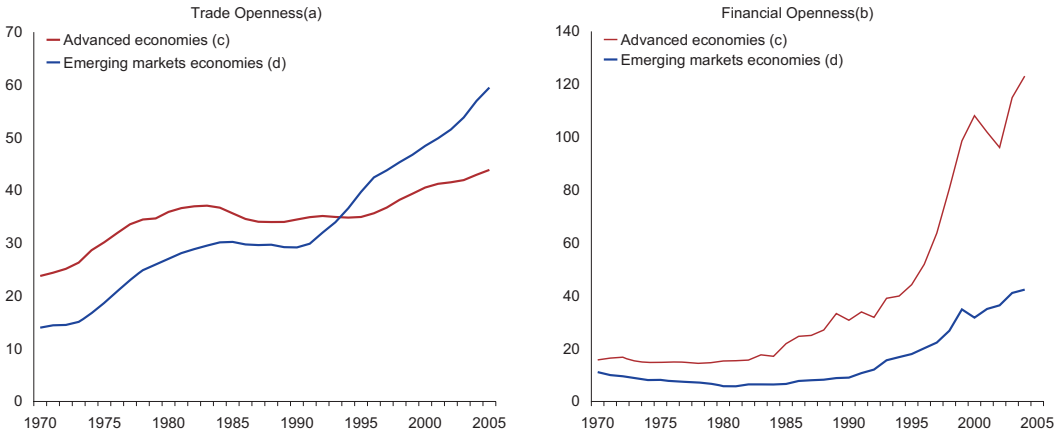
1. INTRODUCTION

Globalisation is a general term used to designate the growing process of international economic integration, covering the significant rise in trade of goods and services and increasing cross-border factor mobility. Globalisation is not a recent phenomenon but intensified as of the early 1990s. In 1990-2005, the average growth of world trade of goods and services increased and continued to exceed world output growth. Trade openness has thus increased significantly both in advanced economies and in major emerging market economies (Chart 1). Financial openness also gained ground in these two groups of countries as of the early 1990s reflecting, to a large extent, the strong increase in world flows of foreign direct investment.

The increased pace of the globalisation process reflects a number of factors. First, it is the result of further advances in the liberalisation of world trade and capital movements and was made possible by technological progress that implied a significant decrease in transport, communication and co-ordination costs. Second, the acceleration in globalisation reflects the growing openness of developing and emerging market economies – in many cases in the wake of political and economic reforms – with special emphasis on large economies such as China and India and countries of Central and Eastern Euro-

Chart 1

TRADE AND FINANCIAL OPENNESS



Source: IMF World Economic Outlook (Apr.2006).
Notes: (a) Measured as the sum of exports and imports in percent of GDP (five-year moving average).(b) Measured as the sum of the stocks of external assets and liabilities of foreign direct investment and portfolio investment in percent of GDP. (c) Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece,Iceland, Ireland, Italy, Japan, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom, and the United States. (d) Argentina, Brazil, Chile, China, Colombia, Czech Republic, Dominican Republic, Ecuador,Egypt, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Peru, the Philippines, Poland,Romania, Russia, South Africa, Thailand, Turkey, and Venezuela.

* The analyses, opinions and findings of this article represent the views of the author, they are not necessarily those of the Banco de Portugal.

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pe. The group of developing and emerging market economies has been experiencing strong increases in both activity and international trade flows, which is mirrored in its rising economic relevance at global level. Finally, the emergence of these new economies with abundant labour supplies and the decrease in transport, communication and co-ordination costs has reinforced the trend towards the reorganisation of productive processes on a global basis with a view to reducing costs. In particular, the most recent period has seen an increase in transfers of industrial activities and business services from most advanced economies to countries with lower production costs. This transfer consists in contracting part of the productive process with foreign suppliers, covering the production of parts, components or semi-finished products, as well as services. Evidence of this growing geographical fragmentation of productive processes is given by the rising volume of trade of intermediate goods and business services as well as in the increase in foreign direct investment flows.

The rapid change of the global environment implied by these forces is expected to have a broad impact on both advanced and emerging market economies. Some of the questions that are frequently raised and which are at the basis of the policy debate include whether globalisation is welfare improving for the economies involved, how will potential benefits and costs materialize (and through which channels), how specialization patterns might be affected, how it might impact on the distribution of income within an economy and what can be done to facilitate adjustment.

The debate on the impact of globalisation is not always guided by sound economic theory (or based on systematic empirical evidence). However, international trade theory in particular should be able to provide well-informed answers to many of the questions raised. In this context, the aim of this article is to present a selective and non-analytical survey of the effects of globalisation for advanced economies that emerge from trade models. It can be seen mainly as a contribution to improve the quality of the globalisation debate. In reviewing the considerable research that trade economists have undertaken, we overlook some issues (e.g. imbalanced trade, as the models reviewed typically assume trade balance equilibrium[2]). Short term adjustment costs associated to the trade induced changes in specialization are also not a feature of the models surveyed. Changes in specialization require restructuring, i.e., economies must be able to move resources to alternative uses, which the models assume to take place instantaneously[3]. As the title of the article suggests, we also leave aside the issues raised by financial globalisation. Our main focus is on assessing the impact of the globalisation of trade, giving special emphasis to the consequences of integrating large labour abundant economies in the world trade system and of the growing international fragmentation of production. We are particularly interested on the effects of these developments on the welfare and income distribution of advanced economies.

The remainder of the article is organised as follows. In section 2, the expected impact of globalisation is analysed in the framework of textbook trade models, which include the Ricardian single factor model, the Hechscher-Ohlin-Samuelson two-factor model and the new trade models incorporating scale economies and monopolistic competition developed in the 80's. The focus of section 3 is on the findings of the more recent trade literature, namely the so-called "new new" trade models incorporating firm heterogeneity. Section 4 reviews the implications of models developed to account for a distinguished feature of the present globalisation process: the growing international fragmentation of production. Section 5 discusses some issues raised by globalization regarding economic policy, in particular, for a small open economy. Section 6 summarizes the main findings.

(2) For a recent reference incorporating imbalances into a quantitative model of trade flows, see Dekle, Eaton and Kortum (2007).

(3) The models assume, for example, that all workers were employed before trade liberalization and that following liberalization all workers are automatically redeployed to other sectors or firms. However, in the real world, the transition will certainly take time and entail welfare losses associated to temporary unemployment due to wage rigidity or to costs incurred through job search, re-location and re-training. While transitory unemployment is not a fundamental argument against globalization, it provides support to policy initiatives enhancing labour market flexibility and adaptability that may contribute to a rapid and efficient resource reallocation in the economy.

2. TEXTBOOK TRADE MODELS

According to international trade theory, countries engage in trade for two reasons: to take advantage of their differences and to benefit from economies of scale in production and product differentiation. In the first type of models, trade arises because countries can benefit from their differences by specializing in the production of goods that they are relatively efficient at producing, that is, in which they have a comparative advantage. The Ricardian model emphasizes technological (productivity) differences as the source of comparative advantage; the Heckscher-Ohlin-Samuelson model focuses on differences in factor endowments. The resulting trade is of the inter-industry kind, that is, trade in which a country's exports and imports come from different industries. In the second type of models, a combination of scale economies and consumer preferences for variety leads each country to specialize in the production of only some varieties. The resulting trade is intra-industry, that is, it consists of two-way trade in similar products or varieties (countries' exports and imports are in the same industry). Both patterns of trade are present in the undergoing globalisation process. However, comparative advantage trade models appear more pertinent to evaluate the impact of the growing integration in the world trade system of emerging market economies which differ considerably from more advanced economies in terms of relative productivities and/or availability of factors of production.

2.1. Ricardo Model

The Ricardo model is the simplest trade model that can be used to answer the question of how advanced economies may benefit from increasing trade with low cost emerging market economies. First, it is important to note that large differences in wage rates between advanced and emerging market economies largely reflect differences in labour productivity. That is, wages in China and India are low because productivity there is also low[4]. Second, these wages and productivities are national averages. There is considerable variation across the various sectors/industries of the economies. These differences across sector productivities and across countries are precisely what gives rise to international trade according to comparative advantage and associated benefits.

In its simplest form, the Ricardo model assumes two countries, two goods and only one factor of production (usually labour), which is immobile between countries. Goods are produced at constant returns to scale and there is perfect competition. The main concept of Ricardo's model is comparative advantage. The principle of comparative advantage is just a matter of relative efficiency and it states that all countries can gain if each tends to specialize in the production of goods that they are relatively more efficient at producing. Even if one country has higher productivity in all sectors vis-à-vis another country – that is, the country has an absolute advantage in producing everything – it can be shown that the two countries can trade to their mutual advantage. The high productivity country specializes in producing goods where its advantage is relatively greater and the less productive country specializes in producing goods where its production disadvantage is relatively smaller. In other words, each economy should specialize in the sector in which it has comparative advantage[5].

(4) See Golub(1998) for evidence that international differences in unit labour costs are much smaller than differences in wages rates because large disparities in wages mostly reflect equally large differences in productivity.

(5) More formally, assuming that production requires only labour in fixed amounts per unit of output (let a_{GC} be the amount of labour needed to produce one unit of good G in country C), then country A has a comparative advantage in producing good 1 if it can produce it with less labour relative to good 2, compared to country B. That is, $\frac{a_{1A}}{a_{1B}} < \frac{a_{2A}}{a_{2B}}$.
Comparative advantage involves a double comparison, across both goods and countries. Hence, it is impossible by definition for a country to have a comparative disadvantage in every good.

Trade specialization according to comparative advantage allows both countries' living standards to increase because the resulting world pattern of production is more efficient than if each country produced only for its own market. From trading according to comparative advantage, the residents in each country can import foreign goods at a lower relative price and export the home-produced goods at a higher relative price, creating an unambiguous increase in real income.

Given the simplicity of the Ricardian model it may be tempting to say that its implications may not be useful to describe the real world. However, the laws of comparative advantage have been shown to be valid in more general models (Deardorff (1980, 2005b)).

Another question that can be answered in the context of the Ricardo model is how the free trade equilibrium changes when the technological productivities available to one of the trading partners are altered. The question is pertinent given that some emerging market economies have been experiencing rapid productivity growth. The issue was raised in a paper by Samuelson (2004), which made the comparison between free trade and free trade with a trading partner experiencing technical progress in one sector. This author showed that the results were not clear cut. Rises in productivity due to technical change abroad may represent a benefit for both countries, but it can also benefit only one country while making the other worse off by reducing the potential gains from trade[6].

Consider the case in which one of the countries (the advanced economy) has an absolute advantage in the production of both goods and the other (the emerging market economy) experiences an increase in productivity in one of its sectors. The advanced economy will gain if the increase in productivity occurs in the production of the good in which the emerging market economy had a comparative advantage (and which the advanced economy was already importing). The rationale is that the advanced economy was entirely dependent upon foreign supply of that good in the initial trading equilibrium, so that the improvement in foreign technology encourages more production, which must improve the terms of trade for the advanced economy. Increased income in the emerging market economy may also lead to greater demand for the advanced economy exportable good. The emerging market country suffers a loss in its terms of trade. If such a relative price change is sufficiently large so as to offset the initial favourable effects of the increase in the country's productive capacity, a reduction in its welfare levels may occur. This is the case of immiserizing growth[7] for the emerging market economy, although most would argue that both economies would benefit from such a productivity increase.

If the productivity improvement in the emerging market economy occurs in the good in which it had not so far a comparative advantage, the advanced economy might end losing but there is also the possibility that it gains[8]. In the example presented in Samuelson(2004), the productivity increase was assumed to be of a magnitude that eroded the economies' entire comparative advantage – that is, countries became identical in terms of relative productivities – so that there was no longer a reason to trade. In that case, the advanced economy was made worse off by growth in the emerging market economy because it loses the gains from international trade and its welfare is the same as in autarky. The emerging market economy is better off in this no trade position than it was in initial autarky, since it now has the benefit of its higher productivity. Although the case is theoretically interesting – it can be seen as a worst case scenario – one should not overstate its practical relevance in a world where international trade is growing at rates exceeding output growth rates. Moreover, it can be shown that productivity improvements abroad in the good the advanced economy initially exports may result in an actual gain for its residents if the alteration in productivities leads to a reversion of comparative advan-

(6) Gomory and Baumol (2004) report similar findings in the context of a Ricardian model with scale economies.

(7) Bhagwati (1958) was the first to use the term immiserizing growth to designate growth that worsens the terms of trade sufficiently so that the country's real income falls.

(8) Ruffin and Jones (2007) detail the conditions for the different outcomes, when analysing the international transfer of technology in a Ricardian model.

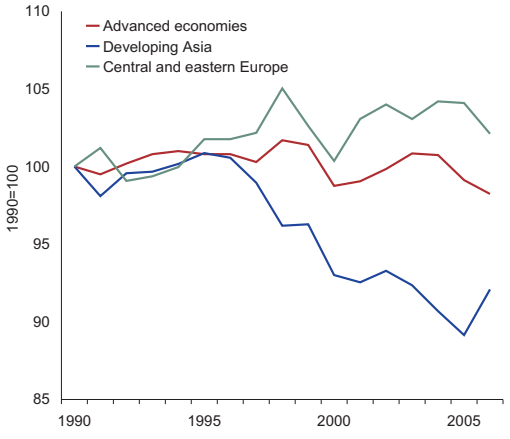
tage between the two countries (i.e. the advanced economy becomes an exporter of the good it previously imported). In sum, when faced with a productivity advance in the emerging market economy, the return to autarky would always imply a welfare loss for the advanced economy vis-à-vis the new free trade equilibrium, except in the extreme case considered by Samuelson, in which the two would be equivalent.

The discussion above serves to highlight that the terms of trade are highly relevant in assessing the welfare effects of globalisation. Note, however, that this indicator is also influenced by factors which may not relate directly to globalisation[9]. The evidence in Chart 2 seems to suggest that the intensification of globalisation and the rapid productivity growth experienced by emerging market economies have not been associated with a deterioration of advanced economies terms of trade. In fact, the terms of trade of this group of countries did not show major changes in the recent period, although this may hide some variation across economies. In particular, Chart 3 shows that while the terms of trade have remained virtually stable in the US, they have showed a slight decrease in the euro area. Japan did experience a more significant loss of terms of trade in the same period. A worsening of terms of trade was also observed in emerging market economies in Asia.

The questions that the Ricardian model can not be used to answer are the ones relating to the distribution of the gains from globalisation within the countries. Ricardo's is a representative agent model of the economy where everyone is the same, so that free trade must be welfare improving for all parties.

Chart 2

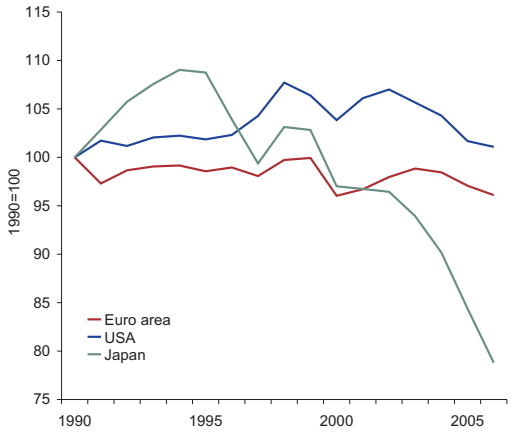
TERMS OF TRADE IN GOODS AND SERVICES



Source: IMF World Economic Outlook Database (Oct.2007).

Chart 3

TERMS OF TRADE IN GOODS AND SERVICES



Sources: IMF World Economic Outlook Database (Oct.2007) and Thompson Datastream.

(9) In recent years, there has been a rise in international prices of raw materials such as oil and metals, which may be indirectly associated to the intensification of globalisation. The increase in global production linked to globalisation implies an increase in the demand for raw materials which, given an inelastic supply, is likely to induce a rise in their relative price.

2.2. Heckscher-Ohlin-Samuelson Model

To think about potential issues concerning the distribution of the gains from globalisation within countries, the Heckscher-Ohlin-Samuelson (henceforth H-O-S) model is the one commonly used. This model explains why there may be winners and losers from globalisation within countries and exactly who they might be. The H-O-S model links specialisation and trade to differences between countries in the availability of factors of production such as capital and labour. Specifically, comparative advantage in this model results from differences in relative factor endowments across countries and differences in relative factor intensities across industries.

The H-O-S model in its original formulation considered two goods, two countries and two factors (labour and capital). The assumptions of the model consider identical countries except for relative factor endowments (that is, same preferences and technology). Both countries produce both goods and the production of both goods uses both factors, which move freely between sectors but not between countries. This model generates some important propositions.

The first is the Heckscher-Ohlin theorem that states that each country will specialize in and export the good whose production is relatively intensive in the factor in which the country is relatively more abundant. For illustrative purposes, let us assume that the advanced economy is capital-abundant and the emerging market economy is labour-abundant (abundance being defined in terms of the capital/labour ratio). Consider that the two goods are machinery and textiles, whose production is capital and labour intensive respectively (intensity depending on the ratio of capital to labour used in production). In the absence of trade, the relative price of machinery would be lower in the advanced economy than in the emerging market economy. Trade leads to a convergence of relative prices: the relative price of the machinery will rise in the advanced economy and decrease in the emerging market economy. In the advanced economy, that rise in the relative price of machinery will lead to an increase in the production of machinery and a decline in relative consumption, so that the advanced economy becomes an exporter of machinery and importer of textiles. The inverse takes place in the emerging market economy.

The second proposition emerging from the H-O-S model is the Stolper-Samuelson theorem that shows who wins and who loses when a country opens up to trade. It states that when the relative price of a good falls, the real return to the factor used intensively in its production will fall. Thus, the answer is that the relatively abundant factor gains and the relatively scarce factor loses. If capital is the relatively abundant factor in the advanced economy, an opening of trade will lead the return on capital in that economy to rise more than proportionately compared to the price of either good, whereas the return on labour will fall relative to the price of either good. This is a very important result widely cited in the debate on globalisation and income inequality. Changes in relative prices in the H-O-S model have quite large effects on income distribution: a change in relative goods prices changes the distribution of income in a way that benefits the owners of one factor of production while harming the owners of the other.

Finally, the factor price equalization theorem postulates that international trade will bring the returns to factors closer together across countries, implying complete equalization in certain circumstances. The intuition is that trade in final goods essentially substitutes for movement of factors between countries to equalize differences in relative factor returns.

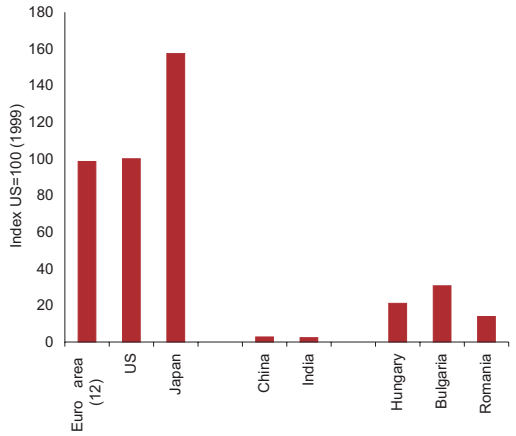
Although the results from the simple 2x2x2 H-O-S model are not easily generalized to models with higher dimensionality (more factors or more goods) or less strict assumptions, it can be shown that they may remain valid in a weaker form (Jones and Neary (1984)) [10].

The available evidence tends to confirm the idea that capital/labour ratios are much lower in emerging market economies than in advanced economies (Chart 4)[11]. In addition, workers with high skill levels (using as a proxy those which attained tertiary education) have a larger weight in the labour force of advanced economies than on some of those emerging market economies (Chart 5). This evidence, and the Heckscher-Ohlin theorem, give support to the view that advanced economies will tend to have a comparative advantage in the production of capital and some skilled-labour intensive goods, whereas the comparative advantage of emerging market economies is more likely to lie in the production of low-skilled labour intensive goods. This may seem obvious, but as remarked by Rogoff (2005), "(…) even today, it is amazing how many people seem convinced that China (which, with 1.3 billion people, is clearly a labor rich country) is going to export everything to everybody as free trade opens up".

The Stolper-Samuelson theorem remains the central theoretical result guiding the understanding of the distributional effects of trade between countries with different factor endowments. According to this theorem, the increasing integration of labour abundant economies in the world economy is expected to put downward pressure on the returns to labour in advanced economies (in which it is the relative scarce factor). This implies that the share of national income received by labour – the labour share, which can be expressed as the ratio of labour compensation per worker to average worker productivity – in those economies should fall as trade flows with emerging market economies increases and the associated specialization progresses. The data shows that there has been a decline in the labour share since the early 1980's across the advanced economies (see Chart 6). Nonetheless, this evolution may reflect other factors besides globalisation.

Chart 4

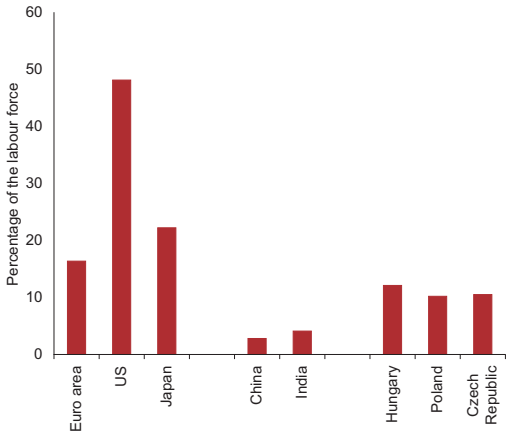
PHYSICAL CAPITAL/LABOUR RATIOS



Source: World Bank (Sandeep Mahajan (PRMEP), 2002). Prices and exchange rates are for 1987.

Chart 5

LABOUR FORCE WITH TERTIARY EDUCATION[(a)]



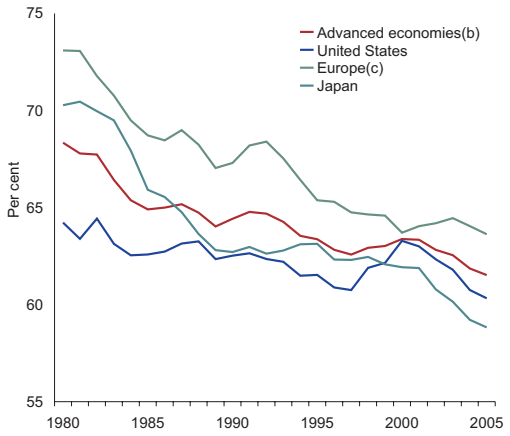
Source: Barro, R. and J. Lee (2000), *International Data on Educational Attainment: Updates and Implications.*
Note: (a) Percentage of the labour force aged 15 and over that attained tertiary education in 2000.

(10) Demonstrating that the H-O-S model holds empirically has been a difficult task (see Krugman and Obstfeld (2000) for an overview). Note, in particular, that complete factor price equalization is not evident in the data, which may reflect the fact that the some crucial assumptions needed to establish this result are not observed in the real world.

(11) There are several problems involved in the measurement of factor endowments, in particular of capital stocks. While using alternative data sources and methodologies may result in figures differing from the ones presented in Chart 4, the qualitative assessment does not change.

Chart 6

LABOUR INCOME SHARES IN ADVANCED ECONOMIES[(a)]



Source: IMF World Economic Outlook (Abr.2007).
Notes: (a) Income share of labour estimates the share of labour compensation of employees and "nonemployees" in value added. (b) Advanced economies include Australia, Austria, Canada, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, Norway, Portugal, Spain, Sweden, United Kinddom, United States; weighted using series on GDP in US dollars. (c) Europe includes Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden

The period under review was also characterized by significant changes in technology and labour market policies. Technological progress, especially in information and communication sectors, is expected to stimulate capital accumulation and to favour demand for skilled labour over unskilled labour. Therefore, globalisation and capital augmenting technological change are expected to have analogous impacts on compensation and the labour share. The labour share may also be indirectly affected by labour market policies, as these may help or hinder the adjustment of the economy to globalisation and technological progress. Because of the complex ways in which these factors interact, it is empirically difficult to isolate their effects.

Empirical work carried out by the IMF (2007) show that technological progress and, to a lesser extent, globalisation have contributed to the decrease in the labour share in advanced economies, whereas changes in labour market policies have generally had a smaller but positive impact on the labour share. These results are broadly consistent with findings reported in other recent studies (International Labor Office and the World Trade Organization (2007), Guscina (2007), Jaumotte and Tytell (2007), Ellis and Smith (2007))[12].

2.3. New Trade Models of Increasing Returns and Monopolistic Competition

Trade does not have to be the result of comparative advantage. Reciprocally beneficial trade can arise as a result of economies of scale and product differentiation. Increasing returns to scale make it advantageous for firms in each economy to specialize in producing only a limited range of differentiated products (or varieties), which enables a more efficient production. The countries then trade with each other in order to be able to consume the full range of products. This will be two-way trade within industries

(12) There is also an extensive empirical literature linking wage inequality between skilled and unskilled workers to globalization and technological progress, in particular for the US economy (see Slaughter (1998) for a survey). Most of these studies conclude that skill-biased technological change was a more important cause of wage inequality than international trade.

(that is, horizontal intra-industry trade), because firms in the two economies produce differentiated goods.

The new trade models introduced scale economies, product differentiation and utility functions including preference for variety and replaced the assumption of perfect competition on product markets with the one of monopolistic competition[13]. The seminal articles on this class of models were by Helpman (1981) and Krugman (1979, 1980, 1981). These models were to a large extent designed to explain why similar countries trade so much and why so much of their trade is intra-industry (as opposed to inter-industry trade driven by comparative advantage). For that reason, these models may be less pertinent to evaluate the impact of the current wave of globalisation which is characterized by particularly fast growth of trade flows between economies differing in their resources and production technologies. However, the process of convergence of per capita income of emerging market economies will likely be accompanied by a movement towards greater similarity of capital–labour ratios, skill levels, technology, etc., vis-à-vis advanced economies. This implies that trade between these groups of countries will gradually shift from inter-industry to intra-industry type and that the findings of the new trade models may acquire growing relevance.

How does the existence of intra-industry trade driven by scale economies and product differentiation change the conclusions reached in the previous sections concerning the effects of trade on the welfare and income distribution for advanced economies?

First, intra-industry trade produces supplementary gains, in addition to those arising from trade based on comparative advantage. By engaging in intra-industry trade, a country can at the same time reduce the number of goods it produces and increase the variety of goods available to domestic consumers. By producing fewer varieties, the country can produce each at larger scale, with higher productivity and lower costs (pro-competitive and scale effects). At the same time, consumers benefit from increased choice of differentiated products (variety effect)[14].

Second, the previous section's analysis of the distribution of the gains from trade demonstrated that trade would not benefit everyone, that is, trade in the H-O-S model induces changes in the income distribution within a country that are always enough to insure that the real income of the scarce factors of production diminishes. If, however, intra-industry trade is the dominant kind of trade, the extra gains from increased choice and scale economies are expected to outweigh any income-distribution effects and everyone may actually gain from trade (Krugman (1981)).

Hence, the impact of trade with emerging market economies on the income distribution of advanced economies depends on the determinants of that trade. If horizontal intra-industry trade gains increasing weight vis-à-vis inter-industry trade in the exchanges between these two groups of countries, the benefits from trade will tend to be more evenly shared among factors of production than would be the case if only the second type of trade was present.

3. "NEW NEW" TRADE MODELS WITH FIRM HETEROGENEITY

The trade models surveyed in the previous sections have in common the fact that they treat the sector as the unit of analysis, ignoring differences among firms belonging to the same sector. However, re-

(13) We will only refer to trade models of economies of scale internal to the firm (that is, the firm's average costs fall as its own output rises), which imply an imperfect competition market structure. External economies of scale, which occur when the unit cost depends instead on the size of the industry, can also be a cause of international trade. However, trade based on external economies of scale has more ambiguous effects on national welfare compared to trade based on internal economies of scale. For a general introduction to both types of models, see chapter 6 of Krugman and Obstfeld (2000).

(14) Recent empirical work measuring the gains from variety has shown that these may be considerable. Broda and Weinstein (2006) estimated that the number of imported product varieties offered to the United States' consumer has been multiplied by a factor of four over the period 1971-2001, entailing a welfare gain for the United States economy corresponding to almost 3 per cent of GDP.

cent empirical evidence shows that differences among firms are crucial to understanding several stylized facts of world trade. For example, most firms do not export at all while exporting firms tend to export only a small fraction of their total sales and tend to be larger and more productive than other firms in the same industry[15]. Hence, the "new new" trade theory emerged, incorporating firm-level heterogeneity to account for some of these firm-level empirics (see Bernard, Eaton, Jensen and Kortum (2003) and Melitz (2003) for early theoretical papers in this literature; Bernard, Jensen, Redding and Schott (2007) for a recent survey).

These models – which currently comprise a significant share of international trade research – have shown that firms' differences have important consequences for assessing the gains from trade and globalisation and their distribution across firms and factors of production. Above all, these models have identified an additional source of welfare gain from trade: the opening up of the country to international trade produces an aggregated productivity gain, driven by reallocations of market share and resources towards the more productive firms in each industry.

We will start by briefly reporting the implications of globalisation in the Melitz (2003) model[16], which incorporates firm level productivity differences into a model of intra-industry trade. The basic setting of the model considers that firms produce horizontally differentiated varieties within the industry under conditions of monopolistic competition. There is a group of prospective firms that can enter the industry by paying a fixed entry cost, which is thereafter sunk. These potential entrants face uncertainty concerning their productivity. After paying the entry cost, it is assumed that these firms draw their productivity level from a known distribution. This productivity remains fixed thereafter, but firms face a constant exogenous probability of a bad shock in every period that forces them to leave. The existence of fixed production costs implies that firms drawing a productivity level below some lower threshold (the "zero-profit productivity cut-off") face negative profits and therefore exit the industry immediately after entering and never produce. In addition, there are fixed and variable costs of exporting. The fixed costs of exporting will typically include costs of research into product compliance, distribution networks, advertising, etc. in foreign markets and, in most part, are sunk prior to entry in the export market. This means that, of the surviving firms in an industry, only the relatively more productive will decide to export. That is, there is self-selection of the most productive firms into the export market: only those who draw a productivity level above a higher threshold (the "export productivity cut-off") find it profitable to export in equilibrium. The remaining firms will only serve the domestic market.

Melitz (2003) shows that the impact of trade liberalization in this type of model is to induce reallocations between firms, which in turn generate both aggregate productivity and welfare gains. In the model, trade has redistributive effects within industries, which operate through the domestic factor market where firms compete. Falling trade costs affect both the decisions about export market entry and industry exit. It offers new profit opportunities for the most productive firms that were selling only to the domestic market and can now sell to foreign markets as well (therefore reducing the "export productivity cut-off"). It also induces more entry as prospective firms react to the higher potential profits associated with a good productivity draw. Thus, labour demand within the industry rises, due both to expansion by existing exporters and to new firms beginning to export. This increase in labour demand bids up factor prices and reduces the profits of non-exporters (that is, it raises the "zero-profit productivity cut-off"). The reduction in profits in the domestic market induces the least productive firms to exit

(15) See Tybout (2003) for a survey. Bernard, Jensen, Redding and Schott (2007) and Mayer and Ottaviano (2007) present recent reports on this empirical evidence for the United States and European firms, respectively.

(16) The Melitz framework is particularly amenable to analysis and leads to predictions regarding the impact of trade liberalization similar to the ones derived from the framework developed by Bernard, Eaton, Jensen and Kortum (2003), which introduced stochastic firm productivity into a multi-country Ricardian model.

the industry. As these less productive firms exit and as output and employment are shifted to more productive firms, aggregate productivity rises.

The Melitz model ignores comparative advantage by considering just one factor and industry and as such can provide only limited answers regarding the impact of globalisation. However, Bernard, Redding and Schott (2007) have remedied this by introducing firm heterogeneity in the model of inter and intra-industry trade of Helpman and Krugman (1985). Their model combines factor endowment di?erences across countries, factor intensity di?erences across industries, and heterogeneous firms within industries and is able to simultaneously generate inter-industry trade (countries are net exporters in their industries of comparative advantage), intra-industry trade (even within an industry where a country is a net importer, two-way trade happens), and selection into export markets (within both net exporting and net importing sectors, some firms export while many others do not). This model yields richer results concerning the gains from globalisation and their distribution across sectors, firms and factors of production for a given economy.

First, as in single-industry models of heterogeneous firms, trade liberalization is followed by compositional changes within industries, which increase aggregate productivity in all industries or sectors. However, in the model of Bernard, Redding and Schott (2007) these increases are stronger in the sector where the economy has comparative advantage. The idea is that the greater export opportunities in this sector lead to a larger increase in factor demand than in the comparative disadvantage sector, which bids up the relative price of the factor used intensively in the comparative advantage sector. This leads to greater exit by low-productivity firms and thereby larger rises in average productivity in this sector compared with the comparative disadvantage sector. These differential productivity gains give rise to differences in average sector productivity that magnifies comparative advantage based on factor abundance and provides a new source of welfare gains from trade.

Second, according to the model, trade liberalization may have an impact on the distribution of income across factors that differ from the ones derived from more traditional models. While the Stolper-Samuelson effect still operates in this model, it is augmented with an additional effect. The opening of trade increases average industry productivity in both sectors and implies a decline in consumer prices for both goods, and so an increase in the real reward of both factors. This second effect contributes to increase the real return of relatively abundant factors while mitigating, or even potentially overturning, the decline of real returns of relatively scarce factors. If the productivity effect is sufficiently large, it becomes possible for both factors of production to gain from international trade.

Finally, the model by Bernard, Redding and Schott (2007) generates a more novel result, as it shows that trade liberalization is associated to factor reallocation both within and across industries. In particular, although trade liberalization generates net job creation in comparative advantage sectors and net job destruction in comparative disadvantage sectors, there is simultaneous job creation and job destruction in all sectors as low productivity firms exit and high productivity firms expand. This contrasts with the findings from more traditional models, in which there would be a simple flow of factors from comparative disadvantage sectors to comparative advantage sectors.

4. MODELS OF INTERNATIONAL FRAGMENTATION OF PRODUCTION

The models surveyed in previous sections assumed for simplicity that all the tasks involved in the production of a good or service were carried out within a country. However, the recent globalisation phase is not only characterized by rapid growth of international trade but also by a remarkable change in the nature of that trade, involving the rising international fragmentation of production, also referred to as offshoring, outsourcing, trade in tasks, global production sharing, vertical disintegration of production

across borders, etc. All these terms have been used to designate the relocation of components of the production of some goods and services to other countries, creating an interconnectedness of production processes across countries, with each specializing in a particular stage of the good's production sequence and trading between them the partially processed good[17]. Baldwin (2006) called it "the second unbundling" in the globalisation process: in his view, the first unbundling corresponded to the spatial separation of factories and consumers, while the second unbundling, characterizing the recent globalisation phase, spatially separates the factories and offices themselves. During the first unbundling, countries produced basically complete products that they consumed and traded with other nations. However, the tasks comprising the production of the goods had to be performed in close proximity due to high transport, communication and monitoring costs. The second unbundling results from a sharp reduction in these costs, which facilitates direct trade in tasks and generates global production networks for several goods and services.

The growing share of parts and components in world trade is an indication of the increase in the international fragmentation of manufacturing production. Jones at al. (2005) reviews empirical work documenting this trend. Yeats (1998) finds that trade in parts and components has grown much faster than trade in final goods and estimates that it could account for 30 per cent of world trade in manufactures in 1995. Recent advances in information technology have implied that trade integration has also progressed quickly in services. Amiti and Wei (2005) report that outsourcing of services has increased considerably, but remaining at relatively low levels compared with manufacturing outsourcing.

How does the possibility of dividing a productive activity into parts that can now be done in different locations alter the conclusions of the previous sections regarding the impact of globalisation? The answer is that while trade models incorporating international fragmentation of production do not change the basic message about the overall benefits of free trade, they nevertheless may change the views on the sharing of these gains among the different factors of production.

International fragmentation of production can be modelled as if it were just like trade in new goods (intermediate goods). Contributions on this line of research include, among several others, Arndt (1997), Venables (1999), Deardorff (2001, 2005a), Bagwati et al. (2004) and Markusen (2005), besides Jones and Kierzkowski (1990), the most common cited reference in this area[18]. This branch of literature presents a set of alternative conceptual frameworks, by adapting the trade models surveyed in section 2 to allow for the breakdown of the production process of a good into sub-processes that can be undertaken in different locations. The main conclusion from these studies is that outsourcing/offshoring leads to the usual gains from trade with the standard caveats applicable to conventional trade. The idea is that breaking down the integrated production process into separate stages opens up new possibilities for exploiting gains from specialization and trade[19]. The main caveat results from the possibility of an adverse movement in the terms of trade, specifically that the beneficial impact of the introduction of outsourcing may give rise to sufficiently strong adverse terms of trade effect that offsets the former. Regarding income-distribution effects, this literature does not offer general conclusions as the impact of offshoring on factor rewards depends upon many variables. In some cases, the scarce factor is made worse off by the possibility of offshoring, but it is also possible to find situations in which all factors are better off after the change. While this line of research has produced interesting insights, it can be viewed as a collection of special cases: the results depend heavily on the assumptions and it is not possible to draw general principles from the analysis.

(17) This can be accomplished by the firm opening a subsidiary in a foreign country or by contracting with a foreign supplier under an outsourcing arrangement. A branch of trade literature has examined which organisational form is preferable in different circumstances (e.g., Grossman and Helpman (2005), Helpman (2006)).

(18) See Baldwin and Robert-Nicoud (2007) for a brief survey of these works.

(19) Offshoring some parcels of production allows Ricardo's logic of trade according to comparative advantage to be applied separately to each of those individual parcels of production.

Hence, Grossman and Rossi-Hansberg (2006a,b) have alternatively proposed a more general model of offshoring, which they boldly called a new paradigm. They developed a model of trade in tasks – defined as the individual steps involved in the production process – as compared to the usual approach of modelling just trade in goods. In their model, the production process in each sector – one exportable and one import competing – involves a continuum of tasks to be performed by each of the factors of production (unskilled labour, skilled labour or others, like capital). As in the H-O-S model, it is assumed that the two goods differ in their factor intensities and that the country exports the good that makes intensive use of its relatively abundant factor.

The tasks can be performed abroad or domestically. Offshoring tasks might entail savings in factor costs but also imply costs. Some tasks are moved abroad more easily than others. The cost of offshoring a task may reflect how much routine it incorporates, how important it is that the task be delivered personally, how difficult it is to transmit or transport the output of the activity, etc. While the model recognizes these differences, it assumes that the costs of offshoring the various tasks are exogenous.

The model can be used to study the impact of task trade or offshoring on factor prices. In the papers, these factor prices are the wages of skilled and unskilled labour, as it is assumed that the relevant tasks are performed by these two types of labour but the results could be re-interpreted in terms of the returns to labour and capital. It is also assumed that when there is a reduction in the cost of offshoring tasks requiring a given skill level, this reduction is proportional across both sectors of the economy. This insures that when, for example, unskilled labour intensive tasks are offshored then they are offshored by the two sectors. The model allows decomposing the effect on wages of this cost reduction for offshoring tasks into three components.

The first is the relative price effect. Improved possibilities for offshoring some tasks provide different incentives for the two sectors to expand, which changes the composition of output. If the offshoring country is a large one, this would create imbalances in world markets at the initial prices and so the relative price of goods will have to adjust. This change in relative prices has implications for factor returns that are familiar from the H-O-S model (Stolper-Samuelson theorem).

The second is the labour supply effect. The increasing offshoring of some tasks imply that the demand for workers performing those tasks at home is reduced, which, other things constant, imply that their wage would have to fall to maintain full employment[20].

Finally, the authors identify a productivity effect that benefits the factor performing the kind of tasks that are moving offshore. This effect seems to have been largely unnoticed in the previous literature. When the tasks performed by a certain type of labour can be transferred abroad, the firms that use this type of labour intensively in their production processes are the ones that gain the most in cost savings[21]. Thus, these firms experience the greatest increase in profitability which induces them to expand relative to firms that use intensively other types of labour. Expansion of these firms leads to a net increase in demand for the type of labour which was used in the offshored tasks. Thus, the real wage for that type of labour rises, other things constant. Grossman and Rossi-Hansberg derived the name for the effect by drawing an analogy between falling costs of offshoring tasks and factor-augmenting technological progress: both reduce the cost of using a factor and the amount of local factor needed to produce a given amount of output, both benefit firms that use the factor intensively, both create incentives for

(20) This effect did not appear in the H-O-S model with incomplete specialization of section 2.2 (in that model, factor growth can be accommodated by a change in the composition of output in each country, without any impact on factor prices). However, in other trading environments, in which the number of the country's factors of production exceeded the number of tradable goods that it produces, factor prices do respond to factor supplies.

(21) Firms' costs fall for two reasons. First, firms choose to offshore new tasks that were previously performed at home. Second, firms save on inframarginal tasks that were already performed abroad before the drop in the cost of offshoring. This second effect is the most important. The idea is that the information and technology revolution changes the ability to perform entire ranges of tasks.

these firms to expand and the expansion of these firms can lead to a net increase in demand for factor whose productivity has increased.

The authors show how the productivity effect can prevail over the other two effects in well-known trade environments. When this happens, reductions in the costs associated to offshoring imply an actual rise in the real wages of the domestic workers that have skill levels similar to those used in performing the tasks that are being offshored. Thus, in contrast to the distributional conflict that results from reductions in the cost of trading goods in traditional trade frameworks like the H-O-S model, reductions in the cost of trading tasks may generate gains for all domestic factors[22].

In the framework developed by Grossman and Rossi-Hansberg, adjustments to globalisation occur at the task rather than the sector level, that is, the tasks chosen to be offshored may be undertaken in a wide range of sectors (e.g. data-entry tasks in all sectors). The model also highlights that not all tasks requiring a given skill level can be transferred abroad, i.e., there is a weak relationship between the tasks being offshored and the level of labour skill required to perform them[23].

5. A SMALL OPEN ECONOMY: SOME POLICY ISSUES

The results from the models surveyed in the previous sections apply directly to a small open economy, such as Portugal. The models show that, in the long run, participating economies may gain from the intensification of the globalization process. One source of those gains is the change of patterns of comparative advantage, which implies restructuring and reallocation of productive factors. Those changes in comparative advantage patterns may be particularly significant for countries like Portugal - with relatively low levels of human capital and technological development compared with other advanced economies – thus requiring policy actions to improve the economy's adjustment capacity.

The benefits from globalisation do not come automatically. The restructuring process associated with globalization implies that firms must be able to reallocate resources rapidly to take advantage of new opportunities and potential income gains and to minimise adjustment costs. The velocity of the adjustment matters, as a rapid adjustment would minimize the losses from having resources locked into inefficient uses in the transition period.

In this context, globalisation may well have increased the importance of economic policy. In particular, the realisation of the full net benefits of globalisation requires the establishment of a suitable institutional framework that facilitates the needed changes and minimizes the adjustment costs. As referred by Rodrick (2007), there is a wide consensus supporting the idea that trade openness alone is unlikely to lead to economic growth in the absence of a wide range of complementary institutional and governance reforms.

Globalisation may require government responses on many levels to reduce the related adjustment costs. The duration of the adjustment period and the magnitude of the adverse effects on employment are linked to the flexibility of the labour market, i.e. how easily labour can move from declining to advancing sectors. Therefore, the promotion of a set of policies in the labour market to ensure flexibility is essential to facilitate a rapid resource reallocation, especially in countries such as Portugal where several rigidity factors still hamper an efficient functioning of the labour market. Initiatives aimed at improv-

(22) Grossman and Rossi-Hansberg report some rough evidence that productivity gains associated to offshoring of tasks performed by low skilled labour have contributed to sustain wages for that type of workers in the United States. However, the available empirical evidence on the productivity effects of offshoring is mixed (see Olsen (2006)).

(23) Blinder (2006) empirically documents this less than perfect relationship by referring to the cases of typing services (a low-skill job) and security analysis (a high-skill job), both of which are examples of services already being offshored to low cost countries. In contrast, there are the cases of services of taxi drivers and airline pilots. Neither can be offshored, but the first is a job with negligible educational requirements and the second is quite the reverse. He also mentions that most physicians need not fear that their jobs will be moved offshore, while radiologists are already seeing that happen.

ing the sectoral and occupational mobility of labour – in particular by investing in human capital, including worker retraining – are also important. These will ultimately enhance the adaptability of the economy to change, whether driven by globalisation or by other perhaps even more important factors like skill biased technology shocks. Policies and regulations promoting product market flexibility and competition also contribute to the efficient use of available productive factors, their adequate sectoral allocation and the incentive to adopt new productive processes. Finally, sustained investments in research and innovation, in particular by the private sector, are also required to take advantage of the opportunities created by the increasing integration of markets, given the ongoing changes in comparative advantages at the global level.

6. CONCLUSIONS

The theoretical models surveyed predict that globalisation is welfare improving for the countries involved in the long run. What is meant by welfare improving is that countries gain with globalisation in terms of the income of the average inhabitant. These welfare gains may arise from reallocating factors to their most productive use across industries, from providing consumers access to a broader range of product varieties than is available domestically and from aggregate industry productivity increases due to self-selection of the most efficient firms[24].

However, the benefits of globalisation are obtained by relocating resources. This restructuring is likely to be associated with distributional impacts, both in the short term, as a consequence of adjustment costs, and in the long term, as a result of permanent changes in relative factor demands (Rodrick (1998)). Therefore, globalization implies efficiency gains but also costly dislocations and potentially distributional consequences.

Based on the more traditional trade models, e.g the H-O-S model, the reshuffling process triggered by globalisation is expected to take place mainly across sectors. According to these models, each country would have a set of identifiable exporting sectors and import-competing sectors. Increasing trade would imply that exporting sectors would expand production and their demand for labour, while import competing sectors would reduce production and possibly lay-off workers. For advanced economies, it was expected that labour-intensive sectors would shrink, while skill and/or capital intensive sectors would expand. Jobs would therefore be destroyed in labour-intensive sectors and capital employed in those sectors would have to be re-employed. Regarding the distributional consequences of globalisation, the traditional result based on the Stolper-Samuelson theorem was that it would negatively affect the returns to the relatively scarce factor – labour or unskilled labour – in the advanced economies.

The more recent theoretical literature shows that the adjustment to globalisation and its impact on the income distribution may be more complex and nuanced. Regarding the adjustment processes, the recent trade models with firm heterogeneity predict that significant resource reallocation may also take place within sectors and not only between sectors. These models incorporate mechanisms according to which globalisation encourages the expansion of high-productivity firms and the closing down of less efficient firms in all sectors, that is, in both net-exporting and net-importing sectors. The recent task trade model by Grossman and Rossi-Hansberg also suggests that job destruction and creation associated to offshoring need not take place according to a well established sectoral pattern or specific skill level. Regarding the distributional effects of trade, the prediction of the Stolper-Samuelson theo-

(24) These aggregate productivity increases may also result from self-selection within firms, in a general equilibrium model of international trade with multi-product firms which are heterogeneous in both firm-specific ability and firm-product-specific expertise (Bernard, Reddding and Schott (2006)). Following trade liberalization, there is reallocation of resources across firms (as firms with low overall productivity exit) and within firms (as surviving firms drop their marginally productive products).

rem is mitigated in the more recent trade models. In the models of scale economies and product differentiation, in the "new new" trade models with firm heterogeneity and in the model of task trade, there is the possibility that globalisation may generate gains for all production factors.

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