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International trade and the position of European low-skilled labour

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World Trade Organization
Economic Research and Analysis Division

**International trade and the position of European
low-skilled labour**

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International trade and the position of European low-skilled labour[‡]

Marion Jansen^{*}

Abstract

This paper presents a discussion of the potential channels through which international trade affects the position of low skilled workers in the European Union. After an analysis of the European Union's trade flows showing the predominant role of intra-industry trade with other industrialised countries, the discussion focuses on the potential effects of intra-industry trade on low skilled labour. Particular attention is paid to possible interactions between trade and technological change and to the possible effects of trade on the price elasticity of labour. The paper also discusses how trade may affect incentives to invest in skills and thus a country's potential to alter the skill structure of its working force.

JEL classification numbers: F10, J31, J24

Keywords: intra-industry trade, skill inequalities, investment in skills

I. INTRODUCTION

Low skilled workers in industrialised countries saw their position in labour markets deteriorate in recent decades. In most European countries the relative unemployment rate between low skilled and high skilled labour grew in the eighties and early nineties (OECD (1997)). Some countries, like the UK and the US, have besides experienced increasing wage inequalities between the high and the low skilled. In the US declining real wages for the lowest income group have even been observed¹. All this happened against the background of a decrease in the relative supply in low skilled labour, as the share of the population with a university education increased in most industrialised countries, while the share of those that achieve only lower secondary education declined.² Though the late nineties seem to have brought slight improvements in inequality figures, the general impression remains that it is mainly the skilled that take advantage of the growth process in industrialised economies.

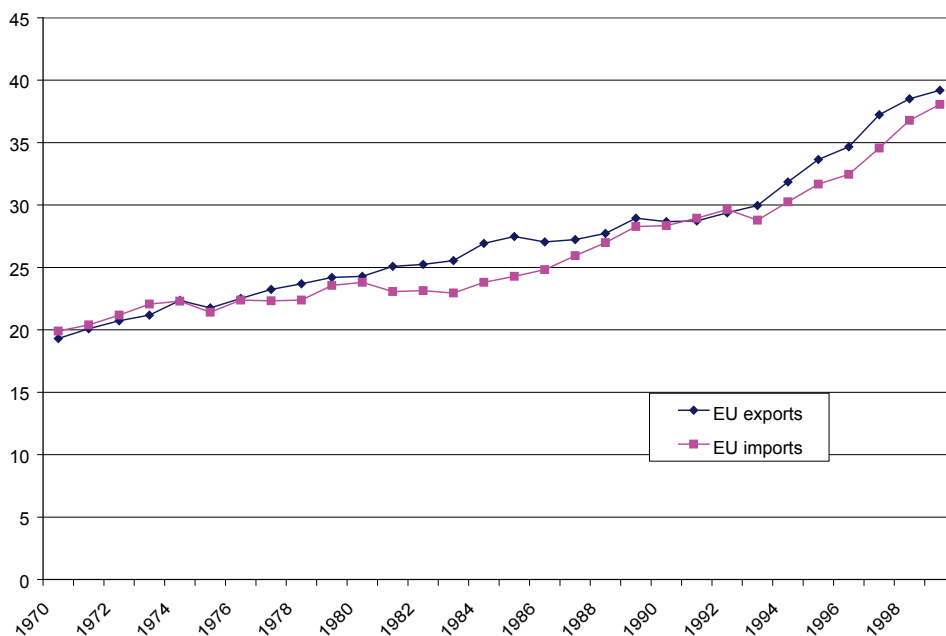
As for most industrialised countries trade volumes increased significantly in the period after World War II, trade has been identified as one potential culprit for the worsened position of low skilled workers.³ Trade is thought to have affected the demand for low skilled workers in two ways. It is thought to have reduced the relative demand for low skilled labour and to have made the demand more responsive to changes in the price of low skilled labour. Both effects would reduce the relative wages of low skilled workers in economies with flexible labour markets. In economies where labour market rigidities prevent wages from falling an increased relative unemployment rate of low skilled labour may result. Country specific labour market characteristics will thus have an important effect on whether and to which extent relative wages and/or relative unemployment rates are affected by trade.⁴ The increased responsiveness to price changes may have another effect that has received less attention in trade literature. It may decrease the bargaining power of workers and it can be shown that this may lower an economy's level of investment in training. Trade could then have an indirect effect of increasing the relative supply of low skilled labour by reducing the incentives to invest in training.

Whether and how trade affects the demand for low skilled workers will very much depend on the type of trade prevalent in the country under consideration. Given our interest in the European Union, the next section will therefore have a closer look at the region's trade volume and trade pattern. Section III will provide a survey of the theoretical and empirical literature related to the effects of trade on the relative demand for low skilled labour. Most of the time the section will refer to industrialised countries in general and not exclusively to European Union countries. Yet Section II will allow the reader to judge which of the arguments presented in section III will be most relevant to the European Union. The same can be said about Section IV that looks at the effects of trade on the responsiveness of demand for low skilled labour to changes in its price. Section V focuses on the impact of trade on the decision to invest in training.

II. TRADE PATTERNS IN THE EUROPEAN UNION

The above-mentioned increase in skill differentials in industrialised countries took place against the background of two other phenomena that marked the eighties and early nineties: an increased emphasis on "internationalisation" of economies and the introduction of new information technologies that seemed to alter existing economic structures significantly. Within the European Union trade in goods was increasingly liberalised and culminated in the creation of the Single Market in 1992. But also on the global level countries increased their openness to trade, partly as a result of continuing negotiations on trade liberalisation that took place in the context of the GATT.

Figure 1 : EU(15) exports and imports as a percentage of GDP based on constant (1987) prices.



Note: Includes intra-EU trade; EU(15) includes ex-GDR only as of 1991.

Source: World Bank, World Development Indicators

As a consequence the role of trade in the economy increased, as can be seen in Figure 1: exports and imports as a share of the European Union's GDP increased steadily over most of the observation period from around twenty per cent of GDP in the early seventies to nearly forty per cent in 1995.

Increased openness raised fears among workers of an increased exposure to foreign competition. Trade was seen as potential cause for the observed increase in skill inequalities, in particular trade with non-industrialised countries with a large and cheap labour force. A closer look at trade patterns however reveals that trade with "poor" countries only plays a relatively small role in the European Union's total trade. The largest

share of trade is intra-EU trade and this share increased over the seventies and eighties to reach more than 60 per cent in the nineties. Following the breaking up of the communist block, trade with Central and Eastern European countries also increased, thus integrating these candidates for European Union membership more and more in the region's economic pattern. Around one fifth of EU imports come from other OECD countries, a share that remained fairly stable over time. Another fifth of EU imports comes from "the rest of the world", which contains the bulk of developing countries and a group of former communist economies. Trade with these countries decreased quite significantly in the eighties and only recently started increasing again. In 1997 imports from these "poor" economies represented around 4.5 per cent of the European Union's GDP.⁵

Table 1: EU(15) Exports and Imports with Trade Partners (percentages)

	1970	1975	1980	1985	1990	1995	1996	1997
EU imports								
Intra-EU	56.5	55.8	54.3	57.2	66.2	61.7	61.6	60.1
CEEC(5)	1.8	1.8	1.5	1.8	1.4	2.5	2.5	2.7
other OECD	19.9	17.1	18.0	18.9	19.1	19.1	18.8	19.4
Rest of world	21.8	25.3	26.2	22.2	16.2	16.8	17.2	17.9
EU exports								
Intra-EU	59.8	58.4	61.2	58.8	65.3	62.1	61.7	61.0
CEEC(5)	1.9	2.6	1.7	1.5	1.6	2.8	3.2	3.5
other OECD	18.9	15.2	14.9	19.4	17.2	16.8	17.1	17.5
Rest of world	19.4	23.8	22.2	20.2	16.0	18.3	18.1	18.0

Note: CEEC(5) include Hungary, Poland, Romania, the Czech Republic and Slovakia. "Other OECD" includes Australia, Canada, Iceland, Japan, Korea, Mexico, New Zealand, Norway, Switzerland, Turkey and the United States. The "Rest of the world" mainly consists of developing countries and transitional economies other than the CEEC(5). For the whole observation period Intra-EU trade refers to trade among the current 15 members of the EU.

Source: UNSD, Comtrade database.

Trade patterns among industrialised countries differ significantly from trade patterns with the developing world. As industrialised countries are relatively similar, in the sense that they use similar production technologies and have similar factor endowments, they produce similar goods. Trade between them therefore mainly takes the form of intra-industry trade, which refers to a situation in which countries export and import goods belonging to the same sector. France will, for instance, export Renaults to Germany and Germany, Volkswagens to France. These goods are similar in the sense that they are both cars, but they differ in their characteristics and this is why it is interesting for both countries to trade. Trade among industrialised and developing countries instead rather takes the form of inter-industry trade: countries export goods belonging to one sector and import goods belonging to another sector. Germany would for instance export Volkswagens to Malaysia and import rubber in exchange.

The so called Grubel-Lloyd (GL) indicator is a measure for the importance of intra-industry trade in an economy's trade pattern. It takes values between zero and one. The closer the

GL indicator is to one, the bigger the share of intra-industry trade in the total trade of the economy. Table 2 gives an overview of the Grubel-Lloyd indicators of EU trade with the regions already specified in Table 1. It shows that trade within the European Union is nearly entirely of the intra-industry type.⁶ Trade with other industrialised countries is also mainly intra-industry and the share of intra-industry trade with CEEC countries has increased steadily over time. The table also shows that trade with the rest of the world was mainly inter-industry trade in the eighties in accordance with the arguments presented in the previous paragraph. But this pattern has started to change in the nineties and in 1997 already half of the trade with the rest of the world was of the intra-industry type. This may be the case because an important share of trade with "the rest of the world" is trade with emerging economies like Hong Kong, Malaysia and Singapore, that have been characterised by strong GDP growth over the observation period. This would explain why the trade pattern between these countries and the European Union is increasingly one of intra-industry trade.

Table 2: The Grubel-Lloyd indicators for the European Union

	1980	1985	1990	1995	1996	1997
Intra-EU	0.981	0.981	0.980	0.956	0.957	0.949
CEEC(5)	0.487	0.571	0.554	0.589	0.598	0.621
other OECD	0.696	0.679	0.733	0.757	0.763	0.772
Rest of world	0.280	0.331	0.441	0.523	0.520	0.535

Note: The GL indicators were calculated on trade flows across 69 manufacturing branches (SITC Rev.2, 2-digit) using the formula $GL = 1 - \sum_x |E_x - M_x| / \sum_x (E_x + M_x)$ where E_x and M_x stand respectively for exports and imports in branch x . See table 1 for the definition of the regions represented.

Within intra-industry trade distinction can be made between horizontal and vertical intra-industry trade according to the characteristics of the goods involved. In the first case, goods have different characteristics and individuals have different opinions about these characteristics. Strawberry ice-cream and chocolate ice-cream could for instance be considered to be two different varieties of the horizontally differentiated product ice-cream. One person will prefer strawberry ice-cream, another chocolate ice-cream, just like somebody may particularly like red t-shirts, while somebody else prefers wearing blue and some people read le Monde and others le Figaro. It is not the case that one product is "better" than the other, but consumers have different preferences about them. Horizontally differentiated goods therefore tend to have similar prices. This is not the case for vertically differentiated goods. Vertically differentiated goods differ in a characteristic that consumers value in the same way, i.e. consumers have the same preferences concerning that characteristic. Consumers will agree that a battery is better the longer it lasts. The same goes for light bulbs. They would also prefer a car that consumes less gasoline to a similar one that consumes more. Those characteristics are somehow related to the way consumers perceive the quality of a good.⁷ All consumers will prefer a high quality good to a low quality good and would be willing to pay a higher price for the first. The question is, whether they can afford to do so. Although consumer preferences are the same for different

types of the vertically differentiated good, they will therefore not all end up buying the same product. It is each individual's budget constraint and the amount available to spend on the relevant product that will determine which quality of a good a consumer ultimately buys.

Empirical research has tried to disentangle horizontal from vertical intra-industry trade in countries' trade flows. Greenaway, Hine and Milner (1994) find that at the end of the eighties two-thirds of the UK's intra-industry trade was vertical. Fontagné, Freudenberg and Péridy (1997) find that more than half of the total intra-EU trade is vertical intra-industry trade in 1994. Several studies indicate that countries specialise in certain quality niches. Jansen and Landesmann (1999) find that the quality a country tends to export depends positively on its level of development, as it is correlated with per capita GDP. This explains why the European Union belongs to the high quality exporters when compared to other countries and regions. But it also explains why within the European Union the "richer", northern countries tend to export higher quality products than the "poorer", southern countries.

Overall, this section has shown that by far the largest part of EU trade is intra-industry trade, as this is the type of trade that prevails among industrialised countries, which are the EU's major trading partners. Even trade with developing and transition economies has become increasingly intra-industry. Besides, there is evidence that within intra-industry trade, trade in vertically differentiated goods is more important than trade in horizontally differentiated goods. This evidence is interesting in the light of the fact that most theories that link trade with skill inequalities are based on models of inter-industry trade. Theoretical analyses on the link between intra-industry trade and wage inequality are scarce, in particular when it comes to vertical intra-industry trade. The next section will treat these issues in more detail.

III. TRADE AND THE DEMAND FOR LOW SKILLED LABOUR

It has been pointed out in the introduction that trade is expected to have a negative impact on the relative demand for low skilled labour in industrialised countries. For a long time it was thought that this would only be the case for inter-industry trade between countries that have very different endowments in low skilled labour. Section A will describe why there are solid theoretical arguments in favour of this opinion. Trade among industrialised countries instead, which consists for a large share in intra-industry trade, has typically not been expected to affect the relative demand for different types of labour. Recent research on the issue however has defined ways in which also intra-industry trade could affect skill inequalities and this research will be presented in Section B. Last, but not least, section C provides a discussion of the empirical evidence for the arguments put forward in the preceding sections.

A. TRADE WITH COUNTRIES HAVING ABUNDANT LOW SKILLED LABOUR

One of the most important theories of international trade, the Heckscher-Ohlin-Samuelson factor endowment model, argues that trade is based on differing factor endowments across countries. The typical model based on this theory looks at trade between two countries that use the same production technologies to produce two consumer goods. The production

process for each good requires two different inputs, that could for instance be high skilled and low skilled labour. The production of one of the goods, for instance computers, is intensive in the use of skilled labour, while the production of the other good, for instance cloth, is intensive in the use of low skilled labour. It is assumed that one of the countries is relatively well endowed with one factor, while the other country is relatively well endowed with the other factor. When thinking of high skilled and low skilled workers this situation could for instance describe trade between an industrialised country, that is relatively rich in high skilled labour, and a developing country, relatively rich in low skilled labour. The theory would then predict that the industrialised country exports computers and imports cloth from the developing country. The relative price of cloth would decrease in the industrialised country, whereas it would increase in the developing country. As a result, in the industrialised country wages of low skilled labour will decline relative to the wages of high skilled labour.⁸ This happens because trade makes available the products produced by the workers abroad, which implies that through the vehicle of trade the relative supply of low skilled labour is increased. According to this theory, inter-industry trade would thus indeed have the effect of increased wage inequality in industrialised countries, while inequality should decrease in developing countries.

Existing evidence on changes in wage inequality in developing countries is however mixed. Wood (1997) points for instance out that since the mid-1980s increased openness has widened wage differentials in Latin America. Acemoglu (1999) argues that this could be the consequence of trade inducing technological change in both industrialised and developing countries. In a world of two final goods, one skill intensive and the other low skill intensive, companies can do research in order to upgrade the technology used. The industrialised country is assumed to be technologically more advanced and the developing country will therefore import technologies from the industrialised country and not do any research itself. When the two countries start trading in final goods, this will have the well-known effect of increasing the price of the skill intensive good in the skill abundant industrialised country. As a consequence the return of upgrading the production technology of this good will increase and more research will be carried out in the high skill intensive sector. This will, however, induce a higher rate of innovation and consequently the price of the skill intensive good will fall again. Wage inequality will however increase in the industrialised country, as technological change has led to an increase in demand for skilled labour. The effect on wage inequalities in the low skill abundant trading partner is ambiguous. On the one the demand for low skilled labour increases as the possibility to export increases the production of the low skill intensive good. Yet imported production technologies are now more skill intensive, which increases the demand for skilled labour also in the developing country. If the latter effect prevails, wage inequality may increase in the developing country.

It has been shown in Section II that at the end of the 1990s the ratio of imports from developing countries to the European Union's GDP amounted only to around 4.5 per cent. There is thus reason to wonder whether trade with developing countries alone could explain the important changes in wage inequality and unemployment rates observed in industrialised countries. Empirical evidence indeed seems to indicate that the impact of trade on labour markets has been relatively small compared to the impact of technological change (see section C). Nevertheless, the belief that trade with low wage countries affects low skilled workers in industrialised countries negatively is wide-spread. Existing empirical research so far did not allow for the possibility of trade inducing technological change, as

suggested by Acemoglu (1999). Once this interaction is taken into account the effect of trade with developing countries on wage inequality in industrialised countries may well turn out to be more important. Other research has emphasised the argument that the possibility of trade increases the substitutability of worker, i.e. it is easier to substitute foreign workers for domestic ones in a reaction to price changes by importing the product made by the foreign workers. This would imply an increase in the elasticity of the demand for workers rather than (or in addition to) a decline in the size of this demand. A change in the elasticity of demand may also affect wage inequality, but would have different implications for the empirical relationship between trade and wages. Section III will discuss this issue in detail.

B. TRADE AMONG SIMILAR, INDUSTRIALISED COUNTRIES

The trade models described in the last subsection give an explanation for the existence of trade between countries that differ substantially in their factor endowments. This difference leads to trade between sectors: a country exports goods from one sector and imports goods from another sector. It has however been shown in Section II that industrialised countries trade above all with other industrialised countries that tend to be rather similar in their endowments. Besides, these countries tend to trade in goods that belong to the same sector, which leads to the phenomenon of intra-industry trade that has been described in Section II.

In the theoretical literature horizontal intra-industry trade has received more attention than vertical intra-industry trade, with the result that a much vaster literature is available on the first topic.⁹ This is in contrast with findings in the empirical trade literature indicating that a larger share of intra-industry trade is actually vertical intra-industry trade.¹⁰ Two crucial assumptions of the models explaining horizontal intra-industry trade are that consumers love variety and that there are increasing returns to scale in the production of the differentiated good.¹¹ Two similar countries will therefore start trading because the larger size of the combined market makes it possible to produce more varieties of the differentiated goods than in the autarchic equilibrium. Each country will end up importing the varieties it doesn't produce at home. Both countries are better off with trade than under autarchy, because more varieties are available to consumers and this at a lower price (thanks to the economies of scale). Two important assumptions in models of vertical intra-industry trade are, that consumers differ in their level of income and the number of producers per country is restricted. Each country can therefore only produce a limited variety of qualities of the good and each consumer buys the quality that corresponds best to his budget constraint. Reducing trade barriers would then lead to trade even if the two trading partners are very similar countries. The fact that a company can sell products to consumers in both countries will increase the range of different qualities produced and thus available to consumers. Again both countries will be better off with trade because many consumers will be able to find product qualities that are more suitable to their budget.

The main objective of the original literature around intra-industry trade was to explain the phenomenon of intra-industry trade. The pattern and size of trade flows were often analysed and the welfare effects on the trading countries. The remuneration of production factors was typically not a focus of these models and they did therefore not lend themselves to the analysis of issues like wage inequality and unemployment. The general impression seemed to be that intra-industry trade does not affect the relative demand between high skilled and

low skilled workers. If anything, factors are likely to gain from intra-industry trade, in particular in the case of horizontal intra-industry trade where trade leads to significant welfare gains.

Recent contributions to the trade literature however have looked at the question whether intra-industry trade may have an impact on the demand for high skilled and low skilled labour and thus on wage inequality. Manasse and Turrini (1999) assume that goods are differentiated in a horizontal and in a vertical way. Workers differ in their skill level and it is the skill level employed in the production of a good that determines the quality of that good. High skilled workers then have a higher income than low skilled workers in autarchy. It is assumed that in order to export a good a fixed cost needs to be paid. When a country opens up for trade only companies producing relatively high qualities can pay the fixed costs and therefore only high qualities will be traded. It is thus only high skilled workers that take advantage of the increased opportunities provided by trade.¹² As a consequence the difference between their income and the income of lower skilled workers that work in non-exporting companies increases. Intra-industry trade thus leads to increased wage inequality within countries and also within sectors.

Duranton (1999) analyses the impact of trade on wage inequality in a model of horizontal intra-industry trade where high-skilled and low-skilled workers are used to produce intermediate goods. Intermediate goods can be of a high or a low quality, with only high skilled workers being able to produce the high quality intermediate. Final good producers have to decide whether to use an advanced technology for producing their good or a less advanced one. The advanced technology requires a higher initial investment, but is more productive. The problem is that in order to use the advanced technology all the intermediate inputs employed must be of a high quality. In this situation it is possible that in autarchy advanced technologies are not used, because of a lack of high quality intermediates due to the scarcity of skilled labour. Trade then opens the possibility for technological change as the high quality intermediates of high skilled workers abroad become available. In other words, trade indirectly increases the pool of high skilled workers that are necessary for employing advanced technologies. Trade and technological progress thus go hand in hand and together lead to an increase in wage inequality, as high skilled workers will now no longer work in the production of low quality goods.

Grossman (1999) presents a very different model of trade between similar countries. He assumes the existence of two sectors that differ only in the way their production is organised. In particular it is assumed that one sector can pay each worker according to his talent (e.g. the software industry), whereas the other sector cannot distinguish each individual's impact on the output (car industry). The same wage is thus paid to all the workers in the second industry and it is determined by the average talent of the workers in this industry. This set-up leads to the result that the most talented individuals will be working in the software industry. When comparing two countries with different distributions of talent, it turns out that in the country with a more heterogeneous working force¹³, more people will be working in the software industry.¹⁴ The fact that more people will work in the software industry has the effect that the wage inequality is higher in this country than in the country with a more homogeneous labour force. When these two countries start trading, the country with the more heterogeneous labour force will export software and import cars. This will increase the inequality even more in that country, whereas the opposite is the case in the more homogeneous country.

Recent research has thus given importance to the question whether trade between similar countries may have (had) an impact on wage inequality. The relevance of this question stems from the fact that the vast majority of industrialised countries' trade consists in trade with other industrialised countries. Given that a large share of this trade is vertically differentiated intra-industry trade, it would be interesting to obtain further insights on the relationship between this particular type of trade and skill inequalities. It has for instance been argued by Landesmann (1996) that growing Eastern European economies shift from inter- to intra-industry trade and start by exporting goods of a relatively low quality. This may imply a stronger competitive pressure on low quality producers in the European Union than on high quality producers. A recent ILO case-study on Switzerland (ILO (1999)) finds that Swiss exporters tend to specialise in high quality niches of differentiated product groups. Import penetration does not seem to affect wages in those industries negatively and the opposite may even be the case. These are just isolated examples of how vertical intra-industry trade may affect wages. So far it has been difficult to carry out a thorough empirical analysis of the issue due to the lack of a robust theoretical framework and adequate data. This is probably why the existing empirical literature on the relationship between trade and skill inequality is based on the traditional trade theories on inter-industry trade as the next section shows.

C. EMPIRICAL EVIDENCE OF THE EFFECT OF TRADE ON THE DEMAND FOR LOW SKILLED LABOUR

The early nineties saw a surge of empirical literature trying to explain the deterioration of low skilled labour's situation in industrialised economies.¹⁵ Most of the research focused on the US economy, for which the rise in wage inequality over the eighties was well documented. Other studies looked at OECD countries as a whole or singled out European countries. Though the techniques used in the different studies varies widely, they all focus on the link between relative demand and supply of low skilled labour on the one hand and unemployment and/or wage inequalities on the other hand. Technological change and trade are considered to be potential reasons for this decline in relative demand. The relative supply of low skilled labour, if taken into account, has been affected negatively by changes in educational attainment and positively by the inflow of low skilled labour through migration.¹⁶ The definition used for "skills" also differs depending on the study and is typically determined by the data set employed. It is either based on the type of tasks carried out by the worker (non-production versus production workers or white collar versus blue collar workers) or on his educational achievement (for instance college versus high school or less, or tertiary versus lower secondary education).

One of the approaches used to separate the effects of trade on employment from the one of technological change, is to decompose the rising employment (or wage bill) shares of high skilled workers into between-sector changes and within-sector changes.¹⁷ The studies using this approach argue that between-sector changes are associated with trade, whereas within sector changes can be related to technological change. The connection between trade and between-sector changes in the relative demand for low skilled labour can clearly be traced back to more traditional trade theories presented in Section A. The studies using this

approach tend to find a small or very small effect of trade on the changes in the relative demand for low skilled labour and emphasise instead the role of technological change.

Feenstra (1998) however casts doubt on the assumption that within-sector changes should only be associated with technological change. He argues that increased possibilities to trade have made it easier for companies to move certain stages of their production process overseas and he shows evidence of a significant increase in outsourcing in OECD countries in the eighties and nineties.¹⁸ Companies in industrialised countries will outsource those activities that use a large amount of unskilled labour, such as assembly of components and other repetitive tasks. Moving these activities abroad would thus reduce the relative demand for low skilled labour at home within each industry. This means that outsourcing has a qualitatively similar effect on reducing the demand for unskilled relative to skilled labour within an industry as does skill-biased technological change. Feenstra goes further by suggesting that trade, through outsourcing, may induce technological change. This would for instance be the case if successful outsourcing requires new inventory methods and rapid and sophisticated communication techniques. Overall Feenstra's arguments thus put more emphasis on the role of trade in the reduction of the relative demand for low skilled labour in industrialised countries.

Another approach to measure the effect of trade on the demand for low skilled labour focuses on the so-called factor content of imports from developing countries. Studies using this approach calculate how much skilled and low skilled labour would have been required to produce domestically goods that are imported from developing countries. Given that, as pointed out above, the ratio of trade with developing countries to GDP is rather small, it is not surprising that studies based on this approach tend to find a small effect of trade on the relative demand for low skilled labour (e.g. Sachs and Schatz (1994), Sapir and Schumacher (1995)). In calculating the amount of labour replaced by imports, one however needs to make assumptions concerning the labour requirements to produce those imports. Typically, factor content studies assume those factor requirements to be the ones of the importing industrialised country for the relevant goods. This assumption has been criticised (Wood (1994)), for the reason that many of the goods imported from developing countries are no longer produced in industrialised countries. The factor requirements to be used should then be those of the developing country and if this method is used the effect of trade on relative demand for low skilled labour turns out to be much higher.

Finally, it has been pointed out by other studies, that the crucial relationship in traditional trade theory is the one between relative product prices and relative factor prices (and not the one between volumes/values of goods traded and quantities of production factors used). A decline in the relative price of low skilled labour intensive goods would thus be a necessary condition for trade to have had any impact on wage inequality. The evidence on the changes in product prices is however not conclusive and depends among other things on the product groups included in the analysis.¹⁹ Lawrence and Slaughter (1993) and Neven and Wyplosz (1996) for instance find no strong evidence of falling relative prices of unskilled-labour-intensive commodities, while OECD (1997) and Sachs and Schatz (1995) find that prices fell significantly in import-competing sectors.²⁰

The estimated impact of trade on the rise in skill differentials differs widely across the various studies. At the one extreme the studies of Berman, Bound and Griliches (1994) and Lawrence and Slaughter (1993) attribute a small or no role to trade, but an overwhelming

role to technological change. On the other extreme Wood (1994) attributes 70 per cent of the causation to trade. The bulk of the empirical literature however provides estimates of a 10 to 20 per cent impact of trade on the rise in skill differentials over the eighties. This can be considered to be a relatively small impact, but it is a significant one. The role attributed to technological change is more important. But it should be considered that the empirical studies cited so far treat trade and technological change as two independent phenomena. Besides, they do not give any evidence for the causes of technological change. Yet it cannot be excluded that trade and technological change are interrelated.

Greenaway, Hine and Wright (1999) do indeed assume that an interaction between trade and technological change exists. They use a dynamic labour demand equation in order to estimate the impact of trade on UK industry level employment. Labour demand is assumed to depend on a technology indicator, which in turn is assumed to depend on the volume of trade. The authors justify this assumption by arguing that exposure to foreign competition induces companies to reduce x-inefficiencies in production. Their findings seem to support this assumption, as increased trade volumes, both in terms of imports and exports, cause reductions in the level of derived labour demand. This is consistent with the view that increased openness serves to increase the efficiency with which labour is utilised in the firm. Results suggest that the disciplining effects of trade with East Asia and Japan is less marked than that associated with imports from the EU and US. This reinforces the idea that trade affects x-inefficiency, with the strongest competition for UK producers coming from the EU and US rather than East Asia.

Acemoglu (1999) and Duranton (1999), described in Section B, present alternative channels through which trade may affect technological change. Both assume that trade affects the decision to invest in advanced technologies and thus induces technological change. This type of interaction between trade and technological change has to my knowledge so far not been taken into account in empirical research. If it was the impact of trade on skill differentials may as yet turn out to be more significant than existing empirical studies indicate.

IV. TRADE AND THE INCREASED SUBSTITUTABILITY OF WORKERS ACROSS BORDERS

The previous section focused on the question whether trade has affected skill inequalities through an effect on the relative demand for low skilled labour. In particular it examined whether trade has reduced the relative demand for low skilled labour as such a reduction could explain the observed increases in wage inequality between high skilled and low skilled labour. Rodrik (1997) points out that the existing research in this field has widely ignored a second effect trade may have on the demand curve for labour and that this effect may prove to be of more importance than the mentioned shift in the demand curve. He argues that trade, by increasing the elasticity of demand for goods, will also increase the elasticity of the demand for labour, as the latter is a derived demand which varies proportionately with the elasticity of demand for goods. This reflects the fact that employers and the final consumers can substitute foreign workers for domestic workers more easily. As a result the demand for domestic labour would become more sensitive to changes in its price. Empirical evidence of an increase in the elasticity of demand for (low

skilled) labour is still scarce²¹, but Rodrik (1997) points out that it could affect the position of low skilled workers through different channels.

An increase in labour standards or in labour benefits increases the wedge between the wage paid by employers and the one received by workers by an amount corresponding to the cost of the increased labour standards/benefits.²² Employer and worker will share these costs. The first will have to pay higher wages, but the second will receive lower wages compared to the previous situation. How these costs are shared depends on the price elasticity of the supply and demand curve for labour. An increase in the elasticity of demand for labour will raise the share of the costs that will have to be borne by workers. Rodrik (1997) thus argues that trade does not need to lead to a "race to the bottom" in benefits and/or standards. What happens instead is that it becomes more difficult for workers to make employers share in the cost of these benefits/standards.

As a second channel, Rodrik points out that a more elastic labour demand curve results in greater instability in labour market outcomes. The flatter the demand curve the bigger the impact of shifts in that curve on equilibrium employment and wages. A changed elasticity in the demand for labour could therefore explain the observed increase in volatility in the US labour-market conditions. Skill inequalities could then increase, if it is the case that low skilled workers go through longer spells of unemployment and/or have to accept bigger wage losses after displacement.

Table 3: Union Membership as a percentage of wage and salary earners

Country	1985	1995
Switzerland ¹	28.8	22.5
Austria	51.0	41.2
Belgium	52.0	51.9
Denmark ¹	78.3	80.1
Finland	68.3	79.3
France	14.5	9.1
Germany ³	35.0	28.9
Italy ¹	47.6	44.1
Luxembourg ³	53.0	43.4
Norway	55.7	57.7
Sweden ¹	83.8	91.1
United Kingdom	45.5	32.9

Note: ¹ Data for 1994 instead of 1995 ² Data for 1993 instead of 1995 ³ Data for 1991 instead of 1985.

Source: ILO (1999)

A third argument relates to the bargaining power of workers. The trade models presented in Section III assume that wages are determined in a perfectly competitive setting and are thus in equilibrium equal to the worker's marginal product. Imperfect markets, for instance due to information asymmetries or matching frictions in the labour market, would instead lead to the presence of labour rents, which are divided between firms and workers. Wages are then determined in a bargaining process and the higher the bargaining power of workers the higher the wages they obtain. If domestic workers can be more easily replaced by foreign

workers due to increased trade, the bargaining power of workers declines. This erosion of bargaining power may explain the loss of union membership in the US and in many European countries in the recent past (see Table 3).²³ In order for this to have an impact on wage inequality it would need to be the case that labour rents (and thus bargaining/unionisation) play a more important role for low skilled employment, an assertion that still needs to be proved but cannot be excluded. The erosion of workers' bargaining power could also have an effect on a country's formation of skills, as it affects workers' and companies' incentives to invest in training. This is an issue that will be treated in more detail in the next section.

There are two important differences between the shift in the demand for low skilled labour and a change in the elasticity of demand. The first difference is that a shift in demand will mainly take place in the case of inter-industry trade, i.e. when countries with very different labour endowments trade. The price elasticity of demand may instead also change when similar countries trade, as a low wage worker in one European country competes with a low skilled worker in another European country. The second difference is that for the demand to shift, trade actually has to take place, whereas the price elasticity can be affected by the mere possibility of trade. Different empirical approaches than the ones presented in Section III would therefore be needed in order to test the impact of trade on wage inequality through the second mechanism.

V. TRADE AND INVESTMENT IN SKILLS

One way out of the dilemma of increasing skill inequalities seems to be to ensure that a larger share of workers becomes high skilled, or, to be more precise, obtains those skills that are demanded by the market.²⁴ A larger share of the working population would thus be able to take advantage of the high supply of well-paid, high skilled jobs. On the other hand, low skilled workers would become scarcer in the labour market, which would probably drive up their wages. The challenge for governments would thus be to create the appropriate incentives for individuals (and for firms) to invest in adequate education and or training.

Formal education, be it of the primary, secondary or tertiary level, is in the European Union still mainly in the hands of the public sector. But when it comes to on-the-job training, the level and type of investment in skill acquisition is decided on the firm level. Depending on the type of training considered workers and firms have different incentives to invest in training. A closer look at these incentives shows that trade may actually influence these incentives. Trade would thus have an impact on a country's possibilities to change the skill composition of its labour force.

The last section referred to situations where market imperfections lead to wages being determined in a bargaining process between workers and employers. The literature around investment in general training has shown that in these situations the bargaining power of each of the parties determines the amount of investment in training (Acemoglu and Pischke (1999)).²⁵ Training will increase the productivity of a worker and thus the surplus that worker and employer will divide when they bargain. It will not only increase the surplus of the current worker-employer combination, but also the surplus generated when the trained worker works with other employers after having left his current employer. This will lead to

inefficiencies when it comes to the training decision, as the following simple example shows. Assume a two period world, in which the decision to train is taken in the first period. Training will increase the worker's productivity in the second period. Assume that with probability p the worker leaves his current job and works for a different employer in period two. Assume also that the worker's bargaining power is such that he can appropriate the share b of the surplus generated with any employer. The expected surplus generated in period two ($SURPLUS_{TOTAL}$) would then be allocated respectively to the worker, his current employer and a potential new employer in the following way:

$$\begin{aligned} SURPLUS_{TOTAL} &= SURPLUS_{WORKER} + SURPLUS_{CURRENTEMPLOYER} + SURPLUS_{NEWEMPLOYER} \\ &= b \cdot SURPLUS_{TOTAL} + (1-b) \cdot (1-p) \cdot SURPLUS_{TOTAL} + (1-b) \cdot p \cdot SURPLUS_{TOTAL} \end{aligned}$$

When the decision to invest in training is taken, the worker will take into account that his remuneration will increase in accordance with the increase in surplus he generates ($b \cdot SURPLUS_{TOTAL}$). The current employer will be willing to participate in the cost of training, as his expected return ($(1-b) \cdot (1-p) \cdot SURPLUS_{TOTAL}$) will also increase as a result of it. Future employers are not involved in the decision to train. The increase in their expected return ($(1-b) \cdot p \cdot SURPLUS_{TOTAL}$) will thus not be taken into account when the amount of training is determined. Economies are therefore expected to invest less in general training than would be optimal from a social planner's point of view, as the social planner would not ignore the increased surplus a worker generates with other employers.

Section IV pointed out that there are reasons to believe that increased globalisation lowers the bargaining power of workers. Thus, this would lower the share b of the surplus workers are able to appropriate and increase the share employers obtain. When looking at the above equation it becomes clear that this would have an impact on the incentives to invest in general training in the economy. Workers would have less incentive to invest in training and employers more. But it would also imply an increase on the part of the benefits of training that nobody wants to pay for, i.e. the benefits accruing to future employers. This is the case, because the last term on the right hand side of the equation would increase with a decrease in the bargaining power of workers. Overall, a loss in workers' bargaining power would thus lead to less investment in general training. The same would happen with an increase in p , the probability that a worker leaves his current employer. This would correspond to an increase in workers' turnover and thus shorter average working periods with one employer. Section IV points out that trade could lead to increased instability in the demand for labour and thus potentially higher turnover. Also policy measures aiming at "increasing the flexibility of labour markets", like the reduction of firing costs, could reduce an economy's average level of tenure. In both cases the average period a worker stays with one employer decreases and so does the employer's incentive to invest in the worker's training (Jansen (1998)).

In some European countries a well established "apprenticeship system" guarantees that an important amount of vocational training takes place within firms. This is in particular the case for Austria, Germany and Switzerland. It has often been argued that it is thanks to this apprenticeship system that the countries under consideration can count on a relatively high skilled labour force with a high productivity²⁶. As Culpepper (1999) points out, the success of the apprenticeship system in for instance Germany, depends crucially on certain institutional features of the German political economy, like its system of industrial

relations. The latter has been characterised by the existence of powerful industrial unions and strong employers' organisations. Both are engaged in the wage bargaining process, but they also play a crucial role in the apprenticeship system. In particular the employers' organisations are engaged in monitoring the provision of training on firm level and they can even make use of mechanisms to enforce companies to provide training. In terms of the above equation this would mean that the German system made it possible to enforce a level of training that is close to the socially optimal one. This is the level of training that would result if the surplus of all employers, i.e. including "future employers", was taken into account when the decision to invest in training is made. In this way, Germany thus seemed to be able to overcome the inefficiency problem pointed out above: firms were organised in employers' organisations and co-operated in order to guarantee the amount of investment that would be optimal for all. The authority of the employers' organisations guaranteed that nobody deviated from this "high investment equilibrium", which would have led to the sub-optimal situation described above.

Recent years have seen the surge of a new type of employers' organisations, the so-called non-wage bound organisations. These associations, that have a rising membership, do not require their members to adhere to the negotiated wage deals signed by the association. Culpepper (1999) argues that these associations are a reaction to increased sensitivity, above all among small firms, to marginal increases in wages. A potential reason for this increased sensitivity is the increased exposure to foreign competition. The fear exists that the surge of new and different types of employer organisations weakens their position when it comes to monitoring their members' attitude towards training. International competition would thus negatively affect the possibility of employers' organisations to enforce a high level of investment in training. This would imply that the economy falls back to the suboptimal situation, in which the positive effect on future employers of today's investment in training is not taken into account. Less training and a lower share of high skilled labour in the working force would be the result.

VI. SUMMARY AND PERSPECTIVES

With strong increases in skill inequalities over the eighties and part of the nineties and continuing integration of economies around the world, interest arose in the link between the two phenomena. This paper presents some of the traditional arguments used in this context. These tend to emphasise the potentially negative effect of trade with developing countries on low skilled workers in industrialised countries. It is also shown in this paper that European Union trade with developing countries is relatively small and that existing empirical studies based on traditional arguments tend to find that only a rather small share of the observed increases in inequality can be explained by trade.

Yet it may be too early to conclude that trade has no or only a small effect on the labour market conditions of skilled and low skilled workers. Alternative channels exist through which trade can affect skill inequalities. They have only recently received attention in the theoretical literature and to a lesser extent in empirical work. One of these channels is that which emphasises outsourcing of production activities. Trade makes it possible for companies to move stages of their production process overseas. Activities requiring above all skilled labour will remain in the industrialised country, whereas those that require more

low skilled labour move abroad. Empirical analyses of this issue exist and have been presented in this paper, but further research could lead to interesting, new insights.

Other issues raised in recent research and presented in this paper include:

- the relationship between (horizontal and vertical) intra-industry trade and the demand for (low) skilled labour.
- the interaction between trade and technological change
- the effects of trade on the price elasticity of the demand for labour

All three channels allow for a possibly more important role for trade in labour market outcomes than traditional trade arguments do. In particular, they do not only focus on trade between "rich" and "poor" countries, but allow for the possibility of trade among industrialised countries affecting negatively the demand for low skilled labour. This possibility deserves to be taken seriously, given that industrialised countries trade above all with each other. One may however already now raise the question as to what would happen if trade among industrialised countries turns out to be a main culprit of skill inequalities. Industrialised countries' resistance of trade liberalisation with developing countries may be weakened, which could be considered to be a positive effect. But would it lead to opposition in the European Union against trade with countries like the US and Japan? And what would it imply for our opinion about the merits of free trade within the European Union?

Last, but not least, this paper raises the issue of skill creation. In particular it looks at how trade may affect company's decisions to invest in training. But other questions arise in this context. If the main driving force between changes in the labour market is technological change, be it or not facilitated by trade, does this imply that skill requirements change at the same rate as technologies? If yes, how can policy makers ensure that national education systems generate at any point in time the right set of skills for the market? Should a larger part of the education system be private in order to be more flexible? But who will pay for private education, if globalisation at the same time lowers companies' incentives to invest in training.

A large amount of literature on the links between trade and the position of (low) skilled labour exists, but a lot of open questions remain. Answering these questions would be a first step towards the development of mechanisms able to direct a larger share of the gains from trade in the industrialised world to low skilled workers.

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¹ Cline (1997) refers to evidence of a 5 percent fall in the real wage of the (lowest) 10th percentile of the wage distribution over the period from 1963 to 1989. Real hourly wages of high school dropouts fell by more than 20 percent between 1973 and 1993, with a nearly 7 percent fall between 1989 and 1993 only.

² See OECD (1997). Persons that achieve lower secondary education or less typically leave school around the age of fifteen or earlier.

³ Other factors that affect wage and/or employment inequalities are migration, technological change and changes in the skill distribution of the labour force. This paper only focuses on the impact of trade on inequality, but will discuss situations where trade interacts with any of the other mentioned factors and through this interaction affects inequality.

⁴ Whenever it is not important for the arguments used in this chapter to distinguish between the two variables, the term "skill inequalities" will be used.

⁵ This value would increase to 5 percent if CEEC(5) were included (compare with Table 1 and Chart 1).

⁶ The size of the Grubel-Lloyd indicator will be affected by the level of aggregation of the data used in its computation. In general, the values found are higher the more aggregated the data used. However, the level of aggregation should not significantly affect cross-country comparisons or the indicator's evolution over time.

⁷ The quality consumers perceive does not necessarily correspond to its real quality. For many products consumers cannot immediately see the quality of the product they buy. In these cases they often rely on reputations and/or brand names. A Mercedes has for instance the reputation to be a "good" car. A buyer therefore is willing to pay a high price for it, even if he cannot possibly be sure that the particular car he is buying doesn't have a major construction error. In most of these cases however the ranking of prices consumers pay will still correspond to the ranking of the qualities of the underlying products, as has been shown in Shapiro (1983).

⁸ They would also decline in absolute terms, as they would decline in terms of the prices of both goods.

⁹ See Krugman (1990) for an overview on the trade literature related to horizontal intra-industry trade.

¹⁰ See Section II.

¹¹ In some models the "consumers" of the differentiated good are actually producers themselves: they use the differentiated good as an intermediate input in the production of a homogeneous final good.

¹² This corresponds to the evidence presented in Bernard and Jensen (1999) that exporting companies are characterised by a higher productivity and a higher percentage of skilled workers. Their analysis shows that "good firms become exporters", but that exporting does not necessarily improve a firm's performance.

¹³ It is assumed that the distribution of talents is such that both countries have the same average level of talent, but that they differ in the variance of the distribution. Grossman (1999) gives the example of Japan as a country with a rather homogeneous labour force and the US as a country with a relatively heterogeneous labour force.

¹⁴ The reason for this is that with a higher spread of talents, it is less interesting for relatively talented individuals to work in the car industry as the risk of being matched with people of a low talent is now higher.

¹⁵ See Cline (1997) for a comprehensive overview and evaluation of this empirical literature.

¹⁶ See for instance Borjas, George J., Richard B. Freeman, and Lawrence F. Katz (1992).

¹⁷ See for instance Berman, Bound and Griliches (1994), Katz and Murphy (1992) and Machin, Ryan and Van Reenan (1996).

¹⁸ Trade had been facilitated through reductions in transport and communication costs and through reductions in barriers to trade.

¹⁹ The role of computers turns out to be important, as their prices have declined drastically above all in the United States (see Cline (1997)).

²⁰ As cited in OECD (1997): Sachs, J.D. and Shatz, H.J. (1995): "International Trade and Wage Inequality in the United States: Some New Results". Unpublished manuscript prepared for the Brookings Institution Conference on Imports, Exports and the American Worker. Washington, 2-3 February.

²¹ Greenaway, Hine and Wright (1999) present a test of Rodrik's proposition and find only weak support for it.

²² It is assumed here that the labour standard does not at the same time increase the workers' productivity.

²³ With the notorious exception of the four Nordic countries Denmark, Sweden, Norway and Finland, where union membership increased. Another measure of the extent to which unions influence the aggregate wage distribution is coverage, defined to be the share of the work force covered by a collective agreement. In many European countries union coverage is significantly higher than union density (i.e. union membership as a percentage of wage and salary earners). Besides coverage has remained stable since 1980, even in countries where union density has declined (Wallerstein (1999)).

²⁴ This approach is for instance advocated by the OECD (1997).

²⁵ The term "general training" goes back to Becker (1964), who distinguished between specific and general skills. Specific skills are only useful to one (the current) employer, whereas general skills are also useful to other employers. Learning a programming language developed and only used by your current employer would thus require an investment in specific training. Learning how to use Excel or Word for Windows instead refers to general training.

²⁶ Other countries have therefore considered to design mechanisms that increase firm level investment in vocational training (Soskice (1993), Broeder (1995)).