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The differential impact of the South on wage inequality in the North

Arjan M. Lejour and Paul J.G. Tang

CPB Netherlands Bureau for Economic Policy Analysis, The Hague, June 2000

CPB Netherlands Bureau for Economic Policy Analysis
Van Stolkweg 14
P.O. Box 80510
2508 GM The Hague, The Netherlands

Telephone +31 70 33 83 380
Telefax +31 70 33 83 350

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1 Introduction[1]

Increasing income inequality in the United States and high unemployment among low-skilled workers in continental Europe have stirred up concerns about the process of globalisation. The fear is that low-skilled workers suffer from intensified linkages between developed and developing countries. The ongoing process of globalisation might deteriorate the position of low-skilled workers even further.

This paper shows, first, that the effects of globalisation on the United States, Japan and Western Europe are different in magnitude. This suggests that the one-sided concentration on the United States is misleading. Low-skilled workers in Japan and Western Europe has more to fear from trade liberalisation than those in the United States. This outcome largely reflects differences in production and specialization patterns. The United States is more specialized in skill-intensive production, especially production of services. Besides, Japan and Western Europe impose and face higher trade barriers. For these reasons the effects of trade liberalisation are stronger for Japan and Western Europe than they are for the United States.

Second, this paper shows that the effects on wage inequality are not only caused by lower trade barriers. Structural changes in developing countries have at least the same impact on wage inequality in developed countries as trade liberalisation. Consumer demand shifts from low-skilled labour-intensive goods such as agriculture toward high-skilled labour intensive goods such as services. This exerts globally a downward pressure on relative wages of low-skilled workers. Labour reallocation from the low-productivity sectors in developing countries to the high productivity sectors contributes to this pressure as well.

[1] This paper elaborates on work presented at the symposium ‘Globalisation and employment patterns: policies, theory and evidence’, organised by the OECD Development Centre and the Centre for Economic Policy Research. The current paper benefits much from contributions of the participants, especially Stephen Seager and Robert Lawrence, and from comments by André de Jong, George Gelauff and Hans Timmer.

Krugman (1995) has laid down the challenge to "produce a general equilibrium model with plausible factor shares and substitution elasticities" to show that a limited volume of trade can (potentially) have a large effect on relative factor prices. So far applied general equilibrium (AGE) models have not lived up to this challenge. There are at least two reasons why calibrated AGE models may not deliver the large effects that the theoretical Heckscher-Ohlin-Samuelson (HOS) models can suggest. First, in AGE models home and foreign produced goods are not perfect substitutes whereas is HOS models they are. This means that factor price equalisation does not have to hold and that relative input prices may differ significantly between regions even if they use similar technologies. Second, and more importantly, actual sectoral classifications are not primarily based on input intensities. Feenstra and Hanson (1995) argue that substantially different input intensities are essential for producing substantial effects of globalisation and that within a sector input intensities differ significantly. In other words, the actual classifications are nearly always inappropriate.

This paper presents simulations with WorldScan, a global general equilibrium model, to explore the potential future impact of globalisation on relative wages in the North. The simulations add some new insights to the discussion about trade and wages. The model allows to differentiate between several sources behind falling relative wages of low-skilled workers. When discussing wage inequality and future changes therein, one cannot ignore the characteristics of the growth process in developing countries. The results also show that the United States is less vulnerable to falling trade barriers and changes in developing countries than Japan and Western Europe are. The effects of globalisation are however not very large.

We present two types of simulations. In the first type that part of manufacturing disappears that intensively employs low-skilled workers. This part typically produces consumer goods like clothes and furniture. Production of these goods can easily move from the North to the South. This first type of simulations closely resembles Lawrence's experiments and helps to establish the maximum effect of trade on wages. Lawrence (1996) has tried to gauge the upper limit of the future impact of trade on wages, by assuming that in the future trade might induce the United States to completely specialize in skill-intensive industries. Our experiment shows that these maximum effects are much larger for Japan and Western Europe than for the United States. However, in all

cases the impact of trade between poor and rich countries on relative wages is modest, if substitution possibilities between low-skilled and high-skilled workers are ample. Also in next decades relative wages in developed economies will not be set in Beijing, even if developing countries grow fast or start to grow fast.

In the second type of simulations the forces of globalisation are given more careful consideration. Inequality rises for several reasons: falling trade barriers, and in developing countries shifting demand patterns and changing (relative) employment of low-skilled and high-skilled workers.

The simulations with the model are embedded in a globalisation scenario. It assumes high growth in many developing countries and almost complete trade liberalisation, so that during the scenario period, 1995-2020, the linkages between North and South intensify and the impact of emerging economies on the OECD countries is allowed to be potentially significant. The so-called Globalisation scenario extrapolates and probably exaggerates current globalisation tendencies. In this setting this second type of simulations also lean towards Lawrence-like experiments.

The remainder of this paper is organised as follows. First, in section 2, the Globalisation scenario will be discussed briefly. Then section 3 goes into the properties of the model. The simulations of the first type are presented in section 4, and the simulations of the second type in section 5. The conclusions are reiterated in section 6.

2 The Globalisation scenario: main characteristics and trends

The simulations in sections 4 and 5 are variations on a so-called Globalisation scenario. They are not necessarily independent of the characteristics of this scenario. Therefore we discuss the main characteristics briefly.[2]

The Globalisation scenario is optimistic about future economic progress in both developed and developing regions. In this scenario many poor countries catch up, though not completely, with rich countries. Non-OECD countries grow at a per capita rate of 5%, see Table 2.1. Only few countries have been able to maintain such a growth rate for two decennia or more. However, this is not the only reason for the sometimes drastic changes that the scenario projects.

Table 2.1 Average growth rates between 1995 and 2020

region	OECD	non OECD	global
total	2.6	6.4	3.7
per capita	2.2	4.9	2.4

The scenario emphasizes globalisation tendencies. International specialisation becomes more and more pronounced during the scenario period in response to liberalisation of goods markets and lower transport costs. Besides, especially in developing countries factor endowments are projected to change significantly. The Globalisation scenario also emphasizes market-oriented policies in the world economy. Countries that do not create favourable conditions for market-based development, are likely to fail. For example, developing economies must open up to allow foreign goods and foreign investment to enter. In the scenario, trade liberalisation is not confined to trade blocs, but applies globally. The OECD countries open up their markets further. Whereas barriers to trade in manufacturing goods are already low, agriculture is still heavily protected.

[2] CPB (1999) provides more details of the Globalisation scenario.

The Globalisation scenario is akin to the High Growth scenario, which CPB and OECD have constructed for their collaborative study on globalisation and the consequences for the OECD countries (OECD, 1997). The idea behind both scenarios is that fast development outside the OECD area and liberalisation of capital and goods markets produce closer economic integration of rich and poor countries. More generally, the scenario extrapolates and probably exaggerates the current globalization tendencies.

Even though the Globalisation scenario is perhaps not the most plausible one, we take it as point of departure. The reason is that it stresses that linkages between developed and developing regions can become stronger and spillovers between these regions can become larger. The simulations therefore demonstrate whether the future effect of trade on wages can be large, even though it has been small up to now. In this setting we try to derive the upper limit of this effect.

Table 2.2 Characteristics of Globalisation scenario

Economy	*high economic growth rates*
Politics	*market-oriented policies* *trade liberalization*
Technology	*rapid technical change* *catching-up of developing regions*
Labour	*more education* *reallocation from informal, low-productivity sectors*
Consumer preferences	*convergence of consumer patterns*

3 WorldScan: a global applied general equilibrium model

WorldScan has been developed to construct scenarios. To avoid extrapolation of current trends or reproduction of the current situation, WorldScan relies on the neoclassical *theories of growth and international trade*. Changes in economic growth and international specialisation patterns evolve from changes in (relative) endowments. The emphasis on the long run also manifests itself in the broad definition of sectors. WorldScan distinguishes seven sectors. This is a relatively small number compared to other AGE models. Over a long period of two decades or more the character of products and branches of industry change drastically. Current statistical definitions of products and branches of industry are likely to become irrelevant at the end of scenario period. For this reason, WorldScan uses broad aggregates (see also Box 1).

Different sectors within a region have different factor requirements. This is an important property of the model or, better, of the data that are used to calibrate WorldScan. However, the requirements are more or less similar across regions. This means that if a sector is relatively capital intensive in one region, it is also likely to be relatively capital intensive in other regions. Sectoral restructuring can readily be linked to changes in relative endowments and changes in (region-specific) demand patterns.

The standard neoclassical *theory of growth* distinguishes three factors to explain changes in production: physical capital, labour, and technology. A major problem is that technology is unobservable, let alone, that changes in technology can be explained or predicted easily. A model should not rely too heavily on technical progress when projecting the future state of affairs. WorldScan augments the simple growth model in three ways. First, WorldScan allows overall technology to differ across countries. Second, the model distinguishes two types of labour: high-skilled and low-skilled labour. Countries can raise per capita growth by schooling and training the labour force. Third, many workers in developing countries are engaged in low-productivity, informal activities, working on the land or providing simple services in cities. They do not have access to new capital and productive technologies. In contrast, capital accumulation and technical progress augment labour productivity in the modern sectors. As a result the wages in the traditional sectors fall behind the wages in the modern sectors. This induces

a flow from the low-productivity sector to the high-productivity sectors.[3] This approach in which economic development is fuelled by sectoral reallocation, stems from Lewis (1958). In principle, all these three factors affect the performance of a region only temporarily. Catching-up, training of low-skilled workers and reallocating labour to high-productivity sectors do not raise the growth rate indefinitely. Nevertheless, they are important in the Globalisation scenario. Adjustments in the economies of developing regions take a great deal of time and will surely show up in the growth rates of these regions in the period under consideration.

[3] Lewis assumes an *infinitely elastic supply of labour*: Workers flow out of the traditional sector into the modern sector at the going wage rate. However, in WorldScan the response to the relative wage difference between the two sectors is finite, and set equal to 2. See for a more details Lejour and Tang (1999).

Box 1 WORLDSCAN, A GLOBAL GENERAL EQUILIBRIUM MODEL

At the heart of WorldScan are the neoclassical theories of economic growth and international trade. The core of the model is extended to add realism to scenarios. In doing so, we aim at bridging the gap between academic and policy discussions. The extensions include:

- convergence of productivity levels conditional on factors like investment in physical and human capital;
- an Armington trade specification, explaining two-way trade and allowing market power to determine trade patterns in the medium run, while allowing Heckscher-Ohlin mechanisms in the long run;
- consumption patterns depending upon per capita income, and developing towards a universal pattern;
- a Lewis-type low-productivity sector in developing regions, from which the high-productivity economy can draw labour, enabling high growth for a long period.

The model distinguishes the following regions, sectors and productive factors (see appendix B for a detailed, regional and sectoral classification):

Regions	*Sectors*	*Productive factors*
United States	Agriculture	*Primary inputs*
Western Europe	Raw Materials	Low-skilled labour
Japan	Energy-intensive Goods	High-skilled labour
Pacific OECD	Consumer goods	Capital
Eastern Europe	Capital goods	(fixed factor)
Former Soviet Union	Trade and Transport	
Middle East and North Africa	Services	*Intermediate inputs*
Sub-Saharan Africa		all sectors
Latin America		
China		
South-East Asia		
South Asia and Rest		

Education and reallocation of workers not only explain the growth performance of developing countries, but also affect production and specialisation patterns in line with standard *theory of international trade*. Workers in the informal, low-productivity sector are predominantly low-skilled. When more workers find employment in the high-productivity sectors, the (relative) wage of low-skilled workers falls and those sectors expand that intensively employ low-skilled workers. Obviously, education has an opposite effect. Either effect can dominate. In some developing countries wages of low-skilled workers lag behind the wage of high-skilled workers and in other regions the skill premium decreases.

To understand changes in relative wages in response to sectoral changes Table 3.1 gives for several important sectors the skill intensity (the ratio of high-skilled to low-skilled employment). These intensities are scaled by the ratio for services. The latter sector is the most skill-intensive sector, so that the percentages in Table 3.1 are typically smaller than 100.

Table 3.1 Sectoral ratios of high-skilled to low-skilled employment in 1995
relative to the ratio in the sector services (%)

	Agriculture	Consumer Goods	Energy-intensive Goods	Capital goods
Japan	22.6	71.7	96.8	96.0
United States	24.5	50.5	80.0	101.0
Western Europe	27.0	57.7	79.0	80.5

Source: WorldScan, based on McDougall et al. (1998)

Agriculture employs relatively few high-skilled workers, whereas Capital goods and Services (including the government) absorb many high-skilled workers. The consequence is that when demand shifts away from Agriculture and towards Services, relative demand for low-skilled worker falls. The table makes clear that the differences between manufacturing and services and within manufacturing are not as large as the

difference between agriculture and the other sectors. The results in next section will reflect this characteristic of the data.

The differences among the three principal OECD regions would not have been large, if it were not for the high skill-intensity of Japanese production of Energy-intensive Goods. Note that the sectoral differences within manufacturing are largest in the United States and are smallest in Japan.

data

WorldScan has been calibrated on the GTAP data base, version 4 (McDougall et al., 1998). From this data set we not only derive the demand, production and trade patterns, but also the labour and capital intensity of the different sectors for 1995. Besides, this version of the database distinguishes wage payments to low-skilled and high-skilled workers. We combine the sectoral data from GTAP with macroeconomic data from Barro and Lee (1993). Whereas GTAP uses occupational classifications to distinguish between low-skilled and high-skilled workers, Barro and Lee allow us to distinguish these two types on basis of educational classifications. Workers are labelled high-skilled when they have completed secondary education or better. Clearly, the two sources give incompatible definitions of low-skilled and high-skilled workers. We use the Barro-Lee data at an aggregate level to characterise differences in education between regions and use the GTAP data at a sectoral level to characterise differences in production technology between sectors.

Ahuja and Filmer(1995) have revised the data of Barro and Lee and also provide projections for labour supply in many developing countries. We lack projections for the OECD, Eastern Europe and the Former Soviet Union. From the high enrolment rates since the sixties we have drawn the conclusion that the growth in the human capital

stock in these regions is negligible (see Table A.3 in Appendix A). The data on the size of the informal sector are obtained from the World Bank (1995) and the ILO (1998).[4]

substitution elasticities

The results of the model depend on substitution possibilities in production and consumption. Production technology is described by a nested CES function. The upper level distinguishes between value added and intermediate goods. The substitution elasticity between these two broad categories is 0.4. At the lower level value added is described by Cobb-Douglas function of the primary productive factors -- capital, low-skilled labour and high-skilled labour -- whereas intermediate goods are combined according to a CES function with again a substitution elasticity of 0.8. The utility function, from which demand for different consumption categories is derived, has been given a Cobb-Douglas specification. The substitution elasticity between any pair of consumption categories is therefore unity.

Traded, foreign goods are not perfect substitutes for domestic goods, and this also affects the outcome of simulations. The substitution between goods from different origins is not perfect. WorldScan employs an Armington-type assumption. However, the price elasticities of demand considerably increase over time, and depend on the market share. When the market share is virtually nil, the elasticity is highest and equal to the substitution elasticity between goods of different origin, and when the market share is unity, the elasticity equals the price elasticity of *total* demand (one). The model employs different assumptions for raw materials, agriculture, manufacturing and services. The long-run substitution elasticities in the benchmark case are 9, 9, 7 and 5 respectively.

[4] See also Lejour and Tang (1999).

4 Complete specialisation in North and South

A common fear is that globalisation undermines the position of low-skilled workers in the North. Jobs that are predominantly occupied by the low-skilled, disappear in the North to reappear in the South. In other words, the fear is that globalisation may bring about a partitioning in society between those who easily find work easily and can live comfortably and those who are likely to be unemployed and hardly have the means to survive (socially). Many economists downplay this fear since the empirical evidence does not seem to indicate that the reallocation of production and employment between North and South has contributed a great deal to rising wage inequality in the United States and the United Kingdom. This does not always offer consolation though. It is not that economists are not believed or understood, but more that the fear for partitioning pertains more to the future and less to the past. The feeling is that the process of globalization has hardly begun and that its consequences will be felt more and more strongly in the near and distant future.

This and the next section address the fear for globalisation and its consequences in the future by conducting Lawrence-like experiments. In this section the idea is pursued that that part of Northern manufacturing may disappear in the next 25 years that intensively employs low-skilled workers. More particularly, the mass production of food, clothes, shoes and furniture is assumed to move from the North to the South. This experiment will help us to gauge the upper limit of the (future) effect on wage inequality.

In this section the aim is to analyse *if* developing countries can have a potentially large impact on wage inequality in developed countries. In the next section the aim is broader: that section will present simulations that analyse not only if but also *how* the South may affect wage inequality in the North. The conclusion is that, aside trade liberalisation, demand changes in developing regions may deteriorate the position of low-skilled workers in the North.

4.1 The consequences of complete specialisation

Table 4.1 summarizes the assumptions and simulation results. In 2020 the sector 'Consumer Goods' accounts for less than 10 percent of total employment in the group of developed countries. The experiment assumes that this sector completely moves from the North to the South (as a result of a production tax). In the first row of Table 4.1 the employment share becomes nil. Consumer Goods employs relatively many low-skilled workers. (See Table 3.1 in the previous section.) Besides, it is vulnerable for competition from the South. Already the imports from the developing regions are much higher than in any other sector.

The other rows show the consequences for employment in Agriculture and for the skill premium, i.e. the wage of high-skilled as a ratio the wage of low-skilled workers.

Table 4.1 The manufacturing sector Consumer Goods disappears in the North
employment patterns and corresponding skill premiums in 2020

	Japan		United States		Western Europe	
	level[a]	change[b]	level[a]	change[b]	level[a]	change[b]
Consumer goods	5.8	-5.8	4.0	-4.0	8.4	-8.4
% of total employment						
Agriculture	2.7	-2.0	1.4	-0.1	3.1	-1.9
% of total employment						
skill premium	166.0	5.0	161.7	2.3	165.1	5.6
relative wage of high- and low-skilled						

[a] the levels in the base scenario

[b] the difference between the levels in the two scenarios as a result of a disappearing Consumer Goods sector

The last row in Table 4.1 immediately shows that even eliminating that part of manufacturing that employs low-skilled workers most intensively, does not produce 'large numbers'. In the United States the skill premium rises only 2.3 percentage points from 161.7 to 164.0. The impact on the United States is smaller than Lawrence (1996) finds when simulating a scenario in which the United States becomes completely

specialized. In Lawrence's scenario the wage of college workers would increase 7.5% relative to the wage of high-school workers. This corresponds roughly in terms of the current results to an increase of (0.075*160.1=) 12 percentage points.

The other sectors in the North benefit from the forced demise of the sector Consumer Goods. The exception is Agriculture. This is the result of a backward linkage. The food processing industry disappears to South and that part of Agriculture that produces for this industry disappears as well. Lower domestic demand does not find (much) compensation in higher exports from the North to the South. Transport costs exclude this possibility of compensation. Besides, even in the Globalisation scenario the tariffs for Agriculture remain partly in tact.

The resulting decrease of Agriculture does not help the low-skilled workers. Agriculture is a sector that employs relatively many low-skilled workers, even more than Consumer Goods (see Table 3.1). Those workers that have lost their job in Consumer Goods cannot turn to Agriculture to find low-skilled jobs but rather face more competition from workers who used to find employment in Agriculture. The backward linkage between Consumer Goods and Agriculture thus tends to reinforce the downward pressure on the relative wage of low-skilled workers.

The simulation results show that the United States sees inequality rise but less than Japan and Western Europe. In other words, inequality in Japan and Western Europe is more sensitive to trade with developing countries than in the United States. An important reason is that the *sectoral structure* is different. In the United States the share of Consumer Goods in total employment is lower than in either Western Europe or Japan. This reflects to a large degree different demand patterns in United States on the one hand and in Western Europe and Japan on the other hand. The fraction of income that is spend on Consumer Goods is lower in the United States than anywhere else, whereas that on domestic, non-tradeable services, for example, is significantly higher.

In the pure, simple Heckscher-Ohlin-Samuelson theory of trade factor prices are tightly linked to world goods prices, so that changes in consumption patterns or endowments in an incompletely specialised, small economy do not lead to changes in relative factor prices. For example, an increase in expenditure on non-tradeables induces sectoral adjustment, but does not affect relative factor prices. In WorldScan, or for that matter in any applied general-equilibrium model, the determination of factor prices is

more subtle than the simple theory. The law of one price does not hold, so that domestic conditions, most notably consumption patterns and endowments, are also relevant for the determination of factor prices. In this particular case, the (initial) sectoral employment patterns matter. In the United States employment both in agriculture and in manufacturing is lower than it is in Japan and Western Europe. This is a important reason behind the differential impact on these three regions of eliminating part of manufacturing.

An additional reason for the relatively modest impact on the United States is found in the situation of Agriculture. In Japan and Western Europe Agriculture produces mainly for domestic use. If the sector Consumer Goods disappears, and along with this sector the food processing industry, Agriculture in these two regions is significantly reduced. In the United States, however, Agriculture is much more export-oriented and depends much less on domestic production of Consumer Goods. The effect on Agriculture is therefore not as negative as elsewhere and almost negligible.

5 The future impact of trade on wage inequality

Developed and developing economies are currently very dissimilar. The difference is not only being rich or being poor. In many developing countries the share of agriculture in total employment is more than 50%, a large part of the labour force is stuck in informal, low-productive activities and protection by means of import tariffs is high. In the Globalisation scenario this will change significantly: developed and developing countries tend to converge in more than one respect.

The aim of this section is to uncover the link between these changes and wage inequality in developed countries. WorldScan allows us to gauge the separate effects of changing demand patterns, labour reallocation and trade liberalisation. Besides, at the end of this section we present a sensitivity analysis for crucial parameters and variables in the model.

5.1 Trade barriers, demand and endowments

In the Globalisation scenario several tendencies are at work that increase the wage inequality in the rich countries. First, *trade liberalisation* intensifies international specialisation. The OECD countries will specialise more in relatively skill-intensive production, raising demand for high-skilled workers and their relative wage. Second, *demand changes* also affect the position of low-skilled and high-skilled workers. In developing countries demand shifts from agriculture to services. The production of domestic services is skill-intensive, whereas Agriculture and Consumer Goods employ relatively many low-skilled workers. Third, the process of development is partly driven by *sectoral reallocation of labour*: from informal, low-productivity sectors to formal, high-productivity sectors. Many workers in developing countries are engaged in informal, low-productivity activities. These workers are predominantly low-skilled. The reallocation from informal to formal sectors implies that overall the supply of low-skilled workers – in efficiency units – rises. This depresses the low-skilled wage in developing countries and indirectly in the OECD.

The simulations in this section deal with these three tendencies that to tend increase wage inequality in the North and that underlie the Globalisation scenario from section 2. They will be reversed to see what impact they have on wages of low-skilled and high-skilled workers in three regions: Japan, the United States and Western Europe. Before presenting simulation results, these tendencies will be discussed in more detail.

trade liberalisation

The Globalisation scenario assumes global trade liberalisation. For manufacturing goods trade taxes become gradually lower, starting in 2000, and are abolished at the end of the scenario period, 2020. For primary goods protection is also reduced, so that in 2020 tariff and subsidy rates are slashed to half of their initial value. Trade taxes are part of the GTAP data set. Trade liberalisation pertains to ordinary import tariffs and export taxes, and does not include non-tariff barriers.

Table 5.1 shows the trade barriers for Japan, the United States and Western Europe in 1995 when importing agricultural and manufacturing goods and when exporting these goods. They are the sum of import tariffs and export taxes weighted with bilateral trade flows.

Table 5.1 Trade barriers for OECD regions in 1995

	imports from non-OECD	exports to non-OECD
agriculture		
Japan	17.7	-5.6
United States	9.1	31.4
Western Europe	17.3	-8.2
manufacturing		
Japan	5.0	14.9
United States	6.4	10.2
Western Europe	8.5	10.2

Source: WorldScan, based on McDougall et al. (1998)

Table 5.1 shows that Japan and Western Europe protect agriculture very heavily, partly at the expense of the United States. For manufacturing the rates are much more modest; the trade barriers have already been reduced significantly in subsequent trade rounds. Generally, the trade taxes for manufacturing imports from the non-OECD are lower than for similar exports to that area. Surprising is perhaps that Japan appears to be relatively open, since this does not concur with the general perception that foreigners cannot easily penetrate Japanese markets. However, this relative openness of Japan is only true for trade between Japan and the South.

The United States is in slightly more favourable position to export manufacturing products to developing countries than Japan, and gives developing countries slightly better access to domestic markets than Western Europe. This will turn out to affect the results of the simulations. Besides, and perhaps more importantly, in the Globalisation scenario protection of agriculture becomes significantly less. In Japan and Western Europe this sector will contract even further, whereas in the United States agriculture benefits from liberalisation.

Employment and demand patterns in the South

The Globalisation scenario will be compared to a scenario in which the situation in 2020 is to a large degree a mere reproduction of 1995. This alternative scenario does not assume further trade liberalisation but instead assumes that import tariffs and export taxes between North and South remain in tact. Furthermore, in the Globalisation scenario the emerging economies profoundly change and in particular Asia sees huge shifts in employment and demand patterns, but in this alternative scenario these patterns are frozen from 1995 onwards.

Table 5.2 Employment and demand patterns in the non-OECD

situation in 1995 and changes in 2020 according to the Globalisation scenario

	low-productive workers		skill-*ex*tensive consumption*	
	% of total labour supply		% of total consumption	
	level	change	level	change
Transition countries	4.2	-1.0	28.0	-13.6
Latin America	25.1	-17.5	32.3	-15.7
Asia	59.2	-25.9	40.2	-24.3
global	43.1	-16.3	20.0	-6.5

* Skill-*ex*tensive sectors are Agriculture and Consumer Goods.

Table 5.2 shows the resulting differences between the Globalisation scenario and the alternative scenario for low-productive workers and consumption of skill-*ex*tensive goods (Agriculture and Consumer Goods). The outflow from the low-productivity sector is sometimes impressive in the Globalisation scenario. In Asia the share of low-productive workers in total supply falls from 59.2% to 23.3%. In the non-OECD economies consumption of skill-*ex*tensive goods decreases. Demand shifts towards for example domestic services and away from Agriculture and Consumer Goods. Converging consumption patterns decreases the global share of the two consumption categories together from 20.0% to 13.5%.

The projected changes in demand and employment patterns are sometimes drastic, but historically they are not exceptional. Many developing countries have already seen huge shifts in the structure of demand and production within the last 25 years. A typical pattern of development is the decline of agriculture. For example in Korea it took less than 25 years for the share of agriculture in GDP to fall from 25% to 7%. Other countries that have not expanded as fast as Korea, have nevertheless seen the share of agriculture decrease substantially. In China the share has fallen from 34% in 1970 to 19% in 1993, and in India from 45% to 31%.[5] One important reason for this share to fall is of course that consumption of food is income-inelastic.

5.2 Wage inequality in Japan, the United States and Western Europe

The developments in emerging economies, as they have been outlined in Tables 5.1 and 5.2, typically increase the wage of high-skilled workers relative to the wage of low-skilled workers in the OECD. The downward pressure on the wage of low-skilled workers could in reality lead to or be absorbed by higher unemployment. The simulation however ignores this complication. The unemployment rate is constant and wages move to equal labour demand and labour supply, minus unemployment. The shocks will thus affect only the ratio of high-skilled to low-skilled wages.

[5] World Bank (1995), Development indicators, Table 9

Table 5.3 Wages of high-skilled workers in the OECD in 2020
relative to wages of low-skilled workers (%)

	Japan	United States	Western Europe
increase in response to			
trade liberalisation	0.3	-0.6	1.6
less low-productivity workers	0.2	0.1	0.3
less demand for skill-*ex*tensive goods	1.1	1.1	1.2
total	1.6	0.6	3.1
increase with similar production functions			
total	1.7	0.6	3.3
level in the Globalisation scenario			
	162.6	160.1	161.6

Table 5.3 presents the results of the three simulations for Japan, the United States and Western Europe at the end of the scenario period. The total impact of the three shocks reveals that Europe is affected most, and the United States least. In Europe the wage ratio increases with 3.1%-points, whereas in the United States the ratio rises with 0.6%-points. The impact on Japan is in between that on Europe and that on the United States. Note that the total differences mainly arise from the different effects of trade liberalisation.

The results in Table 5.3 are directly comparable to those in Table 4.1, since the two sets of results have been derived for similar model parameters. The total effect on wage inequality in Table 5.3 is smaller that in Table 4.1. For the United States the effect becomes small: the United States is in this respect different from Japan and Western Europe. The difference between the two sets of simulations is agriculture. Whereas in

the previous simulations agriculture is initially unaffected, in the current simulations agriculture in the United States benefits from removing trade restrictions.

The outcome of the experiment in this section confirms that Japan and Western Europe are more sensitive than the United States to changes in production and trade patterns. For two reasons the United States has to fear less from trade with emerging economies than either Japan or Western Europe so far as wage inequality is concerned. The first reason has already been discussed in the previous section. The United States is less involved in Agriculture and Consumer Goods than Japan and Europe and is therefore less vulnerable for trade with developing countries. The second reason is that trade liberalisation hurts Agriculture in Japan and Western Europe badly, whereas it benefits this sector in the United States. A similar argument might be made for manufacturing. The United States is in slightly better position than Japan to export manufacturing products to developing countries, and gives developing countries slightly better access to domestic markets than Western Europe. It can therefore expect less changes (in relative wages) than either Japan or Western Europe.

The different impact on the three regions could also follow from different production technologies. If sectors converge with regard to the skill-intensity of production – employment of high-skilled workers relative to that of low-skilled workers – , the impact of trade on wages becomes less. Thus, less pronounced differences among sectors in the United States could explain the lower impact on wage inequality. Table 5.3 shows this is not the case. It reports the overall result of the simulations when one and the same sector in Japan, United States and Western Europe produces according to a similar technology as far as the skill intensity is concerned.[6] The overall result changes only slightly. The total impact on Japan and Western Europe becomes slightly larger, whereas the effect on wage inequality in the United States is virtually unchanged. Most importantly, the table shows that different production technologies are not the reasons for the different results.

[6] See also Appendix A.

The impact of shifting employment and demand patterns on the one hand and the effect of trade barriers on the other hand should only be compared with great care. The projections for demand and employment patterns as well as for trade barriers are highly uncertain. Also, the regional variation in the shocks is bound to have a different impact on Japan, the United States and Western Europe. Nevertheless, Table 5.3 suggests that an assessment of the future impact of globalisation, in particular on the position of low-skilled workers in the rich countries, should not ignore the characteristics of the development process of poor countries. Changes in demand and employment patterns in developing countries are inevitable, and tend to depress the relative wage of low-skilled workers.[7] Note that the modest impact of lower trade barriers can also result from a potentially significant underestimation of the trade barriers.

Substitution between manufacturing goods and between low- and high-skilled workers

In WorldScan substitution possibilities between manufacturing goods from different origin are not perfect. This cushions changes in relative wages. The model has been run with doubled long-run substitution elasticities for manufacturing and services. The upper panel of Table 5.4 shows that better substitution between domestic and foreign goods leads to a significantly higher impact of trade on wages. The total impact of the wage ratio in Japan rises from 1.6%-points to 2.8%-points, in the United States from 0.6% to 1.1% and in Western Europe from 3.1% to 5.0%.

Trade with developing countries changes relative wages in developed countries, but not stunningly so. The result of trade liberalisation and changing demand and employment patterns outside the OECD is that the relative wage of low-skilled workers grows less with at most 0.2% on average each year. The recent experience in the United States and also in the United Kingdom is that the growth difference between wages of

[7] Reallocation from informal to formal activities does not have an impressively large effect on wage inequality in the North. One reason could be that in the GTAP data set the labour share in developing countries is systematically and substantially lower than in developed countries. Reallocation leads to lower low-skilled wages in the South but this does not translate into lower production costs as much as one would expect.

low-skilled and high-skilled workers exceeds 0.2% considerably.[8] Besides, experiments with the model reveal that changes in the composition of the labour supply (i.e. education of low-skilled workers) and asymmetric technical change affect relative wages more than trade with developing countries.

One of the reasons that the simulations with the model uncover an only modest impact of trade on relative wages, relates to substitution between low-skilled and high-skilled workers in production. The lower panel of Table 5.4 show the results of similar simulations where the substitution elasticity between low-skilled and high-skilled workers has been lowered from 1¼ to ¾ while maintaining the increased substitution elasticities between goods of different origin. When substitution possibilities are limited the relative wage responds more to the various shocks so as to induce firms to hire low-skilled workers. The total impact on the wage ratio then (almost) doubles. The results are thus very sensitive for the assumption about substitution possibilities between low-skilled and high-skilled workers. Which substitution elasticity is appropriate, is another matter. Wood (1994) and also Lawrence (1996) discuss this elasticity. It seems that ¾ is low, perhaps too low.

Substitution possibilities are not the only elements of uncertainty. Most obviously, the results apply to the distant and also uncertain future. They highly depend on the scenario. For example, the consumption patterns in Japan and Western Europe are projected not to change. However, these regions might see a shift towards the consumption of services, so that their consumption patterns converge towards that in the United States. When employment patterns adjust accordingly, the result might disappear that wage inequality in Japan and Western Europe is more sensitive than in the United States for increased trade with developing countries. Another qualification has already been mentioned. The trade barriers are likely to be underestimated. The data for (non-tariff) barriers are either lacking or poor. Underestimation is especially a problem for

[8] The OECD (1996) reports that in the United States the upper earning limit of the ninth decile of workers has grown between 1979 and 1995 on average 1% higher than the upper limit of the fifth decile and almost 2% higher than the upper limit of the first decile. The United Kingdom has seen a similar development.

trade in services. The negative effect of trade on low-skilled wages could therefore be larger, because the production of services is skill-intensive.

Table 5.4 Wages of high-skilled worker in OECD in 2020
relative to wages of low-skilled workers (%)

Better substitution between goods from different origin (Elasticities double)			
	Japan	United States	Western Europe
increase in response to			
trade liberalisation	0.5	-0.4	3.0
less low-productivity workers	0.3	0.1	0.3
higher demand for skill-*in*tensive goods	2.0	1.4	1.7
total	2.8	1.1	5.1
***And** worse substitution between low-skilled and high-skilled* (Elasticity goes from 1¼ to ¾)			
country	Japan	United States	Western Europe
increase in response to			
trade liberalisation	0.9	-0.7	5.0
less low-productivity workers	0.7	0.4	0.9
higher demand for skill-*in*tensive goods	3.4	2.4	3.0
total	4.9	2.1	8.8

6 Conclusions

In the United States and the United Kingdom income inequality is rising, whereas in continental Europe unemployment among low-skilled workers is high. A common fear is that the process of globalisation is undermining and will continue to undermine the position of low-skilled workers on the labour market. The prospect of rapid growth in many developing countries only aggravates it. This paper does not take away this fear, but certainly does nothing to feed it. Even in an optimistic scenario in which developing countries are projected to grow fast and the linkages between OECD and non-OECD countries intensify, the impact of trade on wages is not exactly worrying.

Nevertheless, the conclusion that trade with developing countries tends to increase wage inequality is unavoidable. Trade liberalisation increases imports of skill-*ex*tensive goods by developed countries, lowers demand for low-skilled workers and depresses their wage relative to the wage of high-skilled workers. However, lower barriers to trade are not the only reason behind more wage inequality. In developing countries demand shifts from skill-*ex*tensive to skill-*in*tensive goods. Moreover, the process of development is partly driven by reallocation of workers: from informal, low-productivity sectors to formal, high-productivity sectors. These workers are predominantly low-skilled. The reallocation from informal to formal sectors implies that overall the supply of low-skilled workers – in efficiency units – rises. These changes in demand and employment patterns appear to be at least as important as trade liberalisation for the relative wage differences in OECD countries.

Trade liberalisation has less impact on wage inequality in the United States then it has in Japan and Western Europe. Employment in the United States is more concentrated in the production of often non-tradeable services, whereas employment in the other two regions is still found more in agriculture and manufacturing. Besides, Japan and Western Europe face higher import tariffs when exporting and/or levy higher tariffs when importing. For these two reasons low-skilled workers in Japan and Western Europe have to fear more from globalisation than their counterparts in the United States.

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Appendix A Some relevant elements of the model

Input intensities

GTAP provides at a sectoral level wage payments to low-skilled and high-skilled workers. We use these data, first, to classify the 16 manufacturing sectors in GTAP in three categories, and second, to derive the skill ratios per sector and region.

The concordance between 16 manufacturing sectors in GTAP 4 and three manufacturing sectors in WorldScan -- Consumer Goods, Energy-intensive and Capital Goods -- is given in Table A.1.

TableA.1 Manufacturing sectors in WorldScan and GTAP

Consumer Goods	Energy-intensive Goods	Capital Goods
Textiles	Nonmetallic minerals	Transport industries
Wearing apparels	Ferrous metals	Motor Vehicles and parts
Leather	Nonferrous metals	Other Machinery and equipment
Lumber	Chemical rubbers plastics	Electronic Equipment
Rest of manufacturing	Pulp paper, publishing	Fabricated metal products
Food and Tobacco	Petroleum and coal	

Consumer Goods is relatively low-skilled labour-intensive. It produces non-durable goods like clothes, shoes, furniture and so. Often is thought that the production of these goods can take place as easily in the North as in the South. The skill intensities for the three manufacturing sectors are presented in Table A.2.

The difference between the other two sectors is not so much skill-intensity, although Capital Goods (producing both investment goods and durable consumption goods) seems slightly more intensive in high-skilled labour than Energy-intensive goods. The difference is rather – as the names already tell – the use of energy. Besides, the sector Capital Goods is the most labour-intensive sector.

Table A.2 Skill intensities in manufacturing

	Consumer Goods	Energy-intensive Goods	Capital Goods
United States	1.93	1.12	0.72
Japan	1.36	0.93	0.91
Pacific OECD	1.58	0.96	0.72
Western Europe	1.42	0.97	0.83
Eastern Europe	1.27	0.98	0.72
Former Soviet Union	1.30	1.08	0.76
Midlle East	1.16	0.95	0.81
Sub-Saharan Africa	1.14	0.95	0.90
Latin America	1.13	0.97	0.89
China	1.13	1.08	0.82
South-east Asia	1.54	0.99	0.80
South Asia and Rest	1.13	0.93	0.88
OECD	1.53	1.00	0.79
global	1.54	1.00	0.77

source: McDougall *et al.* (1998)

Table 4.4 also reports results of simulations with what is called identical production technologies. In this instance the relative skill intensities in manufacturing are equal in all OECD regions.

In the context of this studie, we have compared our sectoral classification on the basis of GTAP data with classifications on the basis of ILO and OECD data. The ILO data (1998) concern wages for all manufacturing sectors, derived from various national sources. The wages often apply to employees and not to self-employed. The sectors can be grouped into three broad sectors according to the wages they pay (to employees). OECD (1994) does a similar exercise. It divides manufacturing sectors into low-, medium- and high-wage sectors. This classification is made for the year 1985. All sectors in which wages exceed 115% of the median wage are classified as high wage. The sectors in which wages are a most 85% of the median wage are classified as low-wage.

Comparing the three classifications we can draw the following conclusions. The sector Consumer Goods is identical in each of the three classifications. We are thus confident that the sector Consumer Goods is indeed intensive in low-skilled labour.

Relative supply of low-skilled workers

Table A.3 Number of low-skilled workers
% of total labour supply

region	1995	2020
OECD	63.9	63.9
transition regions	63.9	63.9
Latin America	82.5	71.6
Asia	85.2	79.5
global	81.2	77.8

Appendix B Regional and sectoral concordances for WorldScan

1 United States

2 Japan

3 Western Europe

United Kingdom, Germany, Denmark, Sweden, Finland, Rest of European Union, EFTA

4 Pacific OECD

Canada, Australia, New Zealand

5 Eastern Europe

6 Former Soviet Union

7 Middle East and North Africa

Turkey, Rest of Middle East, Morocco, Rest of North Africa

8 Sub-Saharan Africa

South African Customs Union, Rest of Southern Africa, Rest of Sub-Saharan Africa

9 Latin America

Central America and Carribean, Mexico, Argentina, Brazil, Chile, Uruguay, Venezuela, Colombia, Rest of South America

10 China

China, Hong Kong

11 South East Asia

Republic of Korea, Indonesia, Malaysia, Philippines, Singapore, Thailand, Taiwan, Vietnam

12 South Asia & Rest

India, Sri Lanka, Rest of South Asia, Rest of the World

1 Agriculture and food production

Paddy rice, Wheat, Grains, Cereal Grains, Non grain crops, Vegetables, Oil seeds, Sugar cane Plant-based fibres, Crops, Bovine cattle, Animal products, Raw milk, Wool, Forestry, Fisheries, Processed rice, Meat products, Vegetable Oils, Dairy products, Sugar, Other food products, Beverages and tobacco

2 Consumer Goods

Textiles, clothing, Leather etc, Wood products, Rest of manufacturing

3 Intermediate Goods

Chemical, rubbers and plastics, Pulp paper, Petroleum and coal, Nonmetallic minerals, Ferrous metals, Nonferrous metals

4 Capital Goods

Fabricated metal products, Transport industries, Machinery and equipment, Electronic equipment, Motor vehicles and parts,

5 Services

Gas manufacture and distribution, Water, Construction, Financial, business and recreational services, Public administration, education and health, Dwellings, Electricity

6 Trade and Transport

7 Raw Materials

Oil, Natural Gas, Coal, Minerals

Abstract

This paper explores the potential future impact of globalisation on relative wages, using WorldScan. The focus is on wage inequality in Japan, Western Europe and the United States. Inequality rises for several reasons: barriers to trade fall, and in developing countries demand patterns change and at the same time workers shift from traditional low-productivity toward modern high-productivity activities. Even though inequality does not rise dramatically, one should not ignore the characteristics of the growth process in developing countries: trade liberalisation is not only reason behind growing inequality. Another interesting result is the different impact on industrialized countries. Simulations show that the United States is least sensitive to falling trade barriers and changes in developing countries. The impact on Japan and Western Europe is larger.