CHAPTER 4

Trade, earnings and employment: assessing the impact of trade with emerging economies on OECD labour markets

A. INTRODUCTION AND MAIN FINDINGS

1. Introduction

Over the past two decades, the labour market position of unskilled workers appears to have worsened in most OECD countries. The clearest indicator of this deterioration is the marked increase in the unemployment rate of unskilled workers relative to their skilled counterparts. As a result, in all countries, unemployment rates for unskilled workers are several times higher than for skilled workers. In addition, in some countries, the earnings of unskilled workers have declined in relative (and sometimes real) terms [OECD (1996*a*)]. The fact that relative earnings and/or unemployment of unskilled workers have shown similar trends in most of the OECD area suggests that global forces might be at work. Two explanations have been much discussed in the literature, namely increased trade with so-called ''low-wage'' countries and technological change biased against the use of unskilled labour.[1]

International trade is a powerful engine of wealth creation. However, even if trade liberalisation raises a nation's economic welfare, this does not necessarily imply that all economic actors will gain from it. Globalisation has brought about an increase in trade for OECD countries with countries whose living standards and labour costs are much lower than theirs. To the extent that low-wage countries are specialised in sectors that are relatively intensive in the use of their abundant factor of production (unskilled labour), it is often argued that imports from such countries could negatively affect the demand for unskilled workers in OECD countries. This would show up in either falling relative earnings or higher relative unemployment for the unskilled, depending on the degree of rigidity in wages and prices. To the extent that the OECD countries are specialised in sectors that are relatively intensive in skilled labour, exports of these products should raise the relative demand for skilled labour.

On the other hand, many observers have pinpointed skill-biased technical change as the most likely culprit. They argue that the rapid diffusion of information technologies and computers, as well as the adoption of new forms of work organisation, has tended to increase the demand for skilled relative to unskilled labour in all countries.

Much of the literature treats trade and technology as two separate factors, but it is important to note that they may well be inter-related processes. In a context of stronger international competition, firms may come under increasing pressure to adopt new technologies quickly [OECD 1996*b*)]. Technological progress, in turn, can support the expansion of international trade in a variety of ways which are well described in the so-called ''new trade theories''.

Despite the proliferation of empirical research recently on the topic, few attempts have been made to examine the issue of trade and labour markets in a comparative perspective. Most empirical studies to date focus on the United States' experience. In addition, many of these studies have been criticised on the grounds that the assumptions underlying the analysis are unrealistic – such as, for example, when labour markets are assumed to be perfectly flexible. Finally, research is often mute on what is meant by ''skill''.

The purpose of this chapter is to evaluate the labour-market impact of trade between the OECD countries and a group of emerging economies (EEs), in particular to assess whether such trade has contributed to the observed deterioration in the labour market position of unskilled workers in OECD countries. The emerging economies are: Argentina; Brazil; Chile; China; Chinese Taipei; Hong Kong, China; India; Indonesia; Korea; Malaysia; Singapore; and Thailand. These economies were chosen because of their economic dynamism and because they account for most of non-OECD manufacturing trade. The chapter starts with a description of recent trends in OECD labour markets, including a discussion of the concept of skill (Section B). Patterns of trade with EEs are reviewed in Section C. The channels through which trade with EEs may affect OECD labour markets are outlined in Section D which also presents results of an empirical analysis of the issues, based

on a microeconomic data base. Policy implications are discussed in Section E.

2. Main findings

First, there is clear evidence of a worsening in the labour market position of unskilled workers. Between 1980 and the early 1990s, in all OECD countries, the employment rate of low-skilled workers fell relative to their skilled counterparts. As a result, in most countries, their unemployment rate is two-to-three times higher than the rate for skilled workers. The picture for earnings differentials is less clear: only in the United Kingdom, the United States, as well as in the manufacturing sector of New Zealand, is there clear evidence of a deterioration in the earnings of unskilled compared with skilled workers.

These trends cannot be ascribed to labour supply factors alone. In fact, the relative supply of less-educated workers has tended to decline in most countries, a trend which, other things being equal, should have contributed to reducing wage inequalities. The evidence points rather to relative demand shifts as a major driving force.

Second, imports of manufactures from the EEs as a share of OECD GDP have increased from 0.3 per cent in 1967 to 1.6 per cent in 1994. The United States, Canada and the Netherlands experienced the fastest import growth from these countries. Though the increase is substantial, these imports still represent a very small share of GDP in most OECD countries. In addition, OECD exports of manufactures to the EEs have grown broadly in line with imports so that total trade in manufactures has remained close to balance throughout the period.

Third, a sectoral breakdown of imports from the EEs suggests that their incidence is especially high in sectors characterised by both relatively low earnings and a high incidence of manual labour, *e.g.* textiles and clothing. Whereas imports from the EEs are often concentrated in a few products, OECD exports to these countries tend to be more broadly-based. Nonetheless, the incidence of exports to the EEs is relatively high in several sectors where earnings are, on average, relatively high and the incidence of manual labour relatively low, *e.g.* machinery and equipment. These facts point to differences in labour endowments as one key determinant of trade flows between OECD countries and the EEs.

Fourth, conventional trade theories predict that, under certain circumstances, freer trade between skilled-labour-abundant OECD countries and unskilled-labour-abundant EEs will lead to a decline in the relative price of unskilled-labour-intensive products imported from low-wage countries. Lower prices, in turn, will exert pressures on labour markets. A slow rate of productivity growth in unskilled-labour-intensive sectors relative to skilled-labour-intensive sectors produces similar theoretical predictions. During the 1980s, relative import prices in import-competing sectors in OECD countries declined, while export prices rose in export-oriented sectors. In the light of this fact and the finding that import-competing sectors tend to be unskilled-labour-intensive, the possibility that trade with the EEs may have contributed to the labour market problems of unskilled workers in OECD countries cannot be excluded on *a priori* grounds.

This issue is not easy to assess quantitatively. No dominant empirical pattern emerges. In the majority of the countries, however, the drop in the relative prices of import-competing sectors has been accompanied by either lower relative wages, lower relative employment or both. Conversely, therefore, the relative situation of workers in export sectors has improved.

Econometric analysis suggests that trade-price changes have had an impact, albeit small and not always statistically significant, on the wages of unskilled workers. Results also suggest that the trade-price effect on unskilled employment has been somewhat larger. Sectoral total factor productivity gains appear to exert a much stronger influence on unskilled wages – though not on employment. These results confirm the findings of several recent studies which refer to the experience of the United States only.

It is possible that such trade pressures on the unskilled labour market persist, as new major players such as China and India become integrated into the world economy. The appropriate policy response, however, does not lie in protection which, as both theory and history amply demonstrate, would adversely affect skilled as well as unskilled workers. Instead, the challenge is to create the appropriate incentives to help both individuals and firms adjust to a rapidly changing environment.

B. THE STYLISED FACTS ON EMPLOYMENT, EARNINGS AND TRADE

The first aim in this section is to present the evidence on several key labour market outcomes for unskilled relative to skilled workers in OECD countries. In particular, trends in earnings and employment by broad skill category over the past two decades are examined, both for the whole economy and the manufacturing sector. Second, the evolution of trade is reviewed, focusing on OECD trade in manufactures with the emerging economies. The

reason for paying particular attention to manufactures is that the bulk of OECD trade with the EEs is conducted in such products: in 1994, 86 per cent of total OECD imports from the EEs consisted of manufactured goods. Therefore, any labour market effects of trade with EEs should be most noticeable in the manufacturing sector rather than in the service sector which tends to be much more insulated from international trade.

1. Trends in employment by skill category

It is important to start by defining the measures of "skills" used in this chapter. There are obviously many dimensions of skills, ranging from physical abilities to cognitive and interpersonal skills [OECD (1996*c*); ILO (1995)]. Single-variable empirical measures of skills cannot capture all these dimensions. In the literature, the two most commonly used indicators are based either on education or on occupation.

Measures based on *education*, defined either as years of schooling completed or final degree obtained, are usually assumed to capture cognitive dimensions of skill which, from a human capital perspective, can be expected to increase a worker's productivity. However, skills acquired on-the-job or through training are typically excluded from these measures. In addition, such measures make no adjustment for the varying quality of schooling. Nevertheless, educational attainment is a time-invariant characteristic attached to the individual, contrary to characteristics attached to a particular job.[2]

Measures based on *occupation* are defined according to the tasks performed in a particular job (managerial, administrative, technical, clerical, etc.). One problem with these measures is that they are generally not available at a great level of detail, so that existing cross-country studies mainly use rough proxies such as the ratio of either production to non-production workers or blue- to white-collar workers.

Berman *et al*. (1994) show that, for the United States manufacturing sector, the blue/white collar and production/non-production classifications are closely related, and reflect differences in average educational attainments. Machin *et al.* (1996) also find that, for the United Kingdom and the United States, the evolution of manufacturing employment for occupational (production/nonproduction) and educational groupings is very similar. A large body of evidence also shows that educational attainment is positively linked to labour market outcomes. Thus, despite their admitted imperfections, broad classifications of skills based on either educational attainment or occupation are operational, and they are used for this chapter.[3]

Chart 4.1 shows average annual growth rates of total and manufacturing employment by educational attainment.[4] The first thing to note is that total manufacturing employment either declined or barely increased in all countries for which the data are available, except Japan, the Netherlands and the United States.[5] Further, in all countries except the United States, manufacturing employment of workers with the lowest level of education decreased, while it grew for those with the highest level of attainment. The trend among workers with an intermediate (*i.e.* upper secondary) level of education is less clear: some countries registered a decline, others an increase.

Of course, these trends could simply reflect the fact that educational attainment among the population and work force is rising. Indeed, according to Table 4.1*a* which reports the evolution of educational attainment among the population aged 25 to 64, the population share of the lowest-educated men and women decreased in most countries, while the share of the highest-educated increased. As a result, the ratio of low- to high-educated men and women declined (Table 4.1*a*, Columns 3 and 6). Exceptions are Austria, where the ratio for both sexes rose over the period 1989-1994, and Switzerland, where the ratio for women rose over the same period.

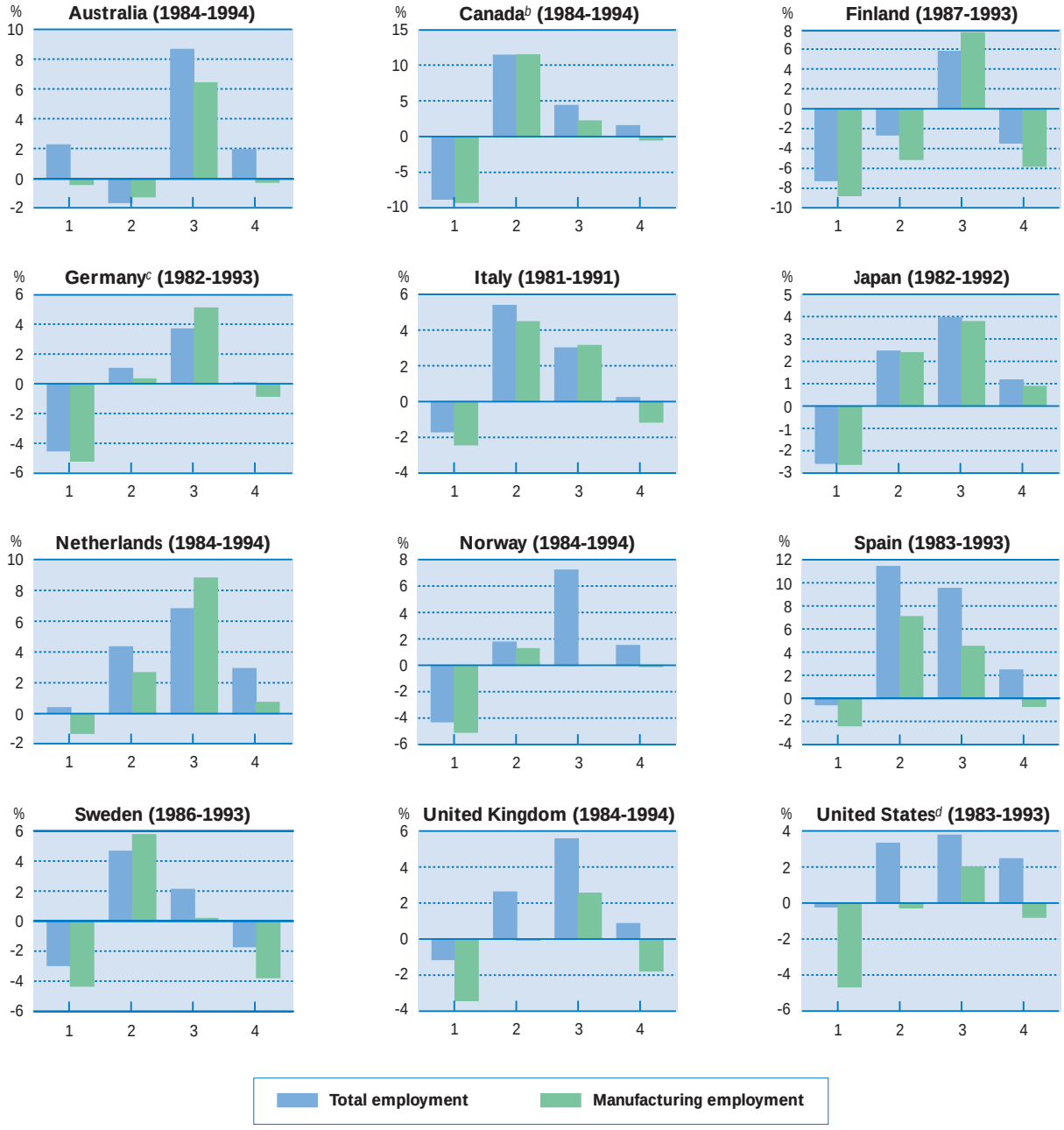
Even though the supply of low-educated workers tended to fall, evidence on employment-population ratios and unemployment rates suggests a deterioration in the labour-market position of low-educated workers in the majority of the countries:

- employment-population ratios fell for both low- and high-educated men in 17 out of 20 countries, while they deteriorated for both groups of women in 11 countries (Table 4.1*b*, Columns 1 to 6). In 15 out of 20 countries, the employment-population ratio of low-educated men declined more than was the case for high-educated men (Table 4.1*b*, Column 3). Relative to high-educated women, the employment-population ratio of low-educated women deteriorated in half of the countries (Table 4.1*b*, Column 6); and
- the evidence on unemployment rates tells a similar story (see Columns 7 to 12). The unemployment rates of lower-educated workers increased noticeably during the 1980s and early 1990s (Germany, Ireland and the Netherlands being important exceptions). Unemployment rates increased as well for higher-educated workers, but remained at comparatively much lower levels. As a result, the difference between the unemployment rates of low- versus high-educated workers increased sharply in most countries for both

Chart 4.1.

Evolution of employment by level of educational attainment[a]

Average annual growth rates



a) 1 = lower secondary or less; 2 = upper secondary; 3 = higher education (tertiary); and 4 = all employed.
b) The large increase in the employment share of people with an upper secondary education may be partly due to efforts made since 1992 to improve the classification of post-secondary educational programmes.
c) Data refer to western Germany.
d) The totals for the manufacturing sector exclude the food, drink and tobacco industry, for which figures were not available.
Source: OECD Education database.

men (except in Germany, Ireland, the Netherlands and Sweden) and women (except in Belgium, Germany, Italy and the Netherlands).

In sum, the relative employment decline for low-skilled workers reported in Chart 4.1 can only partly be due to relative supply changes. Taken together, the falling relative employment-population ratios and the increasing relative unemployment rates tend to indicate that the employment situation of lower educated workers has deteriorated by more than their declining relative share in the population would lead to expect. Although it is somewhat mixed, the evidence seems to point rather to relative demand shifts as an important driving force.

2. Trends in earnings and employment by skill category: whole economy contrasted with manufacturing sector

This sub-section examines the earnings and employment differentials between high- and low-skilled workers in the whole economy and the manufacturing sector (see Annex 4.A for definitions and sources).

Charts 4.2*a* and 4.2*b* show the evolution of the earnings and employment differentials (defined as ratios) between more and less skilled workers. In the case of differentials based on educational attainment, those with a higher or tertiary education are being compared to those with less than an upper secondary education. Comparisons by occupation vary across countries. For France, managers and professionals are compared with labourers and sales and clerical workers. For other countries, comparisons refer to white- and blue-collar or production and nonproduction workers. In all cases, the earnings and employment gaps are calculated as indices, with 1985 or 1986 being the base year.[6]

Looking first at the whole economy, the most striking point is that, except for the United Kingdom and the United States, the earnings gap, as measured here, remained quite stable between 1980 and 1995. In Spain, it increased slightly during part of the 1980s, and stabilised thereafter. In Australia, the earnings gap followed a gentle downward trend. In Austria, Canada and Norway, the earnings gap increased somewhat in the early 1990s, while the opposite occurred in France, Germany, Italy and Switzerland. In the United Kingdom, the earnings gap increased rapidly between 1985 and 1990, and continued increasing, although at a slower rate, through the 1990s.[7] In the United States, the earnings gap increased at a steady rate throughout the whole period. In contrast to this mixed picture for the earnings gap, in all countries the employment gap increased, often substantially.

Evidence for the manufacturing sector is unfortunately available only for seven countries, and comparison with the whole economy is not always possible (Chart 4.2*b*). In Australia, the earnings gap remained constant until 1990, and then dropped more rapidly than for the total economy. In addition, the manufacturing employment gap also started declining after 1990. In Denmark, both gaps were very stable over the period. The earnings differential in Finland fell by over 10 per cent between 1980-1994, while the employment gap increased substantially. The earnings gap for the Japanese manufacturing sector exhibits no trend, in line with the pattern for the total economy. However, the employment gap increased much less in manufacturing, compared with the whole economy. The earnings gap in New Zealand's manufacturing sector increased much more than in the whole economy, while the evolution of the employment differential was very similar in both cases. In Spain, the earnings gap shows similar trends in the manufacturing sector and in the total economy.

In summary, the relative employment of low-skilled workers has deteriorated virtually everywhere. By contrast, as defined and measured here, there is little clear evidence of a deterioration in the relative earnings of unskilled compared with skilled workers, except in the United Kingdom and the United States. The evolution of the relative labour market position of low-skilled workers has not been worse in the manufacturing sector than in the total economy, with the notable exception of New Zealand.

3. Evolution in OECD manufacturing trade with the EEs, 1967-1994[8]

As Chart 4.3 indicates, imports of manufactured products from EEs as a share of OECD GDP have increased steadily over the period considered, from almost 0.3 in 1967 to 1.6 per cent in 1994. Imports from within the OECD amounted, in 1994, to 9.2 per cent of OECD's GDP, or 80 per cent of total manufacturing imports (weighted by GDP). There are, nevertheless, relatively large differences in the importance of imports from EEs among major OECD trading countries. In 1994, the European Union and Canada imported 7.4 and 8.5 per cent of their manufacturing from EEs, respectively; almost 90 per cent of their imports of manufactures came from other OECD countries. This contrasts with the United States and Japan, for which one-quarter and one-third of manufacturing imports came from the EEs, while OECD countries accounted for 70 and

Table 4.1*a*. **Trends in the population of less versus more educated workers**[a]

Percentages of the total population of men and women

		Men			Women		
		Level of education			Level of education		
		Low	High	Ratio of low to high	Low	High	Ratio of low to high
Australia[b]	1989	37.0	12.3	**3.0**	52.4	7.6	**6.9**
	1994	39.9	14.2	**2.8**	59.7	12.6	**4.7**
Austria	1989	24.0	7.4	**3.2**	45.1	5.3	**8.5**
	1994	24.6	7.2	**3.4**	39.3	4.1	**9.6**
Belgium	1989	60.0	10.2	**5.9**	65.4	4.4	**15.0**
	1994	49.2	13.0	**3.8**	52.1	7.2	**7.2**
Canada	1981	40.2	14.3	**2.8**	39.3	8.5	**4.6**
	1989	29.4	17.2	**1.7**	27.8	13.0	**2.1**
	1994	26.4	18.5	**1.4**	25.5	15.2	**1.7**
Denmark	1981	43.5	11.7	**3.7**	56.0	9.3	**6.0**
	1988	37.8	13.0	**2.9**	48.0	8.0	**6.0**
	1994	35.9	14.2	**2.5**	44.2	13.1	**3.4**
Finland	1982	53.1	9.5	**5.6**	56.4	5.7	**9.8**
	1989	42.1	11.9	**3.5**	42.7	7.4	**5.8**
	1994	37.2	12.5	**3.0**	35.6	9.2	**3.9**
France	1981	55.7	8.4	**6.6**	65.4	6.4	**10.2**
	1989	47.5	8.6	**5.5**	56.3	5.4	**10.5**
	1994	28.7	10.7	**2.7**	37.0	7.9	**4.7**
Germany	1989	12.3	13.4	**0.9**	31.0	7.0	**4.4**
	1992	11.4	14.8	**0.8**	24.9	8.3	**3.0**
Ireland	1989	64.9	8.9	**7.3**	59.0	5.8	**10.2**
	1994	58.3	10.2	**5.7**	51.3	7.4	**6.9**
Italy	1989	72.0	6.7	**10.8**	76.5	4.7	**16.2**
	1994	65.0	8.5	**7.7**	68.6	6.5	**10.5**
Netherlands	1990	38.6	8.9	**4.3**	52.0	3.3	**15.5**
	1994	34.7	8.7	**4.0**	45.8	4.1	**11.2**
New Zealand	1981	61.7	6.4	**9.6**	72.3	3.0	**24.3**
	1990	37.4	11.5	**3.3**	49.3	7.5	**6.6**
	1994	37.1	10.7	**3.5**	48.2	7.8	**6.2**
Norway	1981	30.3	10.2	**3.0**	36.8	4.2	**8.8**
	1989	21.2	12.7	**1.7**	24.0	8.4	**2.8**
	1994	18.8	17.2	**1.1**	19.8	15.5	**1.3**
Portugal	1989	91.8	4.8	**19.2**	91.3	3.5	**26.4**
	1994	81.2	7.8	**10.4**	80.6	6.7	**12.0**
Spain	1981	86.5	7.1	**12.2**	92.7	4.2	**22.0**
	1989	77.2	10.3	**7.5**	83.1	8.3	**10.0**
	1994	71.4	11.2	**6.4**	76.1	10.8	**7.1**
Sweden	1981	49.0	11.6	**4.2**	52.5	9.3	**5.6**
	1989	33.6	13.2	**2.5**	32.1	11.8	**2.7**
	1994	29.3	12.6	**2.3**	26.1	11.9	**2.2**
Switzerland	1989	15.2	13.7	**1.1**	27.3	6.2	**4.4**
	1994	11.2	11.6	**1.0**	24.4	5.2	**4.7**
Turkey	1991	80.2	7.6	**10.6**	85.5	4.4	**19.3**
	1994	77.8	8.2	**9.5**	83.8	5.3	**15.8**
United Kingdom	1984	39.7	11.0	**3.6**	52.2	5.2	**10.0**
	1989	30.4	11.6	**2.6**	43.5	6.2	**7.0**
	1994	19.9	14.8	**1.3**	31.1	8.6	**3.6**
United States	1981	19.9	26.2	**0.8**	19.6	17.9	**1.1**
	1989	18.1	26.6	**0.7**	17.9	20.5	**0.9**
	1994	15.3	26.7	**0.6**	14.4	22.3	**0.6**

a) Data refer to the population of age 25-64 years. The classification of educational attainment is based on the International Standard Classification for Education (ISCED).
A **low** level of education corresponds to ISCED levels 0, 1 and 2, that is, up to lower secondary education.
A **high** level of education corresponds to ISCED levels 6 and 7, that is, up to tertiary education.

b) The figures for 1994 must be interpreted with caution. Between 1992 and 1993 there was a change in the interpretation of ISCED which may lead to an overestimation of the increase in less educated workers between 1989 and 1994.

Sources: OECD (1996*e*) and OECD (1996*f*).

Table 4.1*b*. **Trends in the employment and unemployment of less versus more educated workers**[a]

Percentages

		Employment rates by level of education[b]						Unemployment rates by level of education[c]					
		Men			Women			Men			Women		
		Low	High	Difference[d]	Low	High	Difference[d]	Low	High	Difference[d]	Low	High	Difference[d]
Australia	1989	76.7	90.9	**14.2**	44.2	74.1	**29.9**	7.9	3.1	**4.8**	6.5	5.1	**1.4**
	1994	73.0	90.2	**17.2**	50.5	78.3	**27.8**	11.9	3.5	**8.3**	8.6	4.3	**4.3**
Austria	1989	73.4	92.3	**18.9**	39.6	82.1	**42.5**	3.4	0.8	**2.6**	3.8	2.2	**1.6**
	1994	70.0	91.6	**21.6**	47.0	83.9	**36.9**	4.8	1.7	**3.1**	5.1	2.1	**3.0**
Belgium	1989	68.4	91.9	**23.5**	29.6	79.9	**50.3**	7.1	1.6	**5.5**	18.5	3.1	**15.4**
	1994	64.6	88.0	**23.4**	31.7	80.8	**49.1**	9.3	3.7	**5.6**	18.2	4.5	**13.7**
Canada	1981	79.6	94.6	**15.0**	39.5	73.7	**34.2**	7.3	2.0	**5.3**	8.9	4.4	**4.5**
	1989	71.9	91.8	**19.9**	42.2	80.3	**38.1**	9.6	3.2	**6.4**	10.8	4.2	**6.6**
	1994	64.6	87.5	**22.9**	40.9	80.7	**39.8**	14.3	5.2	**9.1**	14.4	5.2	**9.2**
Denmark	1981	77.1	93.1	**16.0**	59.5	86.9	**27.4**	8.6	2.7	**5.9**	7.9	1.9	**6.0**
	1988	72.2	92.5	**20.3**	59.1	90.6	**31.5**	10.5	3.6	**6.9**	13.6	3.0	**10.6**
	1994	65.7	89.8	**24.1**	55.5	87.9	**32.4**	16.3	5.2	**11.1**	18.4	4.6	**13.8**
Finland	1982	79.2	96.6	**17.4**	67.6	87.7	**20.1**	4.4	..	**..**	5.5	..	**..**
	1989	71.6	93.8	**22.2**	65.0	88.9	**23.9**	4.0	0.7	**3.3**	3.9	2.2	**1.7**
	1994	54.6	86.5	**31.9**	50.9	84.0	**33.1**	24.2	7.0	**17.2**	21.0	6.0	**15.0**
France	1981	80.3	92.5	**12.2**	47.6	78.7	**31.1**	5.4	3.0	**2.4**	8.5	3.6	**4.9**
	1989	73.0	91.8	**18.8**	46.8	82.2	**35.4**	8.7	2.0	**6.7**	13.8	4.7	**9.1**
	1994	62.1	86.0	**23.9**	44.0	76.2	**32.2**	13.5	5.9	**7.6**	15.9	6.4	**9.5**
Germany	1989	68.7	91.8	**23.1**	33.1	71.5	**38.4**	13.8	3.3	**10.5**	13.7	7.5	**6.2**
	1992	73.0	90.7	**17.7**	42.0	78.7	**36.7**	9.0	3.3	**5.7**	8.9	4.6	**4.3**
Ireland	1989	64.4	92.8	**28.4**	22.9	76.7	**53.8**	23.8	2.5	**21.3**	10.3	2.9	**7.4**
	1994	67.0	91.8	**24.8**	24.4	77.8	**53.4**	18.0	2.8	**15.2**	21.6	4.4	**17.2**
Italy	1989	78.0	91.0	**13.0**	30.5	79.9	**49.4**	3.8	3.1	**0.7**	11.9	7.2	**4.7**
	1994	72.2	88.0	**15.8**	28.5	75.0	**46.5**	6.4	4.4	**2.0**	12.8	9.3	**3.5**
Netherlands	1990	72.4	84.6	**12.2**	31.7	74.8	**43.1**	7.4	3.8	**3.6**	13.4	8.4	**5.0**
	1994	70.6	87.0	**16.4**	36.2	74.9	**38.7**	7.1	3.6	**3.5**	9.8	5.2	**4.6**
New Zealand	1981	88.3	94.8	**6.5**	47.9	69.4	**21.5**	3.1	1.3	**1.8**	2.2	3.1	**0.9**
	1990	73.7	92.2	**18.5**	52.2	70.4	**18.2**	9.8	1.8	**8.0**	6.2	4.9	**1.3**
	1994	71.4	92.1	**20.7**	51.7	78.5	**26.8**	11.1	2.0	**9.1**	7.2	2.5	**4.7**
Norway	1981	83.1	94.5	**11.4**	52.8	85.4	**32.6**	1.5	0.4	**1.1**	2.8	1.6	**1.2**
	1989	76.4	96.2	**19.8**	54.1	91.8	**37.7**	6.1	0.8	**5.3**	6.4	1.3	**5.1**
	1994	69.2	93.2	**24.0**	51.6	89.1	**37.5**	7.2	1.7	**5.5**	5.6	1.3	**4.3**
Portugal	1989	78.7	79.5	**0.8**	56.2	61.3	**5.1**	2.1	2.1	**0.0**	6.4	7.7	**1.3**
	1994	81.1	92.6	**11.5**	54.8	92.5	**37.7**	5.2	2.4	**2.8**	7.0	2.3	**4.7**
Spain	1981	81.3	89.8	**8.5**	23.8	67.8	**44.0**	9.5	2.0	**7.5**	5.8	9.3	**3.5**
	1989	75.2	84.8	**9.6**	25.3	68.3	**43.0**	10.7	6.6	**4.1**	19.4	16.0	**3.4**
	1994	67.3	82.0	**14.7**	26.1	68.2	**42.1**	17.6	9.8	**7.8**	28.7	18.2	**10.5**
Sweden	1981	85.3	95.2	**9.9**	68.7	93.2	**24.5**	3.0	0.6	**2.4**	2.3	0.7	**1.6**
	1989	89.1	95.3	**6.2**	77.4	94.6	**17.2**	1.1	1.1	**0.0**	1.7	0.4	**1.3**
	1994	81.8	90.8	**9.0**	74.8	89.5	**14.7**	9.6	3.4	**6.2**	7.7	3.4	**4.3**
Switzerland	1989	92.9	93.3	**0.4**	56.3	74.3	**18.0**	0.3	0.3	**0.0**	2.6	2.2	**0.4**
	1994	89.1	91.8	**2.7**	58.2	73.2	**15.0**	4.7	2.6	**2.1**	5.5	6.7	**1.2**
Turkey	1991	83.4	92.3	**8.9**	26.3	73.0	**46.7**	5.7	2.3	**3.4**	5.7	5.8	**0.1**
	1994	82.9	89.3	**6.4**	26.6	76.4	**49.8**	6.2	3.6	**2.6**	5.5	5.5	**0.0**
United Kingdom	1984	71.7	91.3	**19.6**	53.1	72.6	**19.5**	13.7	2.7	**11.0**	8.5	6.0	**2.4**
	1989	71.7	93.2	**21.5**	55.2	80.9	**25.7**	12.1	2.1	**10.0**	7.6	3.1	**4.5**
	1994	61.0	90.0	**29.0**	52.0	84.3	**32.3**	18.8	4.0	**14.8**	8.2	3.7	**4.5**
United States	1981	69.8	91.8	**22.0**	38.7	71.6	**32.9**	10.3	2.2	**8.1**	9.8	2.8	**7.0**
	1989	68.9	92.4	**23.5**	41.9	79.5	**37.6**	9.4	2.3	**7.1**	8.1	2.0	**6.1**
	1994	62.4	90.6	**28.2**	39.2	80.1	**40.9**	12.8	2.8	**10.0**	12.4	2.9	**9.5**

.. Data not available.

a) The classification of educational attainment is based on the International Standard Classification for Education (ISCED).
A **low** level of education corresponds to ISCED levels 0, 1 and 2, that is, up to lower secondary education.
A **high** level of education corresponds to ISCED levels 6 and 7, that is, up to tertiary education.

b) For each level of education, the employment rate is the share of employed workers aged 25-64 years in the total population aged 25-64 years.

c) For each level of education, the unemployment rate is the share of unemployed workers aged 25-64 years in the total labour force aged 25-64 years.

d) Difference of less to more educated workers, in absolute values.

Sources: OECD (1996*e*) and OECD (1996*f*).

Chart 4.2a.

Evolution of earnings and employment differentials by skill category: whole economy

1985 = 100[a]

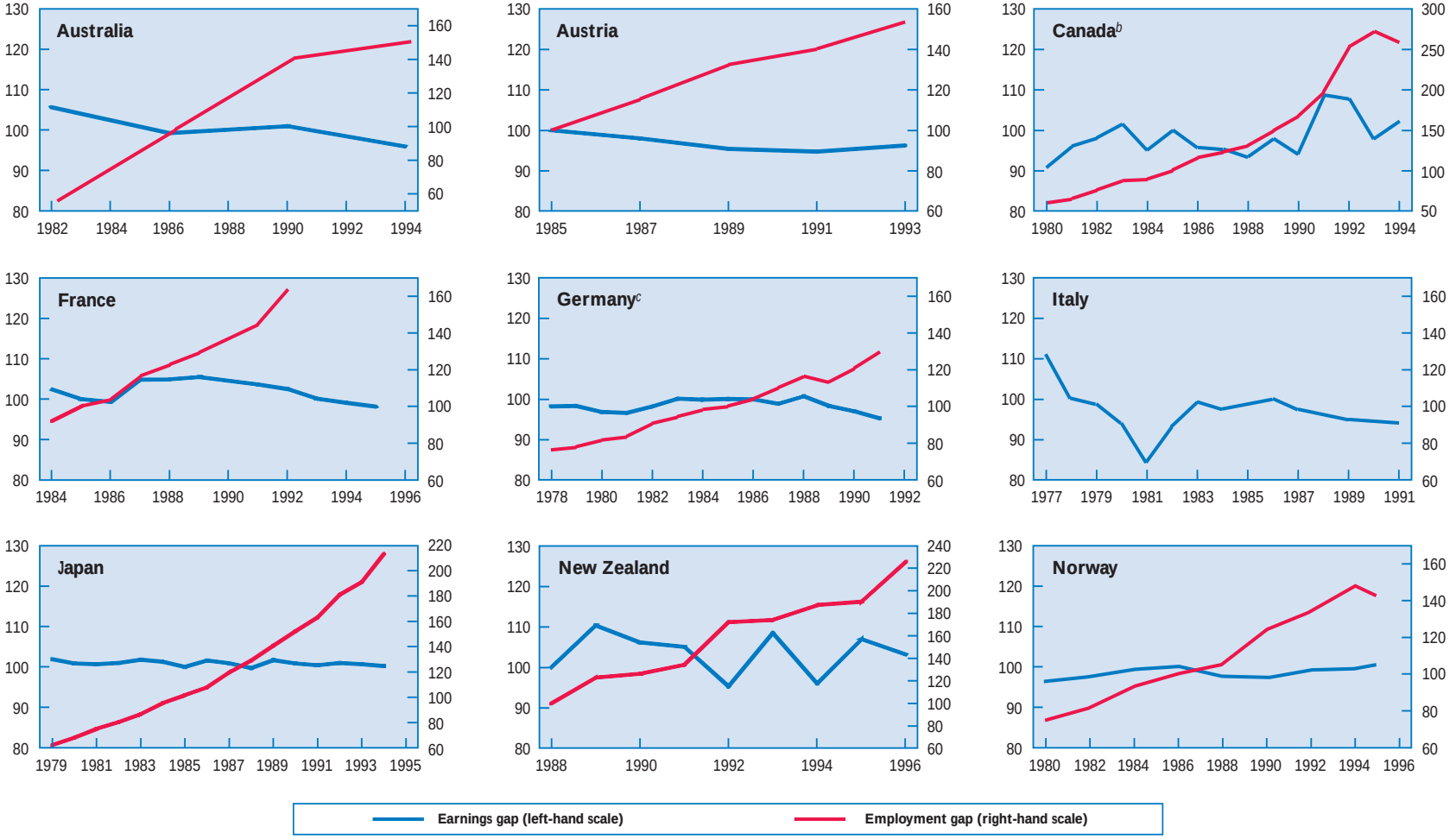
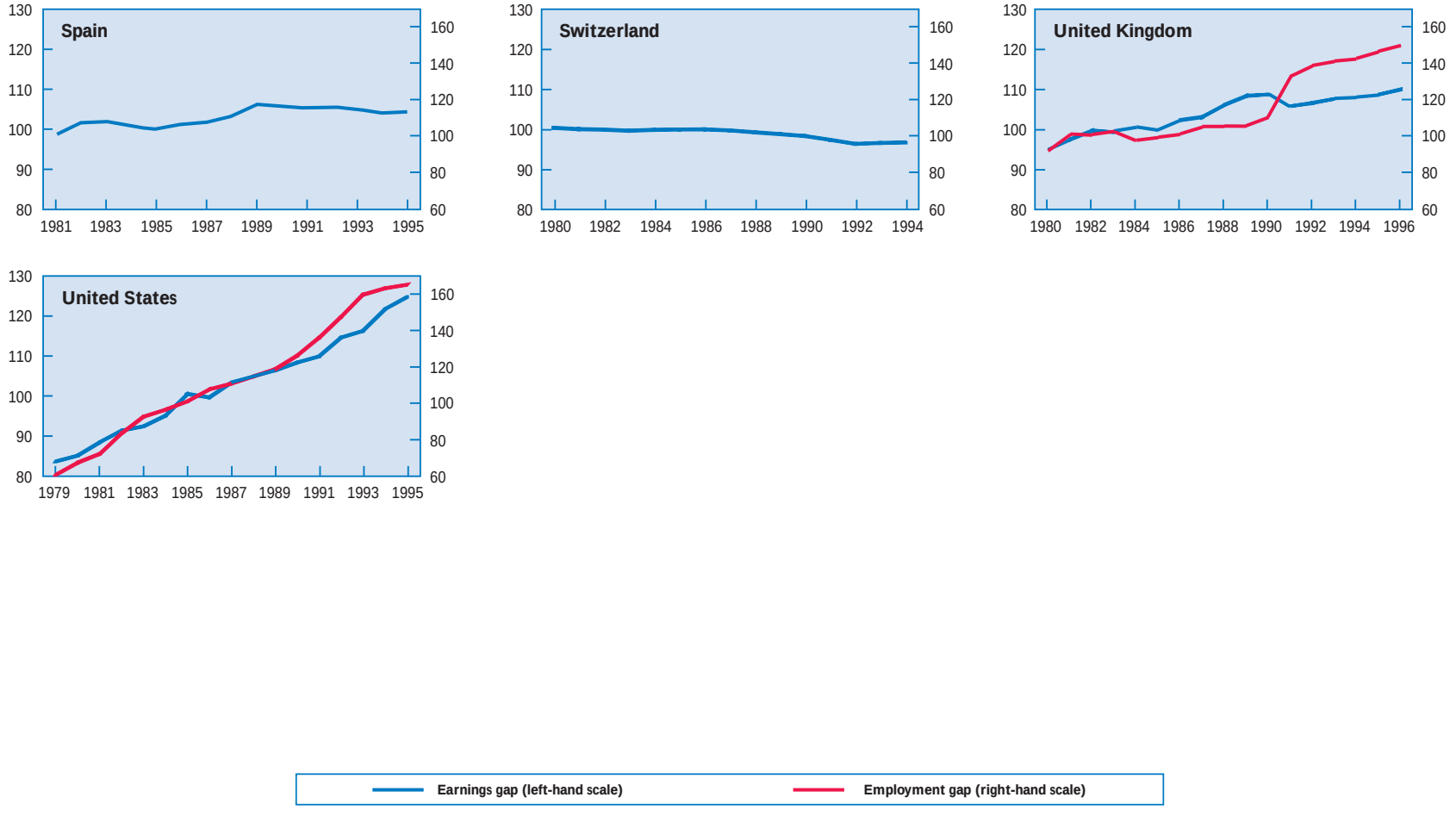


Chart 4.2a. *(cont.)*

Evolution of earnings and employment differentials by skill category: whole economy

1985 = 100[a]

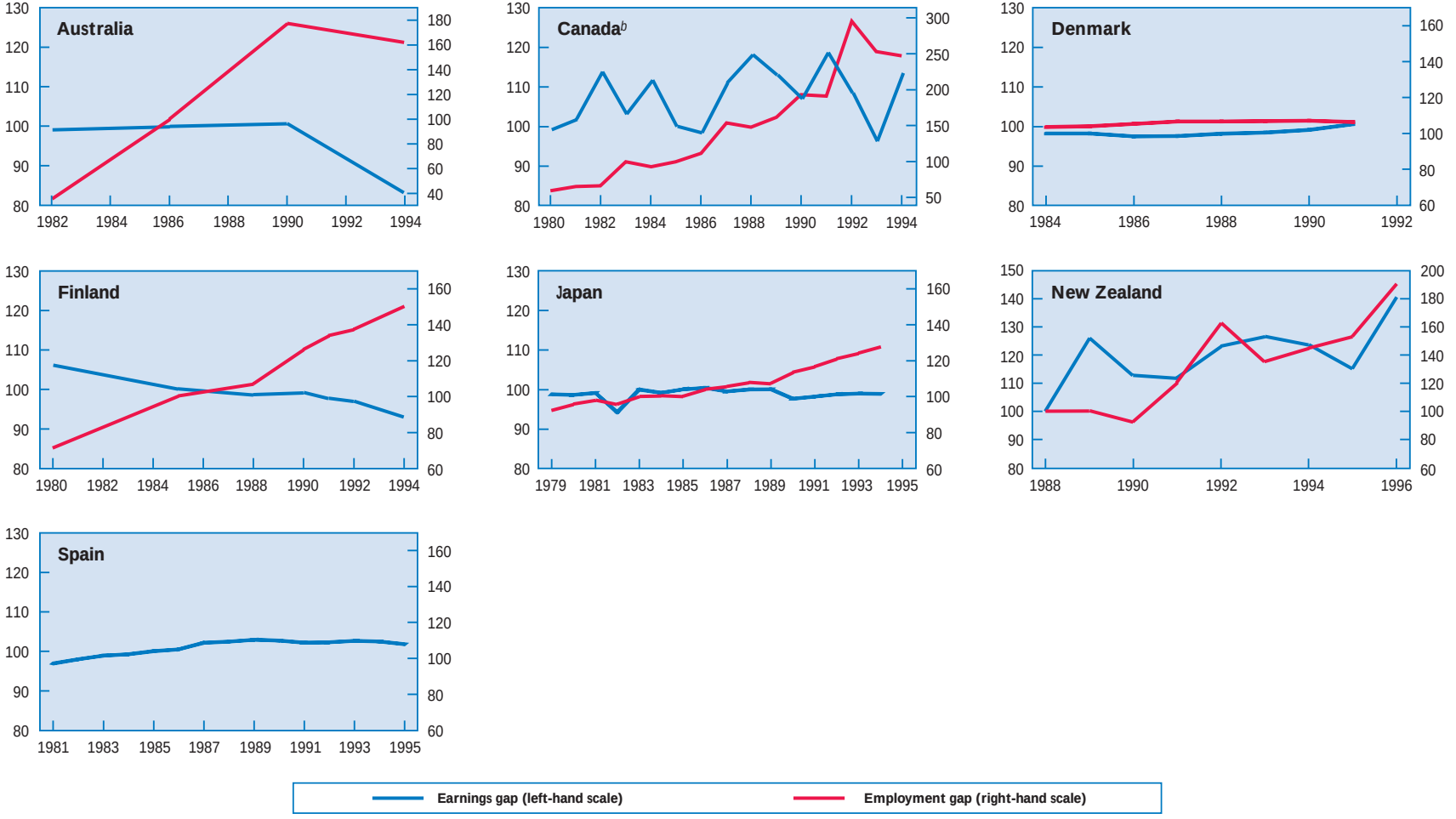


a) 1986 = 100 for Australia, Italy and Norway; 1988 = 100 for New Zealand.
b) For Canada, the low-education group is defined as ISCED 0/1 (*i.e.* up to primary education) due to a change in definition of ISCED 2 in 1988.
c) Data refer to western Germany.
Note: The earnings (employment) gap is defined as the ratio of earnings (employment) of high-skilled workers to earnings (employment) of low-skilled workers. The figures refer to educational attainment for all countries except France, Norway, Spain and Switzerland, for which the data refer to occupational groups.
Source: See Annex 4.A.

Chart 4.2*b*.

Evolution of earnings and employment differentials by skill category: manufacturing sector

1985 = 100[a]



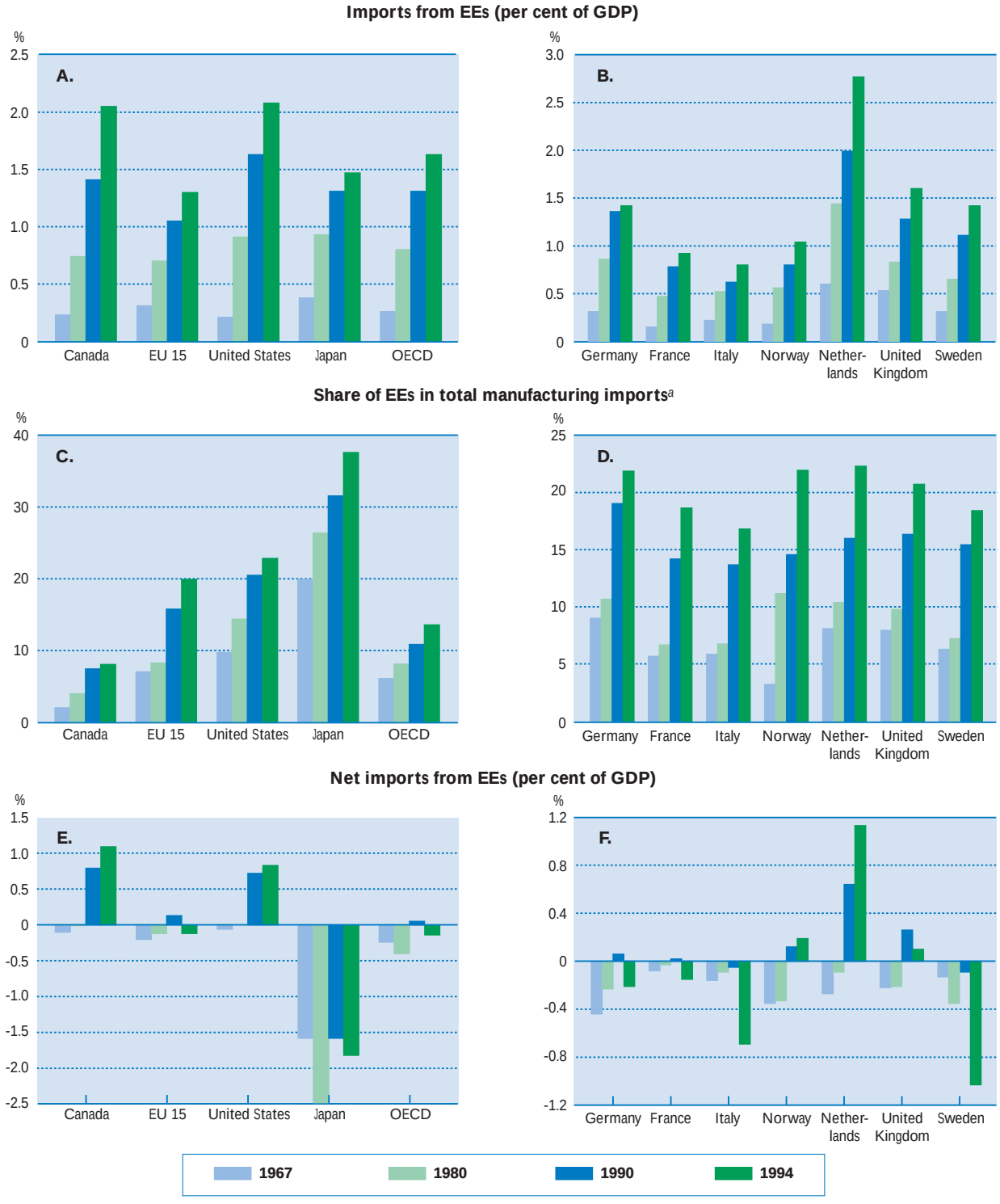
a) 1986 = 100 for Australia; 1988 = 100 for New Zealand.

b) For Canada, the low-education group is defined as ISCED 0/1 (*i.e.* up to primary education) due to a change in definition of ISCED 2 in 1988.

Note: The earnings (employment) gap is defined as the ratio of earnings (employment) of high-skilled workers to earnings (employment) of low-skilled workers. The figures refer to educational attainment for all countries except Denmark, Japan and Spain, for which the data refer to occupational groups.

Source: See Annex 4.A.

Chart 4.3.
Trends in OECD manufacturing trade with emerging economies (EEs)



a) Manufacturing imports from the EU 15 countries are excluded from the calculations.
Source: CHELEM database 1996, Centre d'études prospectives et d'informations internationales (CEPII), Paris.

54 per cent of the total, respectively. In addition, the share of EEs in total manufacturing imports increased for all countries considered, from 4 per cent in 1967 to 14 per cent in 1994 (Chart 4.3, C).

OECD manufacturing exports to EEs have increased even faster than their imports from EEs, especially in the 1990s. As a result, the OECD was for most of the period – except in the late 1980s – a net exporter (see Chart 4.3, E, net exports being shown as negative net imports). In particular, Japan, which imports the most from the EEs, exports even more to them: the value of its *net* exports in 1994 amounted to 1.8 per cent of GDP. The European Union was also a net exporter for most of the period, though by a very small margin. This contrasts with the figures for the United States and Canada, whose net imports in 1994 amounted to about 1 per cent of GDP.

Trade patterns across individual European countries are very similar to the European Union total (see Chart 4.3, B, E and F). In particular, looking at F, most European countries are net exporters of manufactures to the EEs, with the exceptions of the Netherlands, Norway and the United Kingdom (with a decline in 1994).

In sum, if trade balances are the main determinant of labour market outcomes, one would expect the United States, Canada and the Netherlands to have been most affected by import pressures from EEs. Overall, the picture that emerges here is one of a growing, but balanced, integration of the EEs in OECD trade.

C. SECTORAL COMPOSITION OF TRADE WITH THE EMERGING ECONOMIES

The links between trade and labour markets are complex. It is not correct to infer causality directly from the observed parallel increases in trade with EEs on the one hand and unemployment and the dispersion in relative earnings in OECD countries on the other. The stylised facts presented earlier show a more complicated picture. Likewise, the fact that trade with the EEs is relatively balanced and represents only a very small share of OECD GDP does not necessarily rule out the possibility that such trade may have had a significant labour market impact. Even when trade is balanced overall, some sectors may be net exporters while others are net importers and thus are subject to foreign competition pressures. Workers may not easily move from import-competing sectors to export sectors, so that even overall balanced trade could result in transitory labour-market problems. And, as will be seen later, longer-run effects cannot be excluded *a priori* when, for example, the labour content of import-competing sectors is different from that of export sectors.

This section addresses several inter-related questions: What sectors face import competition from the EEs? Is the production process of those sectors characterised by relatively low earnings and/or a high intensity of unskilled labour? Conversely, what are the characteristics of the sectors that export to the EEs? To answer these questions fully, appropriate indicators of ''skill'' intensity at a detailed sectoral level would be needed. Since such indicators are not available, crude proxies such as wage levels and the incidence of operative labour (*i.e.* production labour) by sector are used. Despite these severe statistical limitations, available evidence enables some tentative conclusions to be drawn:

- a sectoral breakdown of imports from EEs suggests that, in most OECD countries, their incidence is relatively high in six sectors: textiles and apparel; wood products; rubber and plastics; computer equipment; transport (other than aircraft and motor vehicles); and a variety of light consumer products such as toys, ranged in the category ''other manufacturing''.[9] As shown in Table 4.2, these sectors are all *net* importers, *i.e.* the value of imports from the EEs exceeds the value of the sector's exports to these countries. There are very few exceptions to this general pattern (in Belgium, the ''other manufacturing'' sector is a net exporter; Japan is a net exporter to the EEs of computer equipment and ''other transport'' material; and New Zealand is a net exporter of wood products). The level of imports in these sectors varies considerably across countries. Import intensities are generally high for Australia, Canada, Japan (except in computer equipment and ''other transport'' material), New Zealand and the United States. Import intensities are lower in many European Union countries, in particular Austria, Belgium, France, Italy, Portugal and Spain. In sum, there are only slight differences among OECD countries in the nature of the sectors which are typically above-average net importers from the EEs. Hereafter, these sectors are called ''import-competing'' sectors;[10]
- average earnings in import-competing sectors are much lower than the average in the total manufacturing sector for all OECD countries under study and indeed almost all import-competing sectors can be characterised as low-wage ones (Table 4.3);[11]

Table 4.2. **Sectors with a high incidence of net imports from emerging economies (EEs), 1993**

Net imports from EEs as a per cent of trade turnover[a]

	Textiles, apparel, footwear and leather	Wood products	Rubber and plastics	Computer equipment	Other transport equipment	Other manufacturing[b]
Australia	27.5	24.3	31.8	23.1	19.3	26.4
Canada	34.8	0.6	10.8	12.4	8.7	22.6
European Union						
Austria	8.1	0.8	3.2	12.4	5.0	6.7
Belgium	3.9	4.7	3.4	2.3	0.6	–7.5
Denmark	13.9	2.0	5.4	5.4	8.3	15.0
Finland	15.3	0.5	7.3	13.8	13.4	13.8
France	9.1	6.2	6.4	9.0	6.9	14.1
Germany	14.9	5.6	6.5	13.7	7.5	14.6
Italy	1.1	1.8	4.7	5.9	3.0	1.8
Netherlands	13.4	13.9	6.7	7.7	8.0	19.0
Portugal	2.3	1.1	5.8	7.5	3.5	10.9
Spain	10.7	4.1	6.1	6.7	9.3	19.7
Sweden	23.6	1.4	5.5	8.1	8.9	17.3
United Kingdom	21.4	15.3	12.8	9.0	10.6	1.9
EU unweighted average	11.5	4.8	6.2	8.5	7.1	10.6
Japan	36.8	42.0	5.7	–5.1	–30.2	14.3
New Zealand	7.2	–1.9	18.2	22.6	36.1	27.3
Norway	23.1	3.3	8.7	11.2	17.0	20.2
United States	46.1	16.2	39.3	22.8	16.8	33.5
OECD unweighted average	17.4	7.9	10.5	10.5	8.5	15.1

a) For each sector, the figures refer to imports from EEs minus exports to EEs expressed as a ratio of trade turnover (calculated as total exports of the sector plus total imports of the sector).
b) The ''other manufacturing'' sector includes mainly consumer products, such as toys.
Source: See Annex 4.A.

Table 4.3. **Earnings and skill intensity of import-competing sectors, 1990**[a]

	Average earnings of the sectors as a per cent of average manufacturing earnings	Share of operatives in the total wage bill in import-competing sectors[b]
Australia	91.4	1.01[c]
Canada	86.1	1.04
European Union		
Austria	82.5	1.01
Belgium	80.5	1.14[c]
Denmark	84.3	1.04[c]
Finland	88.9	1.10
France	89.1	..
Germany	79.5	1.03[c]
Italy	87.0	..
Netherlands	79.4	..
Portugal	85.5	1.05[c]
Spain	80.5	1.09
Sweden	83.8	1.04
United Kingdom	85.4	1.10
EU unweighted average	83.9	1.07
Japan	74.8	0.91
New Zealand	87.3	..
Norway	86.3	1.06[c]
United States	83.6	1.13
OECD unweighted average	84.8	1.04

a) Import-competing sectors are defined as the sectors for which the net imports from the EEs are higher than the average for total manufacturing.
b) Relative to the share of operatives in the total manufacturing wage bill.
c) 1980 instead of 1990.
Source: See Annex 4.A.

Table 4.4. **Sectors with a high incidence of net exports to emerging economies (EEs), 1993**

Net exports to EEs as a per cent of trade turnover[a]

	Chemical products	Drugs and medicines	Machinery and equipment	Motor vehicules	Aircraft	Iron and steel
Australia	1.0	4.8	1.3	–1.2	–0.2	25.7
Canada	3.1	–0.1	0.2	–0.3	1.2	0.3
European Union						
Austria	0.5	4.7	4.2	0.7	–0.2	1.9
Belgium	2.3	2.1	2.4	0.5	0.0	3.8
Denmark	1.0	0.9	6.1	–0.2	8.7	–0.2
Finland	1.6	0.5	13.9	1.1	0.2	4.5
France	2.5	2.1	4.2	2.0	9.0	3.0
Germany	3.5	2.3	9.7	3.7	0.5	5.0
Italy	1.2	3.2	12.9	1.3	–0.4	6.4
Netherlands	1.5	2.8	3.6	0.1	13.0	2.5
Portugal	–1.0	0.7	–1.6	–0.9	8.8	2.2
Spain	0.9	2.8	2.9	0.0	–2.2	10.2
Sweden	1.6	1.8	5.7	5.2	2.3	5.1
United Kingdom	1.9	3.0	5.2	1.2	2.8	5.6
EU unweighted average	1.5	2.2	5.8	1.2	3.5	4.2
Japan	26.3	3.9	39.8	13.8	0.7	39.0
New Zealand	–3.7	0.0	–1.5	–1.1	0.6	4.6
Norway	0.4	1.1	2.4	0.0	9.3	2.7
United States	8.8	3.0	7.1	1.2	24.1	–7.7
OECD unweighted average	3.0	2.2	6.6	1.5	4.3	6.4

a) For each sector, the figures refer to exports to EEs minus imports from EEs expressed as a ratio of trade turnover (calculated as total exports of the sector plus total imports of the sector).

Source: See Annex 4.A.

Table 4.5. **Earnings and skill intensity of export sectors, 1990**[a]

	Average earnings of the sectors as a per cent of average manufacturing earnings	Share of operatives in the total wage bill in export sectors[b]
Australia	113.2	0.98[c]
Canada	112.6	0.97
European Union		
Austria	105.3	0.99
Belgium	108.2	0.95[c]
Denmark	109.0	0.99[c]
Finland	107.8	0.99
France	107.8	..
Germany	109.8	0.99[c]
Italy	113.0	..
Netherlands	105.7	..
Portugal	105.5	..
Spain	118.8	0.98
Sweden	109.6	..
United Kingdom	105.2	0.95
EU unweighted average	108.8	0.98
Japan	113.1	1.02
New Zealand	107.2	..
Norway	104.3	0.91[c]
United States	115.8	0.82
OECD unweighted average	109.6	0.96

a) Export sectors are defined as those for which net exports to the EEs are higher than average for total manufacturing.
b) Relative to the share of operatives in the total manufacturing wage bill.
c) 1980 instead of 1990.
Source: See Annex 4.A.

– available data on the wage bill lend support to the preceding results and suggest that import-competing sectors are, *on average*, unskilled-labour-intensive. Table 4.3 gives the share of the wage bill paid to operatives in the total wage bill of import-competing sectors.[12] With the notable exception of Japan, the share of operatives in the total wage bill of these sectors appears, on average, to be high compared with the same share for manufacturing as a whole;
– whereas imports from EEs are often concentrated in a few products, OECD exports to these countries tend to be more broadly-based. That said, the incidence of exports to the EEs is relatively high in sectors such as chemical products, drugs and medicines, machinery and equipment, motor vehicles, aircraft, and iron and steel (Table 4.4). Most OECD countries are net exporters to the EEs in these sectors. Exports patterns are, however, somewhat different in Australia, Canada, New Zealand and Portugal. Table 4.4 also shows that the EEs represent major markets for Japanese chemical products, machinery and equipment, and iron and steel. Hereafter, the sectors for which net exports to the EEs are higher than average are called "export" sectors;[13] and
– given the evidence on import-competing sectors, the fact that export sectors are, on average, relatively high-wage sectors is not surprising (Table 4.5). Likewise, in export sectors, the share of operatives in the total wage bill is relatively low – Japan being, again, an exception.

Overall, available evidence suggests that import-competing sectors are characterised by relatively low earnings and a relatively high incidence of production workers. The reverse is true in the case of export sectors. Trade between OECD countries and the EEs seems to be mainly of the inter-industry type. This points to differences in resource endowments as one key determinant of trade between OECD countries and the EEs in line with the standard Heckscher-Ohlin-Samuelson theory of trade. There are, however, important departures from this general pattern, suggesting that other determinants of trade, such as economies of scale and product differentiation are also important. For instance, EEs supply a large and growing proportion of OECD imports of computers and office machinery, which are relatively skilled-labour-intensive sectors, characterised by relatively high earnings.

D. ESTIMATING THE POSSIBLE LINKS BETWEEN TRADE WITH EMERGING ECONOMIES AND OECD WAGES AND EMPLOYMENT

1. Channels of transmission between trade and labour markets

According to conventional trade theories, freer trade between skilled-labour-abundant OECD countries and unskilled-labour-abundant EEs will typically lead to a decline in the relative price of unskilled-labour-intensive products imported from low-wage countries. This, in turn, will cause a more-than-proportional cut in the relative wage of unskilled labour – the so-called Stolper-Samuelson theorem, discussed in detail in Box 1. Trade prices, and not trade volumes or import-penetration ratios, are considered as the central channel of transmission for analysing labour-market impacts because the latter are endogenous whereas the former are not. A consensus seems to be emerging in the literature regarding this approach as being the most theoretically cogent [Baldwin (1994); Bhagwati (1995); Courakis *et al.* (1995); Davis (1996*a*, 1996*b*); Krugman (1995*a*, 1995*b*); Leamer (1996*a*); Richardson (1995)].

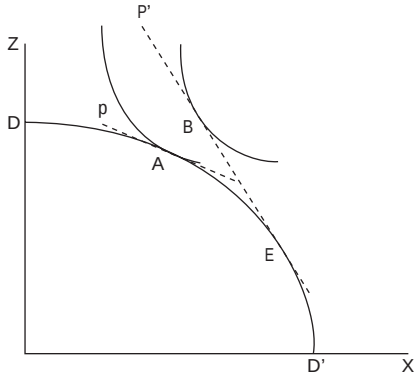
Even though changes in trade prices are potentially an important determinant of changes in relative wages, they are by no means the only ones. Trade can also affect labour markets in the absence of a change in trade prices via the following channels:

– increased international competition with low-wage countries may lead firms in import-competing sectors to invest in labour-saving technologies. As a result, labour demand in unskilled-labour-intensive sectors will be lower than it otherwise would have been. This has the implication that standard "factor-endowment" calculations of the employment effects of trade are likely to under-estimate the contribution of trade and over-estimate that of technical change [Martin and Evans (1981)]. However, technological change may not necessarily be related to trade. Moreover, technological change may be related to international competition in general, not necessarily trade with low-wage countries;
– it has become technically possible to fragment production processes into geographically separate steps, allowing producers to import labour-intensive inputs from low-wage countries – the so-called "outsourcing" process [Feenstra and Hanson (1996); Krugman (1995*a*)]. Outsourcing reduces unskilled-labour demand within firms at unchanged trade prices; and

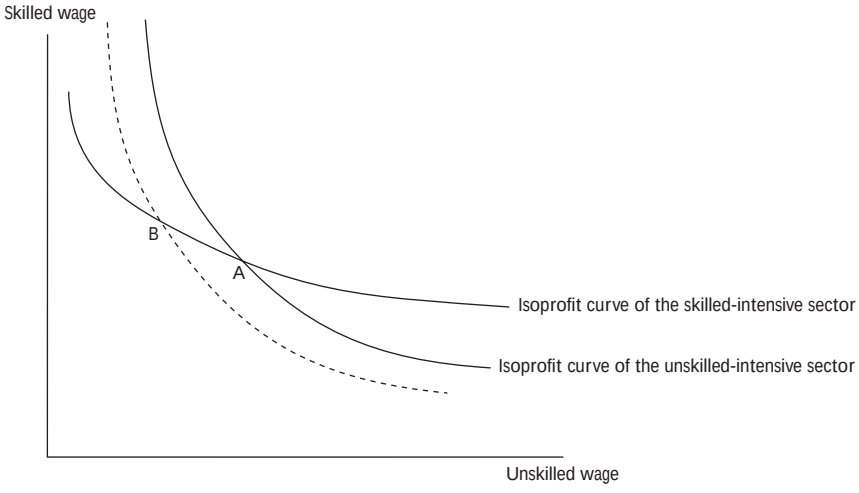
Box 1

Trade, wages and employment: key predictions from conventional trade theories

It is assumed that the typical OECD country has two production factors, namely skilled labour and unskilled labour, and two sectors: a skilled-labour-intensive sector, producing X, and an unskilled-labour-intensive sector producing Z. The production possibilities frontier DD' is given in the chart below. The level of production of each good prevailing in the absence of trade is given by the intersection point (A) between the isocost curve (P) and the production frontier. The slope of the isocost curve indicates the relative price of the two goods. Trade liberalisation can be expected to change relative prices to P' and to shift the patterns of production in line with comparative advantage, thereby increasing consumption possibilities and total welfare: the shift in relative prices leads to a shift in production from A to E, allowing an increase in consumption for the nation as a whole (from point A to point B) – an illustration of the well-known "gains from trade".



In addition, there will be distributional effects from freer trade. In order to illustrate them, it is useful to consider the Lerner-Pearce Diagram, which shows the isoprofit curves associated with the equilibrium depicted above. Isoprofit curves provide the combinations of factor prices, in this case, the wages of skilled and unskilled labour, that are consistent with constant (zero) profits in each sector. The shape of the curves depends crucially on the price level of each good. In the absence of trade, equilibrium is given by the intersection A between the isoprofit curves. Assume that the price of the unskilled-labour-intensive good falls as a result of trade liberalisation. The isoprofit curve of this good shifts inwards, leading to a new equilibrium at point B, where *real* unskilled wages are lower and *real* skilled wages higher than in the no-trade case. This indicates the relationship, known as the Stolper-Samuelson theorem, between changes in goods' prices and changes in factor prices.



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However, for the Stolper-Samuelson theorem to hold, certain conditions must be met. First, trade with relatively low-wage countries is assumed to be of the *inter-industry* type. In other words, the OECD is assumed to export certain products (typically of the skilled-labour-intensive type) and to import other ones (typically unskilled-labour-intensive). Such trade is motivated by differences in resource endowments. The existing evidence reviewed above shows that this is indeed largely the case. If trade was of the intra-industry type (in which case trade involves simultaneous import and export of similar products), the impact on the demand for unskilled labour would be ambiguous – there are instances where a reverse Stolper-Samuelson effect might occur [Oliveira Martins (1994)]. Second, even in a context of inter-industry trade, for the Stolper-Samuelson effect to operate, there must be *incomplete* specialisation of production, *i.e.* the OECD countries must continue to produce the imported goods after trade is opened up. If, instead, complete specialisation were to occur, further increases in trade with low-wage countries would be beneficial to *all* workers, including the unskilled [Bhagwati (1995)]. Third, the theorem assumes perfect wage flexibility. But when relative wages do not adjust, the shift in trade prices will translate into relative employment changes instead of relative wage changes.*

It is also useful to consider the effects of different types of technical change on skilled and unskilled wages with *given* world prices of traded goods. A standard result is that lower productivity in the unskilled-labour-intensive sector would yield distributional effects similar to those of falling prices of unskilled-labour-intensive products. For instance, higher productivity levels in the skilled-labour-intensive sector would put upward pressure on skilled wages – the isoprofit curve for the skilled-labour-intensive sector would move upwards, leading to a rise in skilled wages and a fall in unskilled wages.

In this theoretical framework, *factor-biased* technical change, as opposed to sector-specific technical change, plays no direct role. This is because relative wages depend solely on goods' prices and sectoral productivities. This result is extensively discussed in Leamer (1994 and 1996*b*), who concludes that the consensus view that unskilled labour-saving technical change is mainly responsible for the rise in wage inequalities is unfounded. There are instances, however, where relative wages will respond to factor-biased technical change. For example, this would occur when factor-biased technical change is a world-wide phenomenon, which leads to significant changes in world prices of traded goods [Krugman (1996)]. Also, if the assumption that factors are perfectly mobile between sectors is relaxed, factor-biased technical change can affect relative wages [Jones and Engerman (1996)].

In sum, according to conventional trade theories, the decline in unskilled-labour wages can be explained by either lower relative prices of unskilled-labour-intensive goods, or slower technical change in the production of such goods (or both simultaneously). Changes in relative goods' prices, in turn, may reflect freer trade between OECD countries and low-wage countries as well as unskilled-labour-saving technical change taking place world-wide.

* With rigid wages, employment in the unskilled-labour-intensive sector will fall while the opposite occurs in the other sector. Given that relative earnings do not change, the sectoral employment changes are insufficient to prevent the emergence of unskilled unemployment. It should finally be noted that the Stolper-Samuelson theorem rests on other assumptions, including perfect competition, absence of economies of scale, infinitely elastic labour demand and perfect factor mobility.

– actual or potential "delocalisation" of production from high-wage to low-wage locations abroad via foreign direct investment may also exert downward pressure on the demand for the factor used more intensively in the domestic industries concerned, typically unskilled labour.

2. Evolution of trade prices in import-competing and export sectors

Beyond the theoretical arguments already highlighted, international comparisons of the impact of trade on labour markets have long been hampered by the lack of trade-price data at a detailed sectoral level. Indeed, most studies focus on the United States, the only country for which such data have been readily available up to now. This limitation no longer exists. Based on a data base recently produced by INSEE, the French National Statistical Institute, it is possible to calculate sectoral trade prices for nearly all OECD countries.[14] More specifically, evidence is presented below on trade prices for both import-competing and export sectors.

The focus is on import prices of import-competing sectors versus export prices of export sectors and not on unskilled-labour-intensive versus skilled-labour-intensive sectors. There are two rea-

sons for this. First, the aim of the chapter is to examine the impact of trade with EEs on OECD labour markets. Second, and more importantly, little is known about the "skill content" of products imported from EEs. Sectoral data on operatives' wages, a rough proxy for skill content, are available only for OECD countries, making it impossible to estimate the labour content of products imported from the EEs. It has been shown, however, that technologies in import-competing sectors are, on average, unskilled-labour-intensive; this is suggestive that products imported from the EEs in those sectors are unskilled-labour-intensive, as well. This assumption seems a reasonable one given the relative abundance of unskilled labour in the EEs.

Table 4.6 shows the evolution over the period 1980 to 1990 of import prices of import-competing sectors and export prices of export sectors. Between 1980 and 1990, import prices in import-competing sectors fell in Japan by 7.5 per cent, cumulatively, while they rose in all other countries (the increase ranging from under 1 per cent in the United States to nearly one-third in Australia). The unweighted average increase for the OECD countries shown was 18 per cent. During the same period, export prices in export sectors increased in all the countries. The cumulative increase ranged from almost 10 per cent in Australia to over 40 per cent in Japan, the unweighted average increase being around 30 per cent. It is noteworthy that the average import price in import-competing sectors declined relative to the export price in export sectors in almost all countries; Australia, the Netherlands and Norway are the only exceptions to this general pattern. For the OECD countries as a whole, the unweighted average decline in the relative trade price of import-competing sectors was nearly 12 per cent.

Based on value-added price data for the United States, Sachs and Shatz (1995, 1996) also find that prices in import-competing sectors fell significantly between 1979 and 1990. Other studies, however, find little evidence that prices of unskilled-labour-intensive goods fell over the same period [Lawrence and Slaughter (1993); Lawrence (1996)].

Table 4.6. **Evolution of trade prices, 1980-1990**

Percentage change

	Import prices[a]	Export prices[b]	Trade price gap[c]	Trade price gap: excluding the prices of office and computer equipment (OCE)	Trade price gap: excluding the prices of OCE and petroleum-based products
Australia	31.3	9.5	–21.8	–21.3	–26.8
Canada	14.0	38.0	24.0	10.0	12.8
European Union					
Austria	26.4	27.8	1.4	–3.5	–3.3
Belgium	18.0	26.5	8.5	7.3	13.0
Denmark	10.9	39.1	28.2	25.4	30.4
Finland	27.6	34.0	6.4	5.5	7.7
France	20.9	38.0	17.1	17.8	20.0
Germany	20.2	40.4	20.2	18.7	19.8
Italy	24.0	32.7	8.7	7.7	12.7
Netherlands	19.3	14.8	–4.5	–5.7	3.5
Portugal	15.9	21.2	5.3	5.7	12.9
Spain	21.0	33.9	12.9	11.6	23.5
Sweden	25.2	37.6	12.4	14.0	19.4
United Kingdom	19.3	28.2	8.9	8.9	13.6
EU unweighted average	20.7	31.2	10.5	9.5	14.4
Japan	–7.5	43.2	50.7	55.7	23.6
New Zealand	23.1	25.0	1.9	2.1	4.2
Norway	14.4	10.6	–3.8	–18.1	–9.2
United States	0.7	30.3	29.6	14.6	17.3
OECD unweighted average	18.0	29.5	11.5	8.7	10.8

a) Import prices are average unit values [*i.e.* the ratio of imports at current prices (in US$) to imports at constant prices] of import-competing sectors.
b) Export prices are average unit values [*i.e.* the ratio of exports at current prices (in US$) to exports at constant prices] of export sectors.
c) This is calculated as the difference between columns 2 and 1. It represents the gap, in per cent, between the import price of import-competing sectors and the export price of export sectors. A positive (negative) figure indicates that export prices rose (fell) with respect to import prices.
Source: See Annex 4.A.

These conflicting results can be partly explained by the way the skill content of the different sectors is determined and measured. In addition, some authors exclude computers, a skilled-labour-intensive product, from the calculation [Sachs and Shatz (1995)]. In order to assess whether the behaviour of computer prices affects the estimated trade-price gap presented here, trade prices have also been calculated excluding the price of the office and computer sector. The main result, namely that a gap has been created between the price of import-competing sectors and the price of export sectors over the period 1980-1990, remains unaltered and the OECD average gap falls slightly to almost 9 per cent (Table 4.6, fourth column). In the United States, where computer prices have recorded a spectacular fall, the trade-price gap is substantially reduced. When the prices of petroleum-based products, which tend to exhibit large volatility, are also excluded from the calculation, the average trade-price gap is increased slightly (Table 4.6, last column).

Altogether, judged by the trade-price evidence presented here and the finding that import-competing sectors tend to be unskilled-labour-intensive, the possibility that trade with the EEs may have contributed to the labour market problems of unskilled workers in OECD countries cannot be excluded *a priori*.

3. Trade prices, wages and employment

Lower trade prices, however, do not necessarily mean lower wages. As noted above, in the case of complete specialisation, lower import prices will improve the real wages of all workers. When there is incomplete specialisation (*i.e.* when imported products compete with domestically-produced goods), lower import prices of unskilled-labour-intensive goods will exert downward pressure on domestic prices and, hence, on domestic labour demand for unskilled workers. But the extent to which this pressure translates into a fall in wages depends on a number of factors, including the nature of labour market institutions, regulations and practices:

- in countries where relative wages are flexible, reduced demand will tend to translate into lower wages for unskilled relative to skilled workers. Moreover, a given change in relative trade prices would be associated with a more-than-proportional change in relative wages, owing to the so-called "magnification effect" [Jones (1965)].[15] In the countries where wages are rigid (reflecting minimum wage laws, collective agreements, etc.), adjustment will typically take place through employment changes [Davis (1996*a*); Krugman (1995*a*)]; and
- if unskilled labour is assumed to be specific to the import-competing sector (which is probably more realistic than the assumption of infinitely elastic supply, at least in the short run), the effects of lower demand will be especially strong since, in the short-run, the ability of unskilled workers to move to other jobs or sectors will be hampered. The presence of sector-specific factors would thus strengthen the magnification effect [Jones and Engerman (1996)].

A review of the available empirical literature suggests that trade accounts for only a small proportion of the observed trends in wages and employment for unskilled workers in OECD countries (see Box 2). Most studies conclude that skill-biased technology is the main force at work. However, the empirical basis for this conclusion is not watertight. Since the effects of trade and technology may be inter-related, it is empirically very difficult to isolate their relative importance. Moreover, the measurement of skill-biased technological change is itself problematic. Empirical analysis to date has rested on very imperfect proxies for skill-biased technological change such as research and development expenditures or the ratio of production to non-production workers. In certain studies, large unexplained residuals have been interpreted as evidence of skill-biased technical change.

Chart 4.4 shows the evolution over the 1980s of relative trade prices, wages and employment for import-competing and export sectors. In the majority of the countries, the drop in the relative prices of import-competing sectors has been accompanied by either lower relative wages, lower relative employment or both. Conversely, therefore, the relative situation of workers in export sectors has improved.

At the same time, there is also a large measure of sectoral heterogeneity in the response of relative wages and employment to import-price changes. This may be explained by the fact that studies of the responses of firms to international competition suggest that, while some firms react by cutting labour costs (via lower wages and/or employment), others switch to an "upgrading" strategy. The latter involves a move to a higher-quality product (in search of a new market niche), the adoption of new management techniques and/or technical change [Lindbeck and Snower (1996); Locke *et al.* (1995)].

Though suggestive, any causality links (and, *a fortiori*, the direction of causality) obviously cannot be inferred from these associations. In order to

Box 2

A review of results from other studies

The three main empirical approaches used in the literature to investigate the links between trade and labour markets are: *i*) regression analysis, where changes in either employment or wages are estimated to be a function of changes in trade volumes and, in some studies, a proxy for technological change; *ii*) the so-called "factor-content" approach, which involves calculating how much skilled and unskilled labour would have been required to produce domestically the goods that are imported; and *iii*) empirical tests based on general equilibrium (Heckscher-Ohlin) trade theory. As shown in Table 4.7, the majority of studies to date conclude that trade can only account for a small proportion of observed labour market inequalities.

Studies based on regression analysis

In these studies, a first step is to decompose employment into within-industry and between-industry changes. The former are presumed to capture skill-biased technological change, whereas the latter would reflect trade-related factors. Evidence for the United States [Berman *et al.* (1994); Dunne *et al.* (1996); Katz and Murphy (1992); Machin *et al.* (1996)], and for the United Kingdom, Sweden and Denmark [Machin *et al.* (1996)] indicates that most of the change in both the share of non-production workers in employment and in the wage bill is due to within-industry changes. Since trade's main impact in these studies is assumed to fall on between-industry factor allocation, this finding suggests that trade has only played a very limited role in labour market inequality. From this perspective, the evidence seems to point to an explanation relying mainly on skill-biased technological change.[1]

The studies also carry out regression analyses and they find a statistically significant, but small, impact of trade, and they conclude that skill-biased technological change must be responsible – by default – for increasing inequality. Berman *et al.* (1994), Dunne *et al.* (1996) and Machin *et al.* (1995) introduce explicit proxy measures of technological change, such as R&D expenditures, the share of computer investment in total investment or some other measure of computer use. They find a strong impact of the technology measure on changes in the share of non-production workers in total sectoral employment or the sectoral wage bill.

These studies have been criticised for lacking a solid analytical basis in standard trade theory. In particular, the Heckscher-Ohlin-Samuelson framework provides few grounds for linking trade volumes with labour market outcomes [in particular, see Bhagwati (1995)]: any impact of trade on relative wages should work through changes in relative goods' prices. More importantly perhaps, only poor proxies for biased technological change are available.

Factor-content studies

Another approach is to calculate how much skilled and unskilled labour would have been required to produce domestically the goods that are imported from LDCs. Katz and Murphy (1992) and Sachs and Shatz (1994) find a very small labour market impact of trade in manufactures with low-wage countries, which is consistent with the fact that this trade only accounts for a 2 per cent share of the OECD countries' combined GDP.

The way in which the factor-content method is applied in the above studies has been criticised on the grounds that it underestimates the labour market impact of trade. For example, according to an influential study by Wood (1994), many of the manufactured products imported from LDCs are non-competing products which are no longer produced in industrialised countries. Hence, estimation must not be done using the "North's" labour requirements, but those of the "South" should be used instead, correcting for the higher factor costs in the North. In addition, actual or expected increased competitive pressures from cheap manufactures will push producers in the North to adopt unskilled-labour-saving techniques. When adjustments to observed labour coefficients are made to correct for these factors, Wood's estimates of the impact of trade with the South on employment in the North are at least ten times larger than those of previous studies.

Wood's results, which imply a much larger role for trade with LDCs in explaining changes in the demand for unskilled labour in OECD countries, have been criticised.[2] The assumed proportion of imports of manufactured products from the South that are non-competing seems too high in the light of available evidence [Baldwin (1994)]. In addition, Wood assumes that technology is the same in both the North and South. But if technology in the North is more efficient, as shown to be the case in Trefler (1993), then Wood's method will overestimate the amount of labour needed in the North to produce domestically the manufactured products imported from the South.

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(continued)

As pointed out by Leamer (1996*a*), the factor content of trade is jointly determined by tastes, technologies, factor supplies and the external goods market. Therefore, the factor-content approach yields meaningful results only when comparing two equilibria where tastes, technologies, and factor supplies are held constant.[3] Another issue is that this approach is mostly ad hoc, so that the results are very sensitive to small changes in method.

Studies based on general equilibrium analysis

The majority of the studies based on this approach test the theory's prediction that trade prices of unskilled-labour-intensive goods should have declined relatively to other prices, this being a necessary condition for the validity of the argument that trade has caused wage inequality. However, the evidence on trade prices is not conclusive. Empirical evidence on the possible links between trade prices, wages and employment is also inconclusive. For example, Neven and Wyplosz (1996) focus on France, Germany, Italy and the United Kingdom and find no strong evidence that the relative price of unskilled-labour-intensive commodities fell significantly over the period. For unskilled-labour-intensive commodities, however, relative domestic production prices tended to fall rather more than import prices. This may indicate that domestic industries have come under pressure from import competition and, as a result, have adjusted domestic prices more than would have been expected. Importantly, they also find evidence of restructuring in unskilled-labour-intensive industries, in terms of downsizing and of skill upgrading. Finally, they estimate a reduced-form equation for sectoral wages and employment and find that competition from developing countries affects an important number of industries.

This brief review of the literature suggests that the impact of trade on labour markets is especially difficult to assess. First, it is difficult to isolate the effects of trade from other factors, in particular technology.[4] Second, trade prices, which are considered as a key channel of transmission, may reflect other forces, as well as trade liberalisation. Moreover, trade effects may be conveyed through channels other than prices, such as outsourcing and ''delocalisation'', but there are very few studies of these latter channels. Third, most of the studies focus on the United States, one reason being that trade-price data were not readily available for other countries. However, despite these important caveats, the majority of the studies conclude that trade has played a small role in labour market outcomes, especially shifts in relative employment and wages for unskilled labour in OECD countries.

1. One way of reconciling the evidence of within-industry demand shifts with a trade-related explanation is the outsourcing hypothesis. For the United States, Feenstra and Hanson (1996) find that outsourcing can account for about 30 per cent of the increase in the non-production worker wage that occurred in the 1980s. However, meaningful tests of this hypothesis would require highly disaggregated trade and industry-level information. Such data do not exist for the moment.
2. See Wood (1995) for a response to his critics.
3. Lawrence and Evans (1996) argue that the net factor-content approach can be useful in a very particular case. Since the relationship between factor content and factor prices will hold if trade flow changes are due only to changes in trading opportunities, this approach can be used to approximate the labour market effects of a hypothetical situation in which the United States fully specialises in high-skill goods and with a fivefold increase in manufactured goods imports from developing countries. The study finds a substantial impact of trade on the relative wages of unskilled workers (–7.5 per cent), but this is assuming a unit elasticity of substitution between the different labour inputs, and ignoring other possible spillovers of trade, *e.g.* increasing scale economies, enhancing competition, transferring technology and increasing product diversity.
4. It has been argued that one way of distinguishing between trade and technology explanations is to look at the evolution of relative wages and employment of unskilled workers in LDCs. Indeed, in these countries, the Stolper-Samuelson effect would be expected to raise wages and employment of unskilled workers (*i.e.* the opposite of the result predicted for OECD countries). Unfortunately, the lack of reliable wage and employment data in LDCs makes it difficult to assess the validity of this prediction. According to the limited available evidence, it seems that relative wages of unskilled workers have declined also in some LDCs [Hanson and Harrison (1995); Revenga and Montenegro (1995); Robbins (1996)].

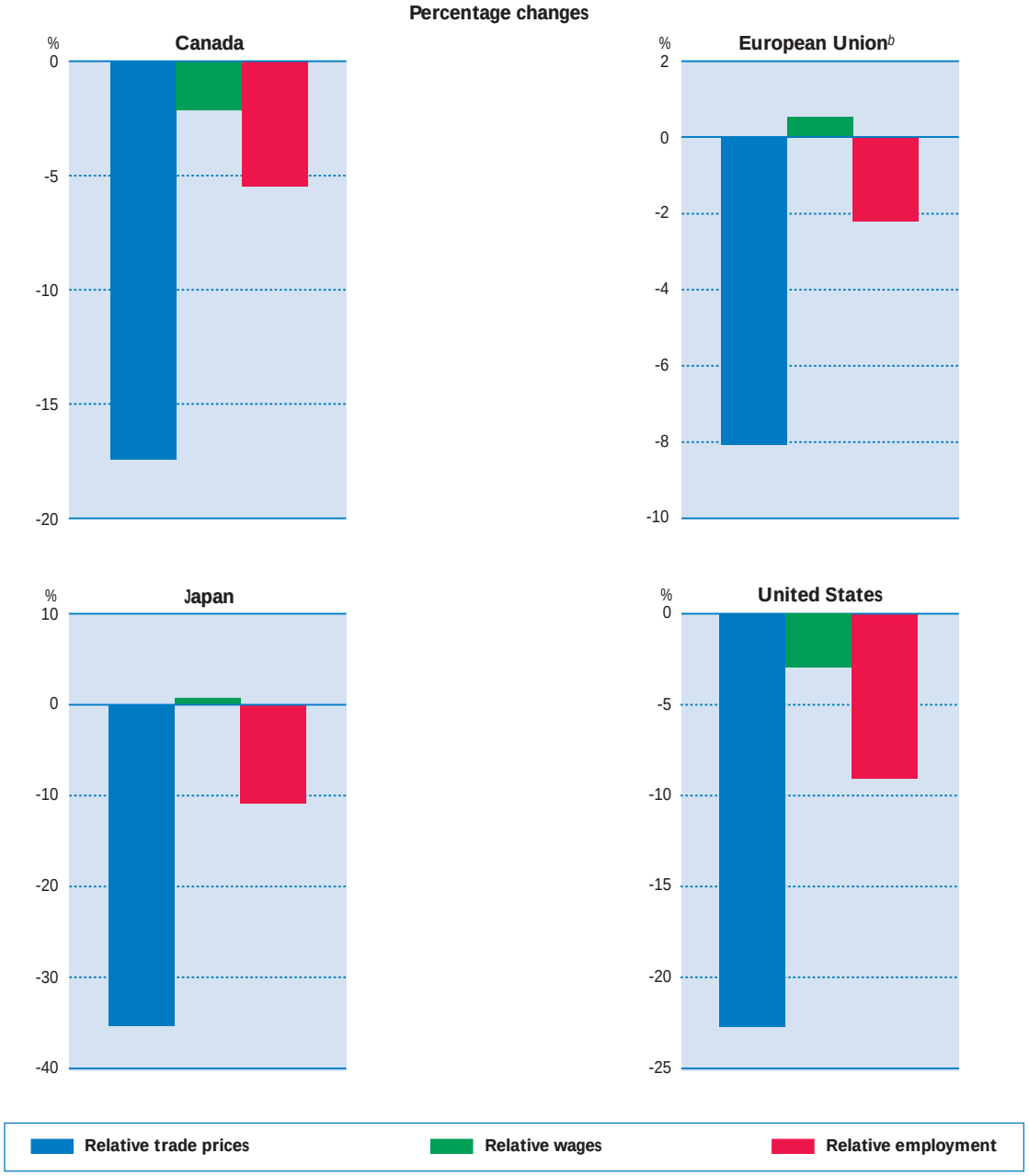
better gauge causality links, some simple econometric tests have been carried out:

– the impact of trade prices and total factor productivity (TFP) on wage inequalities in the total manufacturing sector has been tested by estimating an equation derived directly from the conventional trade model. In the model, wages of workers with the same skill should equalise or the original differentials be restored after a shock to trade prices such as trade liberalisation. Importantly, the

Chart 4.4.

Evolution of relative trade prices, wages and employment, 1980-1990[a]

Import-competing relative to export manufacturing sectors



a) Relative trade prices are ratios of import prices of import-competing sectors to export prices of export sectors; relative wages (employment) are ratios of labour costs per person (employment) of import-competing sectors to labour costs per person (employment) of export sectors.

b) The European Union data refer to unweighted averages of the eleven countries for which data is available *i.e.* Austria, Denmark, Finland, France, Germany (western), Italy, Netherlands, Portugal, Spain, Sweden and the United Kingdom.

Source: See Annex 4.A.

Table 4.7. **Summary of recent empirical studies on trade and labour markets**

Study	Theoretical framework	Dependent variable	Data	Main results
A. Studies using regression analysis				
Baldwin and Rafiquzzaman (1997)		Wage differential of non-production to production workers.	Canada: Canadian Census of Manufacturers, plant-level data for 1973-1992. Trade: net export intensity. Technology: number of technologies in use in different parts of the production process.	Trade and technology go hand in hand in explaining the increasing skilled/unskilled wage differential. Rising wage differentials are associated with both increased trade intensity and the types of technologies that are being used in the plant.
Berman, Bound and Griliches (1994)	No explicit model. The change in demand for skilled labour is decomposed into within and between industry effects.	Share of non-production workers in total employment and the wage bill, by industry.	US: CPS, Annual Survey of Manufactures and NBER Trade-Immigration-Labor market data for 1959-1987. Trade: import and export share of total manufacturing shipments. Technology: R&D expenditures/total manufacturing shipments taken as an indicator of high-tech capital in total manufacturing capital stock.	Most of the change and the acceleration in both the share of non-production workers in employment and the wage bill is due to within-industry upgrading unrelated to trade. Within-industry upgrading has occurred both in those manufacturing industries that invested heavily in computers during the 1980s and in those that are R&D intensive.
Dunne, Haltiwanger and Troske (1996)	Cost-minimisation solution to the optimal skill mix, then analysis of within and between plant changes in skill mix.	Share of non-production workers in total employment in manufacturing industries.	US: Longitudinal Research Database, compilation of the plant-level data from the Census of Manufactures and the Annual Survey of Manufactures, 1972-1988.	While observable indicators of changes in technology account for some of the secular increase in the average non-production employment share, unobservable factors account for most of the secular increase, most of the cyclical variation and most of the cross-sectional heterogeneity at the plant level. Results are interpreted as consistent with the view that individual plants have fundamentally changed the way they produce goods in terms of the mix of workers.

Table 4.7. **Summary of recent empirical studies on trade and labour markets** *(cont.)*

Study	Theoretical framework	Dependent variable	Data	Main results
Katz and Murphy (1992)	Supply-demand framework, different types of labour being treated as imperfect substitutes.	Real average wage changes and relative changes by education, gender and experience.	US: CPS data for 1964-1988.	The rapid secular growth in relative demand for skilled workers reflects within-industry demand shifts, and could be indicative of skill-biased technological change. Differences in time pattern of rising education earnings differentials and rising within-group inequality suggest that they are distinct phenomena. Using the factor-content method, the authors find that trade-induced changes in relative demand go in the right direction to explain wage differentials in the 1980s, but the effect is quite small.
Machin, Ryan and Van Reenan (1996)	Within/between industry decomposition, and derivation of an empirical specification of factor demands from a translog production function.	Non-production workers' wage bill and employment share.	US, UK, Denmark and Sweden: STAN (Structural Analysis) and UN data on manufacturing industries, 1973-1989. Technology: R&D intensity. Trade: import and export intensity. Skills: occupation and education.	Structural change within industries is associated with a common shock. Important skill-technology and physical capital/skill complementarities are found. No impact of industry import and export intensities is found, but labour market institutions seem to play an important role: in the UK and the US, industries with higher unionisation levels experienced less downgrading of the relative wages and employment of unskilled workers.
Cortes and Jean (1997)	Production function with skilled and unskilled labour and capital as inputs.	Change in productivity of skilled and unskilled labour.	France, Germany and the US for three periods: late 1970s, mid-1980s and early 1990s. Trade: import penetration, average propensity to export, etc. Distinction between "poor" economies and other trading partners.	For all three countries, the increase of the import penetration rate has a significantly positive impact on the labour productivity growth rate, and a small positive impact on the ratio of skilled to unskilled workers. The impact on productivity is almost twice as large when imports come from "poor" versus "rich" countries. The study does not investigate how changes in labour productivity translate into labour market outcomes.

Table 4.7. **Summary of recent empirical studies on trade and labour markets** *(cont.)*

Study	Theoretical framework	Dependent variable	Data	Main results
Revenga (1992)	Supply-demand framework. Workers are assumed to be mobile across industries, but not across skill groups.	Change in wages and employment by manufacturing sector.	US: panel of 38 manufacturing industries, 1977-1987. Import price data: quarterly fixed-weight Laspeyres index of transactions prices based on 1980 import market basket.	Import competition is estimated to have had a significant, but small, effect on both employment and wages: a 10 per cent reduction in the price of competing imports is associated with a drop of 2.5 to 4 per cent in employment and 0.5 to 1 per cent in wages.
B. Factor-content studies				
Lawrence and Evans (1996)	Net factor-content analysis and small simulation model to explore impact on US labour market of fivefold increase in imports of manufactured goods from NIEs.	Relative wages of workers with college/high-school education, and blue/white collar workers.	Simulations.	Impact of very large shifts in trade in the future is likely to be small, so that the comparatively smaller growth in trade with developing countries over the past 15 years is seen as unlikely to have had major impacts on OECD labour markets.
Wood (1994)	Net factor-content analysis. Counterfactual labour coefficients are based on "South" input coefficients and "North" labour costs.	Share of high and low educated workers by sector.	UN, OECD, National sources, for OECD and non-OECD countries.	The author finds an impact of trade almost ten times larger than previous studies. However, this result hinges on the assumption that all manufactures' imports other than processed primary products are non-competing, *i.e.* not produced in the "North"; and that labour productivity is the same in the "South" and in the "North".
C. Tests of Heckscher-Ohlin theory				
Baldwin and Cain (1997)	General equilibrium trade model relating changes in product prices to factor price changes and factor shares.	Changes in sectoral prices. Low- and high-skill defined as up to 12 years and 13 or more years of schooling.	US: input-output tables prepared by the Bureau of Economic Analysis for 79 2-digit sectors (all sectors, not just manufacturing); price series from the BLS; CPS data on education and wages by industry, for periods 1968-73, 1973-79 and 1979-91.	In 1979-91, trade could have been an important cause of the decrease in the relative wages of the least educated workers. The authors also find support for the hypothesis that technical progress that is unskilled-labour-saving and more rapid in manufacturing sectors intensive in the use of highly educated labour could have been the main force operating not only to decrease the relative wages of the low-educated group but also to widen the wage gap between the two groups.

Table 4.7. **Summary of recent empirical studies on trade and labour markets** *(cont.)*

Study	Theoretical framework	Dependent variable	Data	Main results
Lawrence and Slaughter (1993)	Heckscher-Ohlin.	Change in relative prices in low-skilled and high-skilled sectors. Low- and high-skill are defined as low and high education.	US: NBER Trade and Immigration data files, and BLS export and import price indices.	No evidence that the relative prices of goods that use production labour relatively intensively have declined. A positive association between the growth of total factor productivity and the relatively intensive use of non-production labour is found.
Neven and Wyplosz (1996)	Heckscher-Ohlin.	Sectoral wages and employment.	Eurostat data for France, Germany, Italy and the United Kingdom.	There is no evidence that the relative price of unskilled labour-intensive commodities has fallen since 1975. Overall, there is no significant impact of LDC import competition on sectoral wages and employment, but there are differences across the countries studied: Germany is adversely affected by LDC competition while the effect is positive in Italy and the United Kingdom.
Sachs and Shatz (1995)	Heckscher-Ohlin.	As in Lawrence and Slaughter (1993).	US: NBER CPS merged data files, and US Department of Commerce trade statistics. Measures of value-added prices rather than gross output prices and extension of data to 1995.	Falling relative prices of commodities intensive in low-skilled labour could have contributed to the widening of wage inequalities between skilled and unskilled workers.
Freeman and Revenga (1995)	Three main theoretical approaches linking trade and labour markets are considered: Heckscher-Ohlin, Ricardo and factor-content calculation. Attempt to see if the evidence bears out the theoretical implications of the different models.	Trade patterns, skill and wage structure by industry are investigated.	OECD: authors combine STAN, OECD data on bilateral trade and UNIDO and UN data on production, employment and earnings 1978-1990.	The authors find some moderate effects of import competition on the implicit value-added price deflators, but weak evidence that the impact of within-OECD trade is more important than the impact of non-OECD trade. Relative prices among industries have fallen when import shares rise and/or have a high percentage of operatives. They also find that import shares have a substantial negative effect on wages in the US and Canada, but a negligible effect in Europe.

Table 4.7. **Summary of recent empirical studies on trade and labour markets** *(cont.)*

Study	Theoretical framework	Dependent variable	Data	Main results
Courakis, Maskus and Webster (1995)	Heckscher-Ohlin model with technological progress.	International wage differentials and productivity changes in OECD countries.	World Bank and ILO data.	The authors argue that technology and globalisation are interrelated and that globalisation affects the diffusion of technology and relative technology changes. International differences in technology are seen as the main cause of the empirical failure of the Heckscher-Ohlin model. World-wide technological change is a more plausible source of downward pressure on wages and employment in OECD countries.
Lücke (1996)	Heckscher-Ohlin model with technological change. Test of Wood's hypothesis for Germany: has the disproportionate increase in unskilled unemployment in Germany been caused by expanding trade with LDCs?	Changes in stock and compensation of unskilled/skilled labour are proxied by the portion of employee compensation that exceeds the compensation paid to totally unskilled labour.	Germany: national accounts for manufacturing industry, 1970-1992.	Product prices have not turned against unskilled-labour intensive industries, nor has Germany increasingly specialized in human-capital-intensive goods.

model predicts that, under certain assumptions, lower relative prices of unskilled-labour-intensive goods should lead to lower demand for unskilled labour, while slower technological progress in unskilled-labour-intensive sectors would produce similar effects (see Box 1). The results of an attempt to estimate these predictions through an econometric equation are shown in the first column of Table 4.8. The equation's dependent variable is the ratio of operative wages to non-operative wages in the total manufacturing sector. The explanatory variables are *i)* the import price of import-competing sectors relative to the export price of export sectors and *ii)* trend-TFP of import-competing sectors as a ratio of trend-TFP of export sectors.[16] It should be pointed out that trend-TFP is an imperfect proxy for *sectoral* technological change. It is unlikely to capture all the aspects of the technological progress and indeed recent studies propose alternative measures, which unfortunately are not available for the purposes of this chapter [Bartel and Sicherman (1997)]. Despite these data limitations, the equation's results suggest that trade with EEs has had a small impact on OECD unskilled wages – the import-price elasticity is about 10 per cent, *i.e.* a 50 per cent cut in relative import prices of import-competing sectors would lead to a fall in relative unskilled wages of about 5 per cent.[17] On the other hand, the effect of sectoral trend-TFP is twice as large. Using the relative import price as explanatory variable (instead of relative trade prices) yields a much lower price elasticity (2 per cent only) and a similar elasticity with respect to trend-TFP (second column of Table 4.8);

– the nature of labour-market institutions in many countries may be such that the burden of the adjustment process will fall on employment, instead of wages. In this case, the predictions of the standard model would have to be reformulated in terms of relative employment performance. In order to consider this possibility, the third column of Table 4.8 presents estimation results of another equation where the dependent variable is relative operative employment. Explanatory variables are the same as in the first equation. The estimated impact of trade price changes is much larger than is the case of the wage equation – the import-price elasticity is 20 per cent. However, given the evolution of trade prices shown in Table 4.6, even this higher elasticity cannot explain more than a small fraction of the observed decline in unskilled employment.[18] The employment impact of trend-TFP is relatively small and statistically insignificant. Similar results are obtained when the employment equation is

Table 4.8. **Determinants of industry wages and employment: equations for the total manufacturing sector**[a]

Dependent variables:	Ratio of unskilled wages to skilled wages[b]		Ratio of unskilled employment to skilled employment[b]	
	(1)	(2)	(3)	(4)
Explanatory variables:				
Relative trade price[c]	0.116*[f]		0.200*	
Relative import price[d]		0.022		0.311*
Relative trend-TFP[e]	0.213*	0.219*	–0.094	–0.062
Memorandum items:				
Number of observations	175	175	175	175
F-statistic	25.10*	16.45*	2.09	7.37*

a) All variables are expressed in log-level terms, so that the coefficients can be interpreted as elasticities.
The countries included in the equations are those for which the data are available, *i.e.* Australia, Canada, Denmark, Finland, Germany, Japan, Sweden, the United Kingdom and the United States. The estimation period is 1970-1990. The equations are estimated using OLS techniques, based on pooled time-series, cross-section data, with country dummies.
A "*" means that the coefficient is statistically significant at the 5 per cent level.
b) The term "unskilled" refers to operatives (wages or employment) and the term "skilled" refers to other workers (wages or employment).
c) The relative trade price is the ratio of the import price of import-competing sectors to the export price of export sectors.
d) The relative import price is the ratio of the import price of import-competing sectors to the import price of export sectors.
e) Relative trend-TFP is the ratio of trend-TFP of import-competing sectors to trend-TFP of export sectors.
f) Excluding Australia (the only country among the nine analysed in the equation for which relative trade prices of import-competing sectors increased over the 1980s), the estimated coefficient would be 0.027 and statistically insignificant. Other coefficients shown in the Table are largely unaffected when Australia is excluded from the regressions.
Source: OECD estimates.

estimated with relative import prices as explanatory variable (fourth column of Table 4.8);

– but trade prices and trend-TFP may also affect wages *within* sectors because labour is not perfectly and instantaneously mobile between sectors, as is assumed to be the case in the standard Heckscher-Ohlin-Samuelson model. For example, labour mobility may be inhibited in the presence of obstacles to geographical mobility or when skills are sector-specific. In Table 4.9, the impact of relative import prices and trend-TFP on sectoral wage and employment patterns is estimated. As in other studies [Revenga (1992) ; Neven and Wyplosz (1996)], sectoral import prices are used in the equations because they are assumed to capture sectoral trade pressures. Interestingly, results are similar to those of the manufacturing-wide equation, suggesting that the estimated coefficients are fairly robust (first and fourth column). When relative export prices (instead of relative import prices) are used in the equations, the results remain largely unchanged; and

– sectoral product-market characteristics also matter. According to conventional trade theory, the standard results on the impact of trade on domestic wages will obtain only if perfect competition prevails in the domestic market. However, industries are characterised by different degrees of competition, and different outcomes can be expected to obtain in sectors where firms have some measure of market power. In a preliminary examination of this hypothesis, industries have been grouped in two mutually exclusive categories according to whether the goods they produced were relatively "homogeneous" or relatively "differentiated". This classification has been shown to effectively capture differences in product market structure and to be quite stable across countries [Oliveira Martins (1994)]. As shown in Sutton (1992), homogeneous goods industries can be expected to be much more sensitive to price competition compared with differentiated-goods industries, which compete mainly in terms of quality. The estimation results show that indeed the import price coefficient is positive and statistically significant only in the case of homogeneous-goods industries (Columns 2, 3, 5 and 6 of Table 4.9). This result, however, may not be very robust: when relative export prices (instead of relative import prices) are used in the equation, the price coefficient becomes statistically insignificant for both "homogenous-goods" and "differentiated-goods" sectors.[19]

Based on the results of Table 4.8, it is tempting to quantify the extent to which trade-price changes have contributed to explain the labour market

Table 4.9. **Determinants of industry wages and employment: sectoral equations**[a]

Dependent variables:	Relative sectoral wages[b]			Relative sectoral employment[b]		
	All sectors	Homogenous-goods sectors[c]	Differentiated-goods sectors[c]	All sectors	Homogenous-goods sectors[c]	Differentiated-goods sectors[c]
	(1)	(2)	(3)	(4)	(5)	(6)
Explanatory variables:						
Relative import price[b]	0.014	0.012*	–0.004	0.129*	0.013*	0.01
Relative trend-TFP[b]	0.15*	0.022	0.018	–0.017	–0.112	–0.068*
Memorandum items:						
Number of observations	8 599	3 425	2 944	8 708	3 461	2 985
F-statistic	83.90*	0.84	0.37	15.89*	2.76*	2.91*

a) In the equations for "All sectors", the variables are expressed in log-level terms. In the other equations, the variables are expressed in rates-of-change terms. The countries included in the equations are those for which the data are available, *i.e.* Australia, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, the Netherlands, Norway, Sweden, the United Kingdom and the United States. The estimation period is 1970-1990. The equations are estimated using OLS techniques, based on pooled time series, cross-section data, with country and industry dummies. A "*" means that the coefficient is statistically significant at the 5 per cent level.

b) The term "relative" means relative to the manufacturing average.

c) Homogeneous-goods sectors are: Textiles, apparel and leather; Wood products and furniture; Non-metallic mineral products; Other manufacturing; Paper products and printing; Petroleum products; Rubber and Plastic; Iron and steel; Non-ferrous metals; Shipbuilding and repair. Differentiated-goods sectors are: Metal products; Non-electrical machine; Electrical machines; Professional goods; Food, beverages and tobacco; Chemicals (including drugs and medicine); Motor vehicles; Aircraft; Other transport equipment.

Source: OECD estimates.

trends reviewed in Section B. Estimated elasticities suggest that the fall in relative trade prices of import-competing sectors would explain less than 10 per cent of the widening earnings inequalities recorded in the United Kingdom and the United States.[20] Likewise, trade-price changes are estimated to have accounted for only a small proportion of the observed worsening in the relative employment position of unskilled workers: for the countries considered in Table 4.8 the trade-price changes would have generated a cut in the relative employment of unskilled workers ranging between 1 per cent in Finland to 7 per cent in Japan.[21] Nevertheless, it is important to stress that such calculations provide only a possible order of magnitude and are moreover subject to the limitations inherent to the data base used. They should therefore be treated with caution.

E. CONCLUSIONS

The evidence presented in this chapter suggests that unskilled workers are more likely to be hurt by increased exposure to foreign competition than skilled workers. This could take the form of lower wages or higher unemployment or a combination of both outcomes. There is uncertainty about the likely magnitude of these effects, but the best available evidence suggests that they are likely to be small. However, trade pressures can be expected to persist, as new major players such as China and India become integrated into the world economy. The issue is not whether foreign competition *per se* is bad. If firms employing low-skilled workers are relatively inefficient, they will have either to close, downsize or adapt by changing their production methods and upgrading the quality of their products. Efficiency gains represent an important argument in favour of trade liberalisation. Nevertheless, the adjustment process is generally neither instantaneous nor painless. Therefore, though freer trade is likely to generate welfare gains for a nation as a whole, its distributional effects need to be considered.

In addition to trade pressures, the adoption of new technologies and work-organisation practices can go hand-in-hand with higher demand for skilled relative to unskilled workers. Many studies suggest that technological change is a more powerful determinant of shifts in relative demand for unskilled labour than trade with emerging economies, though not everyone accepts this finding. In addition, growing trade and technological progress are closely interrelated processes, and it is extremely difficult to assess their separate impacts, suggesting that further work is needed is this area.

From a policy perspective, the crucial point is that both factors work in the same direction. The main issue facing policy makers, therefore, becomes one of how best to cope with this trend decline in the relative demand for unskilled workers. The appropriate policy response is not trade protection, which, as both theory and history demonstrate, would adversely affect skilled as well as unskilled workers. Instead, the challenge is to create the appropriate incentives to help both individuals and firms adjust to a rapidly changing environment. Policy action along the lines advocated by the OECD Jobs Study is especially relevant in this context [OECD (1996*d*)]. More generally, the response of OECD economies to increased international competition will depend on the extent to which workers' skills are adapted and upgraded. This raises a number of yet unanswered questions. In particular, are market-based incentives powerful enough to encourage the needed change in skills? Should governments support this process and, if so, how? More research on the ways trade, wages and the acquisition of skills interact with each other would help clarify the policy debate.

Notes

1. It is also sometimes argued that, in a context of high overall unemployment, employers may sometimes hire skilled workers in unskilled-job positions and that this may be one reason behind the observed trend in labour market inequalities.
2. See OECD (1989), Chapter 2, for a more complete discussion of the economic significance of educational attainment.
3. The data on employment by educational attainment in the total economy and the manufacturing sector, as presented in Chart 4.1, come from an OECD survey of workers' skills in twelve OECD countries. Data referring to the educational attainment of the total population and labour force used in the remainder of the subsection are taken from the OECD Education data base.
4. Educational categories follow the International Standard Classification of Education (ISCED). Three categories are used: higher education or tertiary (ISCED 6/7), lower secondary or less (ISCED 0/1/2) and an intermediate level (ISCED 3/5).
5. In the majority of countries under study, the data on employment by education appear to be in agreement with official employment statistics – *i.e.* the rate of growth of total employment obtained by adding up employment by level of education comes close to the Labour Force Survey estimate of total employment growth. There are, however, some notable exceptions: in the cases of Spain and the Netherlands, the rate of growth in total employment, as derived from education statistics, appears to be an over-estimate. Aggregate figures should, therefore, be interpreted with caution.
6. For ease of presentation, when both educational and occupational groupings were available for a country, only the education differentials are presented.
7. The apparent jump between 1990 and 1991 may be partly due to a change in the classification of occupations.
8. The data source for this subsection is the April 1996 version of the CHELEM (Comptes Harmonisés sur les Échanges et l'Économie Mondiale) data base published by the French research institute CEPII (Centre d'Études Prospectives et d'Informations Internationales). This data base contains time-series data of bilateral trade flows at the product, sector and degree-of-processing levels, in value terms for 46 major trading countries and seven zones covering all the other countries, from 1967 until 1994.
9. In this section, the source for the trade data is OECD, *Bilateral Trade Flows* and not CHELEM. The former data base contains a more detailed level of sectoral disaggregation than CHELEM.
10. Import-competing sectors are defined as those sectors for which the ratio of net imports from the EEs to trade turnover (exports plus imports) is higher than the value of the ratio for the manufacturing sector as a whole. The import-competing sectors are not necessarily the same for all countries and they do not always coincide with those presented in Table 4.2.
11. However, although not shown here, wages in a few import-competing sectors are relatively high, *e.g.* computer equipment. It is also interesting to note that, in some countries, computer equipment imports from the EEs are expanding rapidly.
12. Labour compensation is measured by total wage payments. It is the product of average earnings per employee times the total number of employees. The data on labour compensation, which comes from United Nations sources, are available for all employees as well as for operatives only.
13. Export sectors are defined as those sectors where the value of the ratio of net exports to EEs to trade turnover (exports plus imports) is higher than the value of the ratio for the manufacturing sector as a whole.
14. The INSEE database contains data on import and export unit values, and not "true" import and export prices. The calculation of the unit values is explained in Annex 4.A.
15. The magnification effect arises because, according to the Stolper-Samuelson theorem, a fall in the price of the unskilled-labour-intensive good leads to lower unskilled-labour wages in terms of the price of both the unskilled-labour-intensive good and the skilled-labour-intensive good. On the other hand, skilled-labour wages rise in terms of the price of both goods.
16. The impact of technological change on relative wages and employment is likely to manifest itself gradually over time. This is why the trend in TFP (and not actual TFP, which exhibits high volatility in annual time-series data) is used in the equations. Trend-TFP is the predicted value of a regression of actual TFP on both a time-trend and the square of a time-trend.
17. A detailed analysis of these econometric results shows that the price coefficient is four times smaller for all the countries except Australia (for which the coefficient is over 0.2). The price-elasticity reported in the table must therefore be considered as an upper bound of the likely true value in most countries. Other estimation results reported in Table 4.8 are largely unaltered when Australia is excluded from the estimated equation.
18. In most countries, relative unskilled employment has declined by more than half, *i.e.* much more than relative import prices of import-competing sectors.

19. One alternative indicator of the extent of product market competition is the mark-up of price over marginal cost. Mark-ups capture the ability of firms to set prices above marginal costs, hence the degree of market power. Industries with relatively high mark-ups can be expected to be less affected by competition pressures, be they domestic or foreign. Data on mark-ups (coming from recent OECD work) are, however, available for only a relatively small subset of industries. In addition, sectoral coverage varies across countries, thus making it difficult to use such data in the present chapter – for individual countries, information on mark-ups is available for a maximum of 24 industries, out of 30, and a minimum of 16.

20. In the United Kingdom and the United States, the import-price of import-competing sectors relative to the export price of export sectors has declined by 7 per cent and 22.7 per cent, respectively (Table 4.6). This, combined with an elasticity of wages with respect to trade-prices of between 0.026 (wage equation of Table 4.8 without Australia) and 0.116 (wage equation of Table 4.8 with Australia), makes for a cut in the relative wage of unskilled workers of between 0.2 per cent and 0.8 per cent for the United Kingdom. In the case of the United States, reflecting a stronger fall in relative trade prices, the result is somewhat larger: the "explained" cut in the relative wage of unskilled workers would be between 0.6 per cent and 2.6 per cent.

21. These estimates are obtained by combining the estimated elasticity of 0.2 shown in Table 4.8 with the reported decline in relative trade prices.

ANNEX 4.A

Data sources

1. Sources for the earnings data used in Section B

Australia

Source: Income Surveys.
Coverage: All residents for the years 1986, 1990, 1994.
Skill categories: Educational attainment.

Austria

Source: Austrian micro-census.
Coverage: All employees for the years 1985, 1987, 1991 and 1993.
Skill categories: Educational attainment.
Earnings refer to net personal income, converted to a weekly working time of 40 hours, excluding monetary transfers.

Canada

Source: Survey of Consumer Finances.
Coverage: Full-year, full-time employees, 1980-1994.
Skill categories: Educational attainment and occupational groups.
Average annual earnings for the total economy and the manufacturing sector.

Denmark

Source: National Bureau of Statistics.
Coverage: Salaried employees in manufacturing, yearly from 1984-1991.
Skill categories: Skilled and unskilled workers.
Average hourly earnings in manufacturing.

Finland

Source: Statistics Finland.
Coverage: Salaried employees only, for the years 1980, 1985, 1988, 1990, 1991, 1992 and 1994.
Skill categories: Educational attainment.
Average monthly earnings in manufacturing.

France

Source: INSEE, DADS.
Coverage: Full-time salaried employees affiliated to the DADS, years 1984-1995.
Skill categories: Occupational groups. Average net annual earnings.

Germany

Source: German micro-census.
Coverage: Full-time, full-year employees with one main occupation, 1978-1991. Apprentices, employees without pay and employees with more than one occupation are excluded.
Skill categories: Both educational attainment and occupational groups.
Average yearly earnings.

Italy

Source: Survey of household income and wealth, Bank of Italy.
Coverage: All salaried employees, 1977-1991.
Skill categories: Educational attainment.
Annual earnings.

Japan

Source: Basic Survey on Wage Structure, as published in the *Yearbook of Labour Statistics*.
Coverage: All regular employees in establishments with ten or more regular employees, in all industries and manufacturing, 1979-1994.
Skill categories: Educational attainment for the whole economy and production/non-production workers for manufacturing.
Total monthly earnings, including overtime and one-twelfth of annual special earnings.

Norway

Source: Division for Labour Market Statistics.
Coverage: Non-manual, full-time workers in establishments affiliated with the Confederation of Norwegian Business and Industry, for the years 1980, 1982, 1984, 1986, 1988, 1990, 1992, 1994 and 1995.
Skill categories: Occupational groups. Average monthly earnings.

Spain

Source: Encuesta de Salarios, Boletín de Estadisticas Laborales.
Coverage: 1983-1995.
Skill categories: White- and blue-collar workers for the total economy and the manufacturing sector.
Average total hourly earnings.

Switzerland

Source: Until 1993, October Survey on Wages and Salaries. Since 1994, data are from the "Service de centralisation des statistiques de l'assurance-accidents", Federal Statistical Office.
Coverage: All workers, 1945-1994.

Skill categories: Semi- and non-skilled workers, skilled workers and employees.
Index of nominal wages.

United Kingdom

Source: New Earnings Survey.
Coverage: All full-time employees whose earnings for the survey period were unaffected by absence. A one per cent sample of the working population, 1980-1996.
Skill categories: Occupational groups.
Average weekly earnings, including overtime and bonuses before tax.

United States

Source: Current Population Survey, Bureau of Labor Statistics.
Coverage: Wage and salary workers who usually work full-time, 1979-1995.
Skill categories: Educational attainment and occupational groups.
Usual weekly earnings.

2. Sources for the data used in Sections C and D

Employment and earnings

Average employment and earnings in each sector are taken from the OECD-STAN (Structural Analysis) data base, which has been created by the OECD Directorate for Science, Technology and Industry. These data are available at the 3-digit ISIC (International Standard Classification of Industry) level for a large number of OECD countries, generally for the years 1970-1993.

The data on wages and employment of operatives come from United Nations sources. The definition of operatives is similar to that of production workers. Wages include all wage and salary payments received by the workers. These data are available for a relatively narrow range of sectors (in general 2-digit ISIC sectors), for the period 1970-1990. The data cover only eleven countries (Australia, Austria, Canada, Denmark, Finland, Germany, Japan, Spain, Sweden, the United Kingdom and the United States).

Bilateral trade flows

Statistics on trade flows with EEs come from the OECD Bilateral Trade Flows database. The sectoral classification used is somewhat different from that used in both the OECD-STAN and United Nations data bases. The data are available for most OECD countries, for the period 1970-1993.

Trade prices

Data on trade prices are obtained from a trade data base developed by the French National Statistical Institute (INSEE). Trade prices are average unit values, that is the ratio of exports (and imports) in current dollar prices to exports (and imports) in volume terms.

Trade data at current prices come from OECD Foreign Trade Statistics. Data on trade at constant prices are estimated by the INSEE on the basis of OECD Foreign Trade data in physical quantities. The methodology for estimating such data is explained in a report by the Division des Échanges Extérieurs of INSEE (“Flux bilatéraux de commerce extérieur : traitement des déclarations à l’OCDE”, Paris, 1993). The methodology includes several adjustments to the raw data to ensure comparability, both across countries and through time. The need for such adjustments arises because of *i)* discrete changes in accounting units and nomenclatures; *ii)* international differences in accounting methods; *iii)* missing values; and *iv)* errors. Various quality controls have been carried out by INSEE, including a comparison with national accounts statistics. Accordingly, the trade data for 3-digit sectors (the level of sectoral disaggregation most often used in the chapter) would be reliable; some of the more disaggregated data would be subject to problems of either changes in nomenclature or lack of international comparability.

The data so estimated cover most OECD countries. The data are generally available for the period 1970-1992 (a notable exception being Portugal, for which the data begin in 1981). The level of sectoral disaggregation is very detailed (usually 4-digit industries), so no problem of sectoral comparability with other data used in Sections C and D is posed.

Total factor productivity

Total factor productivity (TFP) is measured as the ratio of value added in constant prices (taken from OECD-STAN) to a Cobb-Douglas production function combining factor inputs. The latter is obtained as a weighted average of employment and real capital stock, with fixed weights (reflecting the assumption of constant factor shares). In line with the approach followed in OECD, *International Sectoral Data Base* (1996), the value of the fixed weights has been imposed to be the same for all sectors and countries: the labour share is assumed to be 70 per cent and the capital share 30 per cent. Indeed, evidence suggests that observed factor shares come close to these values in all manufacturing sectors of all countries. Sensitivity analysis shows that the econometric results presented in the chapter do not depend much on the assumed factor shares.

TFP is thus given by the following formula:
$TFP = VA/(E^{.7} \times K^{.3})$;

where VA is value added at constant prices, E is employment and K the real capital stock.

The annual values of TFP so calculated exhibit high volatility. Therefore, instead of actual TFP, the trend in TFP is used in the estimation, where trend-TFP is the predicted value of a regression of actual TFP on both a time-trend and the square of a time-trend. It should also be noted that even trend-TFP is an imperfect proxy of sectoral technological change [see Bartel and Sicherman (1997) for a discussion of alternative measures].

TFP data are available for fourteen countries (Australia, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, the Netherlands, Norway, Sweden, the United Kingdom and the United States). The sectors and years covered are broadly the same as with OECD-STAN.

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