The Impact of Globalisation with Rigid Labour Markets

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Chapter 1

Introduction

The public debate reveals that people are unsettled about the impact of the current globalisation wave. News about job losses fuel this unrest regularly. It is a matter of fact that firms relocate their production activity to low-wage countries in Eastern Europe and the Far East, or specialise in more capital intensive fabrication in order to withstand international competition and to maximise profits. Although firms have always been investing abroad and globalisation is not at all a new phenomenon, the fall of the Iron Curtain and the rise of China and other East Asian economies have created new investment and trade opportunities, and have thereby accelerated the process of global market integration. Due to their proximity to the new markets in the East, Western European countries seem to be especially affected. Low-wage competition literally takes place in their backyard.

Economic theory basically stresses the advantage of market integration. Since the times of Adam Smith and David Ricardo, trade has been viewed as welfare increasing, as all participating countries can extend their consumption possibilities. In the early 20th century, Eli Heckscher and Bertil Ohlin introduced a new theory that also allowed the analysis of the distributive effects of trade. While the existing result of welfare gains for all participating countries remained, the theory claimed that there are winners and losers of the process in each country. The factor that used to be relatively scarce in autarky and becomes less so in a global world, must accept a lower remuneration and

vice versa. This implies that (low-skilled) workers in capital abundant countries must expect lower wages, whereas capital owners benefit from more profitable investment opportunities around the world. Although the winners win more than the losers lose, there still remains a fundamental social problem that societies have to solve. Income dispersion, the gap between the rich and the poor, tends to widen.

To protect citizens against economic uncertainties, industrialised countries have installed welfare systems that are partly designed in a very generous way. It is not uncommon for the state to regulate employment conditions such as hiring and firing, minimum wages, temporary contracts or working time and holidays. Furthermore, the social insurance systems provide replacement income for unemployed workers. On the one hand, the tax and benefit system in fact compresses the wage distribution, but on the other hand simultaneously distorts economic decisions. For instance, unemployment benefits define the reservation wage for low-wage workers and thereby inhibit wage flexibility in the lower part of the distribution. Of course, minimum wages exhibit the same effect. As the Heckscher-Ohlin model predicts a decline in real wages for low-skilled labour, rigid wages cause unemployment and thereby exert detrimental effects on employees. What was originally intended to protect workers and contribute to higher welfare through more security, turns out to retard structural change and disfavours large parts of the work force in the presence of globalisation forces. In fact, many European states have experienced a rising trend in unemployment since the 1970s.

Furthermore, the mentioned results of the classic and neoclassic trade models only hold true if wages adjust perfectly to exogenous shocks and full employment is maintained. This ensures that the necessary structural change, which is the root for welfare gains, can take place. The labour market is central as it has to absorb the adjustment pressure caused by international competition. Workers have to be transferred from shrinking to booming sectors. While the literature on trade and factor mobility with flexible labour markets discusses every imaginable effect, the scientific output considering rigid labour markets appears comparably less. Nevertheless, there are seminal

papers that provide basic insights into the mechanisms with imperfect labour markets. Richard Brecher (1974) has shown that rigid wages may even cause net welfare losses for such an economy if it opens up for trade - a result that stands in sharp contrast to the traditional trade literature. More recently, papers by Paul Krugman (1995) and Donald Davis (1998) have brought this issue back on the economic research agenda.

It is this book's task to contribute further insights into this strand of the literature, and to specifically discuss the implications for developed countries. While we take a look at the most important industrialised economies, the German situation is stressed in various contexts. Therefore, it is helpful to relate the German situation to other countries' performances. While Germany benefitted from market integration after World War II, as per capita output and wages for industrial workers caught up with richer countries, Eastern European states and China entered the global stage in the meantime and are now catching up with the leading nations in terms of per capita income. This implies that high growth rates can now only be found in these 'catching up'-economies, whereas Germany and other rich countries have to cope with this new competition. Just consider that the emerging markets in Eastern Europe and the Far East represent billions of people. This massive number underlines that we are not talking about a marginal field in economics. It is *the* issue of our times. This work tries to provide answers to questions evolving from this situation. We discuss both the fundamental economic connections as well as policy implications.

In several chapters, we study the impact of economic integration when labour markets are imperfect, that is when wages do not adjust to assure market clearing. However, to motivate the subject of this analysis, we start out with two survey chapters - one on globalisation and the other on labour market institutions and labour market performance in several countries. Chapter 2 provides an overview of globalisation from a historical perspective and stresses new features and recent developments. We structure that chapter by the main three channels via which market integration takes place: trade, capital mobility and labour migration. Over the last 150 years, there have been two major waves of globalisation. The first ended with the outbreak of World War I

and ebbed away in a protectionistic interwar period. It was only after 1945, that the international community started to strike a liberalisation path again. This commitment was mirrored specifically in the trade arena, for instance with the foundation of the General Agreement on Tariffs and Trade (GATT) in 1947, and a rising number of regional agreements thereafter. As a consequence, trade flows recovered and reached unprecedented levels at the beginning of the 21st century. The new feature in this field is the high share of intra-industry trade. While in 1914, the majority of commodity trade took part between developing and developed countries, trade between industrialised economies makes up a much larger share today. With respect to capital mobility, global markets were already well developed before World War I. However, the importance of short-term capital and cross-border mergers and acquisitions (M&A) is unrivalled. With respect to migration, labour mobility became subject to strict regulations after World War I. Nevertheless, immigration peaked in many countries in the 1990s in absolute terms. Relative to prevailing population levels though, migration in the 19th century is unequalled. Despite the low relative migration numbers today, the impact on national labour markets is pronounced in certain sectors. As immigrants are mostly low-skilled or carry out low-skilled jobs, the impact of labour mobility can specifically be expected for low-skilled workers.

As this book relaxes the traditional assumption of flexible labour markets, it is worthwhile to take a closer look at labour market regulations in various developed countries. We do so in Chapter 3. It turns out that there are substantial differences across nations. The rough picture shows that the US and the UK, for instance, regulate less than many continental European states. Especially for Germany, Italy and France, the assumption of rigid labour markets is justified. Surprisingly, smaller countries like Denmark or the Netherlands managed to implement fundamental labour market reforms to reduce their unemployment rates. Chapter 3 compares trade unions' and employers' organisations, bargaining systems, minimum pay regulations and employment protection, and comes up with an overall evaluation of labour market flexibility. In addition, the chapter provides a survey of major labour market reforms in selected European countries as well as an overview of labour market performance.

Chapter 4 provides the starting point for the theoretical analysis. In a constant returns to scale framework, we start with a 'one-good model' with two countries to study the effects of capital and labour mobility when wages must not fall. It becomes clear that the rigid wage country unambiguously loses relative to both a flexible wage scenario and even autarky. Ironically, the welfare losses have to be borne by workers alone. Hence, the minimum wage does not protect workers from low-wage competition. Furthermore, capital flows are artificially inflated as wages remain on their high autarky level. Thus, rigid wages imply excessive capital flight. A similar story holds true with labour mobility. Chapter 4 also analyses the implications of distorting taxes. It turns out that even more capital leaves the country if employees refuse to accept a part of the tax burden. This speaks in favour of non-distorting tax regimes if labour markets are imperfect.

After having read the fourth chapter, one might not be convinced that the results also hold in a more general setting. Therefore, Chapter 5 extends the analysis by introducing a two-good economy. This allows us to study both the effects of trade *and* factor mobility. It turns out that the Heckscher-Ohlin setup, which can be regarded as the workhorse model in international trade, confirms the outcome of the previous chapter. Specifically, capital exports and labour immigration would be identical to the one sector model. The excessive factor flows unambiguously bring about a welfare loss for the rigid wage country. With regard to trade, we show that trade flows - that are perfect substitutes for factor mobility - are pathologically too high instead. Thereby, we arrive at the same equilibrium as with factor mobility alone, as long as both countries are of about equal size. With a small country assumption, however, the capital abundant region is driven into complete specialisation that prevents factor price equalisation. It is not clear whether trade flows are higher or lower compared to a flexible wage scenario. Due to unemployment, though, welfare clearly declines. However, adding factor mobility brings about the same catastrophic result as in the case of factor mobility alone.

The Heckscher-Ohlin model builds on the assumption that factors are perfectly

mobile between national industries. However, this might only be a good description of reality in the long run. In the short run, one might well assume that factors of production are specific to their industries, and might only be reemployed in other branches with turnover costs. Therefore, Chapter 6 looks at the effects of downwardly rigid wages when either both capital and labour are sector specific or labour can be transferred to other industries more quickly. This setup is well known as the 'specific factors model' and was revitalised in the early 1970s by Paul Samuelson (1971) and Ronald Jones (1971a). Nevertheless, there has been no attempt to implement rigid wages in such a setup. The insights are twofold. Firstly, we can study how results change in the specific factors model if wages are fixed at a certain level. Secondly, the separation between different degrees of interindustry factor mobility allows us to analyse the transition from the short run with no interindustry factor mobility to the long run as in the Heckscher-Ohlin case. Mussa (1974, 1978) and Neary (1978) have introduced the specific factors model as the short run interpretation of the Heckscher-Ohlin model. We do the same here, but with rigid wages.

Chapter 7 leaves the ground of constant returns to scale, and implements a monopolistic competition sector that exists next to an agricultural branch producing at constant returns to scale. In a core-periphery agglomeration model, we depict imperfect labour markets by means of a fair wage constraint in the fashion of Akerlof and Yellen (1990). Thereby, we can describe different degrees of wage compression and study the impact on unemployment and relative factor remuneration, as well as the impact on the pattern of capital agglomeration in the long run. We show that a higher fair wage parameter, that is, a higher wage relative to the return to capital, leads to more unemployment if regions are symmetric. Capital will agglomerate in one region already at a higher level of trade costs that favour dispersion forces more when wages are flexible. Interestingly, when both countries possess asymmetric fair wage constraints, that is, one labour market is more rigid than the other, capital is gradually driven to the less constrained region. Although there are levels of trade costs that could theoretically ensure full agglomeration in the more constrained country, this equilibrium will never be reached if one assumes a decreasing trend of trade costs over

time. As the agglomerated region benefits from higher real income, the economy with the more constrained labour market is disfavoured by the higher fair wage.

The overarching result in all theoretical chapters is that rigid wages turn out to be detrimental for output and welfare. It would even be advantageous not to open borders for trade and factor flows. Chapter 8 summarises the main findings and discusses policy implications. Policy measures should be designed to enable an efficient outcome and let everybody benefit from the aggregate welfare gains. What may sound like a miracle can be achieved by wage subsidy schemes for low-wage workers - as in the fashion of the US Earned Income Tax Credit. Thereby, wages are allowed to settle on the market clearing level to achieve a first-best allocation, while reductions in income are compensated by public wage supplements. The analysis in this book underlines that there is no other promising way to become a winner of globalisation. There is just no way to withstand global market forces by defending national wages.

Chapter 2

Globalisation from a historical perspective and recent trends

Globalisation is not a new phenomenon. There have already been times of deep integration of factor and goods markets about 100 years ago. Capital mobility for instance, was not more restricted than it is today, and long-term capital flows resembled actual numbers. To understand the current globalisation discussion, it is worthwhile to take a closer look at the development of trade, capital and migration flows. Comparing the current situation with historical experiences allows us to put the extent of market integration and thus, international competition, into perspective.

In recent years, several factors have led to an increase in the pace at which market integration takes place. Apart from the fact that China introduced a more market oriented economic system and began to open up for international trade in 1978, the breakdown of the Communist Bloc in 1989 delivered another major external shock to the world economy. As a consequence, an additional 1.5 billion people[1] - which is about one fourth of the entire world population - now participate in the global economy in addition. Moreover, the reduction in transport and information costs now makes goods from remote areas attractive for consumers at the other end of the world. This trend was joined - at least after the Second World War - by a political commitment to cut

[1] United Nations (2005).

back tariffs and quotas.

The outline of this chapter is composed of the three basic mechanisms through which globalisation takes place: trade, capital mobility and labour migration. The relevant time period we want to observe embraces the last 150 years. It turns out that there have been two waves of globalisation, the first from about 1850 to 1914, and the other spanning the second half of the 20th century. These two eras were sharply divided by a relapse into protectionist policy that artificially created huge barriers to the mobility of goods and factors. World War I sharply marked the beginning of this period. It was not before the end of the Second World War that policy makers slowly and modestly shifted back to a more liberal path.

The levels of market integration in 1914 and the present day resemble each other in many respects. Furthermore, regulation of commodity and factor flows had reached very low levels. However, there are also fundamental differences. Information and transport costs continuously declined since and no longer impose substantial obstacles to international trade. Hence, trade levels have caught up with pre-World War I levels and clearly exceed them by now. Another difference to the end of the first wave of globalisation is that intra-industry trade between developed countries is dominant today, whereas trade between industrialised and developing countries was more important in the past. With regard to capital market integration, it is unambiguous that the share of short-term capital flows has reached all-time highs and that foreign direct investments have never played such an important role as they do today, including cross-border mergers and acquisitions. With respect to labour mobility, one must admit that current migration flows by no means reach 19th century levels in relative terms. Although, in absolute figures, the 1990s saw an unprecedented wave of migration. On a disaggregated level, some countries that were never subject to immigration have just recently experienced high inflows of foreign workers. The migration pattern has clearly changed over time.

2.1 Trade

2.1.1 Obstacles to commodity market integration

Two basic obstacles prevent commodity markets from becoming integrated: technical and political trade barriers. Crucial inventions set off a decline in transport costs. Examples include the steamboat that replaced the sailing-ship, or the railway. Harley (1980, 1988, 1989) and North (1958) present evidence that shipping costs declined on a very large scale between 1850 and 1914. The British index of ocean freight rates, for instance, fell by about 70 percent from 1870 up to the time of World War I.[2] The development of the North American railway system reduced the wheat price spread between New York and Iowa from 69 percent in 1870 to 19 percent in 1913 – a very clear indication of high market integration.[3] Freight costs for transporting a quarter of wheat from Chicago to New York shrunk from about six shillings in 1868 to about one shilling at the turn of the century.[4]

In the course of the 20th century, transportation costs continued to decline, however at a slower rate. For the second half of the last century, Hummels (1999) found that ocean freight rates even increased, whereas the prices for air transport receded. This change in relative prices caused a shift in the pattern of transport modes. While in 1965, nearly 70 percent of the imports reached the US via ocean shipping, the share crumbled to about one half 30 years later. As air fares declined most in relative terms, the share of trade by air freight gained importance. Table 2.1 presents an overview of the development of shares of transport mode in US trade since 1965. A similar pattern evolved for Europe. In terms of tonne-kilometres, road freight tripled since 1970, whereas inland waterways and railways remained on their 1970 level.[5]

Another feature that promoted trade growth was the sharp decline of communication or information costs. The price of a 3-minute-phone call from New York to London

[2] Harley (1988).
[3] Williamson (1974), p. 254.
[4] Findlay and O'Rourke (2003), p. 36. See same article for more evidence and Bairoch (1989).
[5] European Conference of Ministers of Transport (2002), p. 23.

Table 2.1: Share of US trade by transport mode (percent of value)

	Imports			Exports		
year	Ocean	Air	Land	Ocean	Air	Land
1965	69.9	6.2	23.9	61.6	8.3	30.1
1970	62.0	8.6	29.4	57.0	13.8	29.2
1975	65.5	9.2	25.3	58.9	14.1	27.0
1980	68.6	11.6	19.8	54.8	20.9	24.3
1985	60.4	14.9	24.8	43.0	24.5	32.4
1990	57.2	18.4	24.4	38.4	28.1	33.5
1995	51.2	21.6	27.3	34.7	29.3	39.0

Source: Hummels (1999).

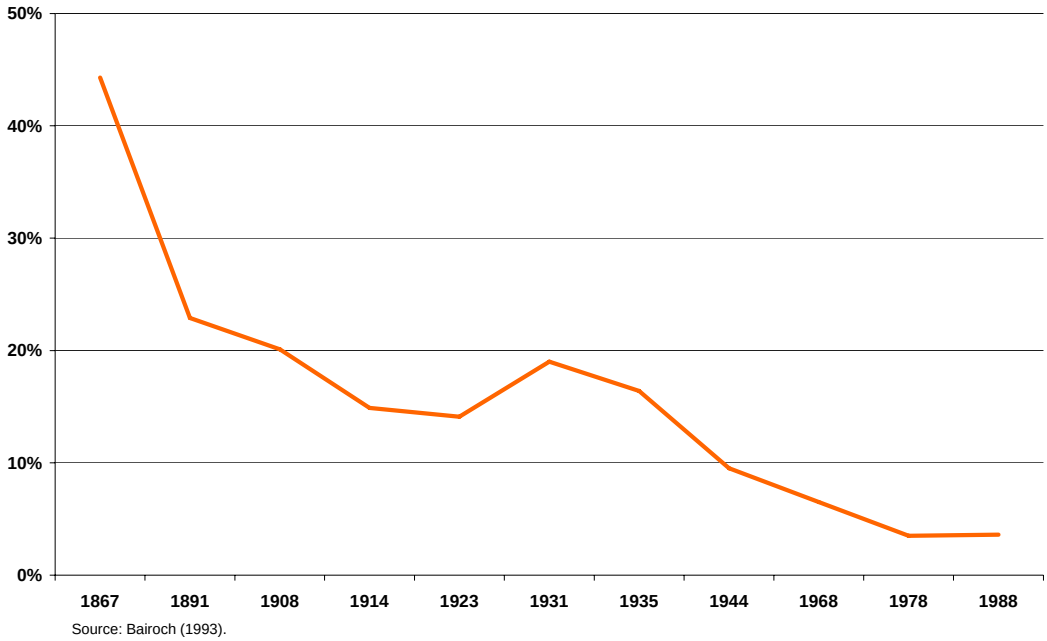
cost about 250 US$ in 1930, 50 US$ in 1960 whereas it costs only a few cents today.[6] In addition, the invention and broad diffusion of the World Wide Web fell into the era of the second wave of globalisation.

Political trade barriers prohibited the exchange of commodities to a large extent in the 19th century. However, politicians continuously reduced tariffs and quotas since. The UK was at the forefront in this respect. Not only was trade within the Colonial Empire entirely liberalised, but also external trade barriers had been abolished completely since the 1870s. As the term "Empire" suggests, the United Kingdom belonged to the most prosperous countries on the planet. Free trade and its gains surely contributed to that prosperity. Continental Europe and other countries like the US imitated the British way. The creation of a customs union can be seen as a first step on the integration ladder. In Germany, for example, Prussia and several other smaller states launched the "German Customs Union" in 1834. More states joined the agreement at a later date. For the time being, relatively high tariffs for external trade remained in place.[7] However, they were reduced substantially by World War I. The inter-war period was characterised by a backslide into protectionist thinking. As the zeitgeist was to blame liberalised markets for the Great Depression, politicians reacted to that by introducing higher protection of national markets. After World War II trade was promoted by the General Agreement on Tariffs and Trade (GATT). It was

[6] Baldwin and Martin (1999), p. 24.
[7] See Bairoch (1989) for an overview.

signed in 1947 and served as the forerunner of the World Trade Organization (WTO), which was established in the Uruguay Round negotiations (1988-94), and subsequently came into power on January 1, 1995. The political willingness to liberalise commodity markets is reflected in a substantial drop in tariffs. On average, tariffs were cut in half between 1988 and 2003. While developing countries reduced their tariffs from 26 to 13.5 percent, the level in high-income OECD countries receded from 7.1 to 3 percent.[8] Figure 2.1 illustrates the development for the US since 1867.

Figure 2.1: US tariffs, 1867-1988 (3-year-averages)



A special feature of the 1990s was the creation of Regional Trade Agreements (RTA). While in the period from 1958 to 1989 only 29 agreements were created, the number rose to 94 in the 90s. This is an indication that regional integration of commodity markets has been even more intense than trade liberalisation efforts on the world level. The European Union is a very prominent example where the Internal Market was finally established on December 31, 1992. From this date on, all internal tariffs were eventually abolished. Other examples of RTAs include the North American Free Trade

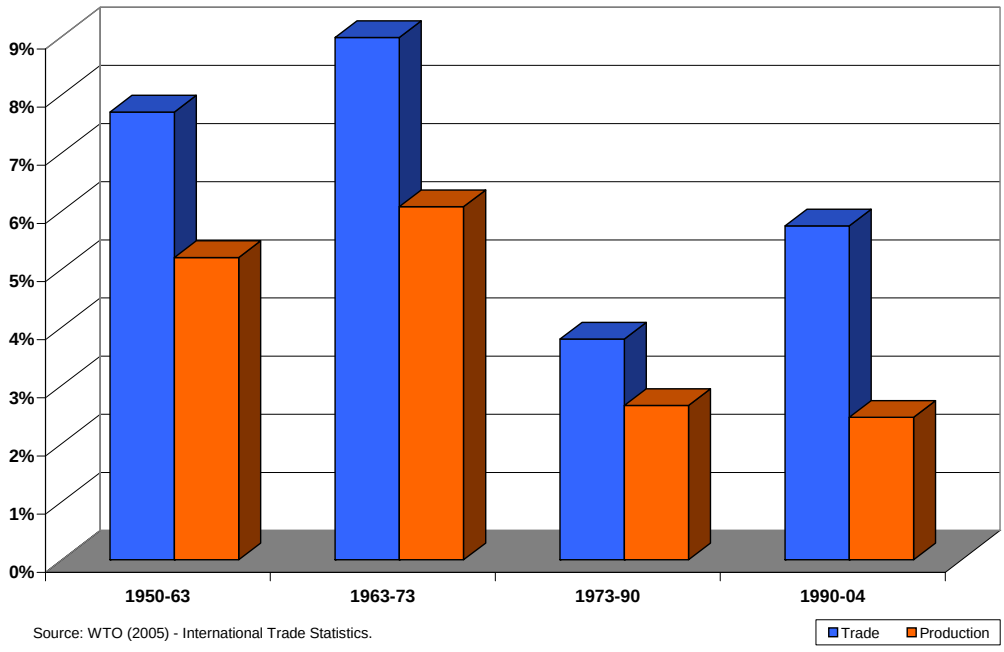
[8] WTO, figures for 2003 estimated.

Agreement (NAFTA) or the Asia-Pacific Economic Cooperation (APEC). The intra-bloc trade shares of these three RTAs amount to 55.7 percent, 62.1 percent and 73.2 percent respectively. But it is widely discussed whether RTAs have promoted trade more than the GATT or WTO otherwise would have done.[9]

2.1.2 Trade flows from a historical perspective

Compared to present levels, international goods markets were already highly integrated before 1914. Nevertheless, actual numbers are unprecedented. Findlay and O'Rourke (2003) provide evidence that world merchandise exports as a share of GDP accounted for 7.9 percent in 1913, fell to 5.5 percent in 1950 and increased to 17.2 percent in 1998. This development is not very surprising in the light of shrinking transport and information costs, as well as lower tariffs. In the second half of the 20th century, growth rates in trade outweighed growth rates of production in every single decade. Figure 2.2 draws a very clear picture.

Figure 2.2: Growth rates of trade and production



[9] WTO (2003), World Trade Report 2003.

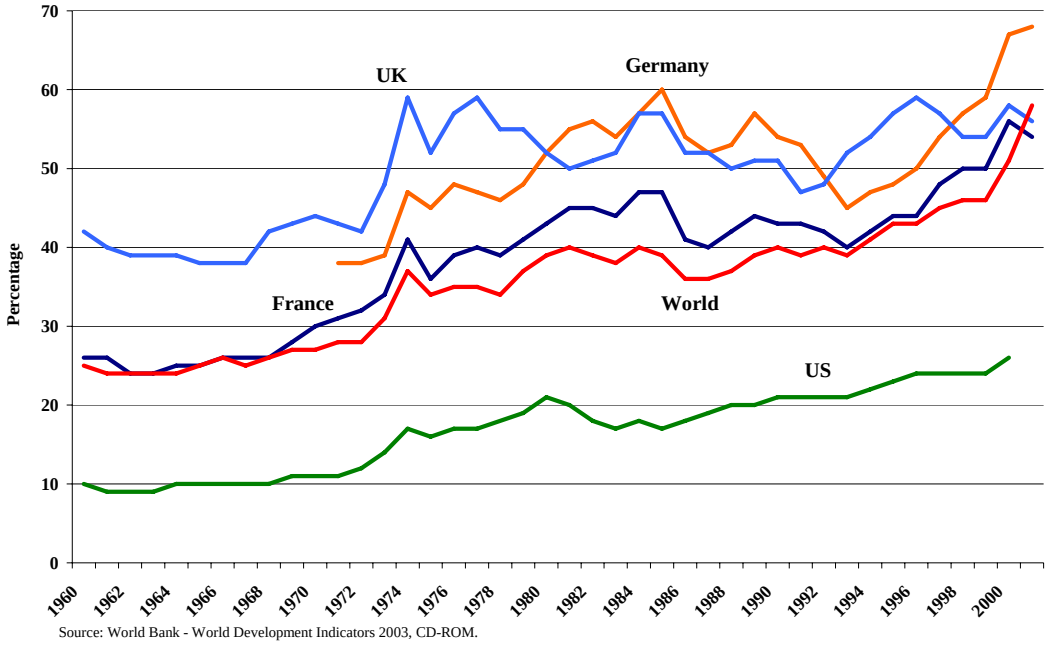
Not surprisingly, both trade and production growth reached comparably high numbers by 1973 because developed economies had to begin again from a very low level after 1945. This was due to the destruction during World War II and the protectionistic trade policies in the interwar period. As trade growth has always outperformed production growth, trade-to-GDP-ratios have risen steadily over time. On the aggregated world level, this figure increased from 25 percent in 1960 to 58 percent in 2001.[10] This result was mainly driven by developed countries that created the institutional conditions for the reduction of political trade barriers in the late 1940s. Accordingly, France and Italy both increased their share from about 26 percent (1960) to about 54 percent (2001). The UK had relatively integrated goods markets already: their trade-to-GDP-ratio grew from 41.8 percent to 56.4 percent in the same period. Due to their size, the United States traditionally possess a lower share. However, the jump from 9.6 percent to over 26 percent in 2001 is more than distinct. Germany has shown a steep increase since the early 1990s. During the last decade none of the mentioned economies was characterised by such a development. Figure 2.3 visualises these trends.

Additionally, the South-East Asian Tiger States and China joined the global competition game. The most populated economy became a member of the World Trade Organization on December 11, 2001. Its trade-to-GDP-ratio had increased from only 3.7 percent in 1970 to an incredible 49.2 percent in 2001.[11] The rise of China as a leading export nation can be underlined by another figure. Relative to Germany's commodity exports, the world's leading nation in this respect, China's exports rose from 14.7 percent in 1990 to 78.5 percent in 2005. This translates into an increase in the world market share from 1.8 to 7.3 percent.[12] India, just to mention the second largest populated economy, increased its trade-to-GDP ratio from 8.1 percent to 29.1 percent in the same period.

Even though the ratios reflect an unambiguous trend, they still underestimate the true development. Lindbeck (1973) has argued that the absorption of the state is

[10] Trade is the sum of exports and imports of goods and services measured as a share of GDP.
[11] World Bank, World Development Indicators 2003, CD-ROM.
[12] Calculations according to WTO Statistics Database (2006).

Figure 2.3: Trade as a share of GDP, selected countries and world, 1960-2001



Source: World Bank - World Development Indicators 2003, CD-ROM.

much higher than it was 150 years ago. Back then, GDP was made up by private activity to an overwhelmingly high extent. In the second half of the 20th century however, governments' expenditure accounts for between 30 and more than 50 percent of GDP. If one relates trade to the private activity only, then the ratios would clearly be much higher. On the other hand, trade to GDP ratios depend on the country size. As the second half of the 20th century has seen many declarations of independence and splitting up of countries, this trend automatically leads to higher ratios without an intensification of trade flows. With regard to Figure 2.3, however, this argument can only be applied to the aggregated world level. There is no doubt that for most countries, trade-to-GDP ratios rose markedly.

These stylised facts clearly show that we can talk about a world commodity market. It is true that industrialised countries still protect national markets against agricultural imports, but for the majority of goods, namely industrial goods, trade barriers have nearly completely vanished over time. A national producer has to compete with products from companies anywhere on the planet.

2.1.3 Germany's situation in the face of EU's Eastern Enlargement

In the second half of the last century, Germany's export sector has always been a central pillar of economic development. While in 1950, trade values amounted to 10 billion euros, the figure increased to 1.4 trillion euros in 2005 in nominal terms. This is equivalent to 20 percent and 62.9 percent respectively, relative to nominal GDP.[13] Despite the new competitors in the Far East, Germany's market share in global goods trade resembles the level from 1960. 8.4 percent of global imports were demanded by Germany in 1960, 9.8 percent in 1990 and 8.2 percent in 2003. The same pattern applies to exports. Here, the share was 10 percent in 1960, peaking in 1990 with 11.9 percent. In 2003, Germany contributed 10.1 percent of world exports. It is remarkable that German trade shares even rose in recent years.[14] In 2000, export shares amounted to 8.6 percent while imports made up 7.8 percent of the global aggregate.

Contrary to the aggregated number, the trade pattern with Eastern European economies has defied the trend. The share of German imports and exports of the total trade value of the 10 new EU members increased from 29 percent to 32 percent between 1994 and 2002.[15] Nearly one third of the entire foreign commodity transactions is undertaken with Germany. Figure 2.4 illustrates the development of German trade value with the eight new Eastern European EU members.

Both exports and imports were nearly five times higher in 2005 compared to 1993.[16] The Eastern European trading partners have gained a higher weight for German foreign transactions. But the trade value still does not make up more than one tenth of Germany's entire trade value. The dependency is much larger the other way around. About 40 percent of Czech, Hungarian and Polish exports go to Germany. The import

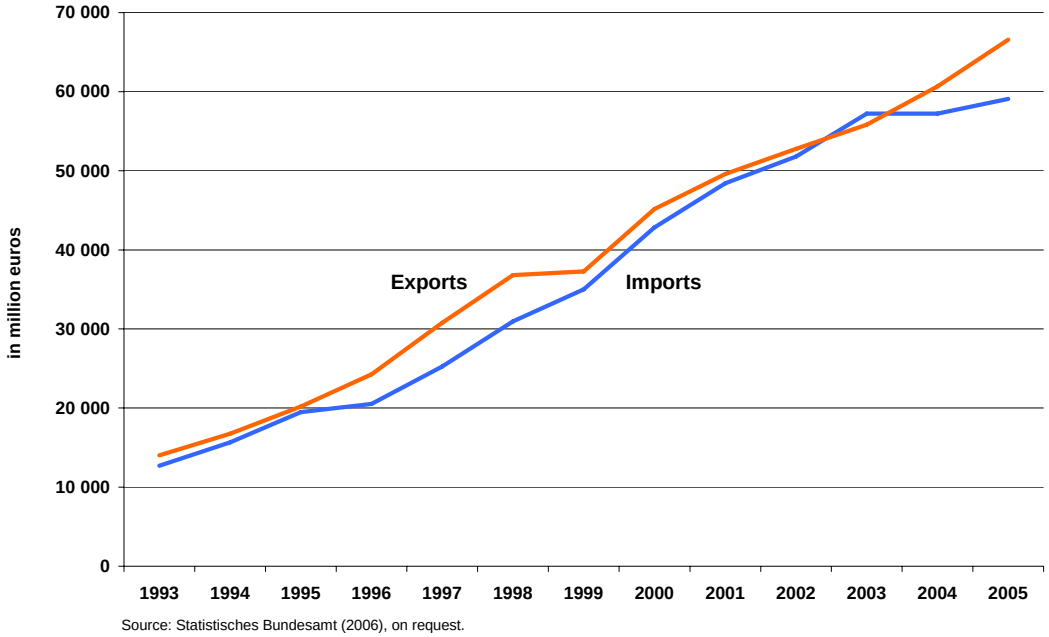
[13] GDP in current prices were 50.4 bn € (1950) and 2,244 bn € (2005) respectively. Data according to Statistisches Bundesamt.

[14] Institut der Deutschen Wirtschaft Köln (2005), p. 137.

[15] EUROSTAT (2003), own calculations. The ten new EU members acceding in 2004 are Poland, Hungary, Czech Republic, Slovakia, Slovenia, Lithuania, Estonia, Latvia, Malta and Cyprus.

[16] According to Statistisches Bundesamt. Data provided on request (2006).

Figure 2.4: German trade with eight new Eastern European EU-members, 1993-2005



Source: Statistisches Bundesamt (2006), on request.

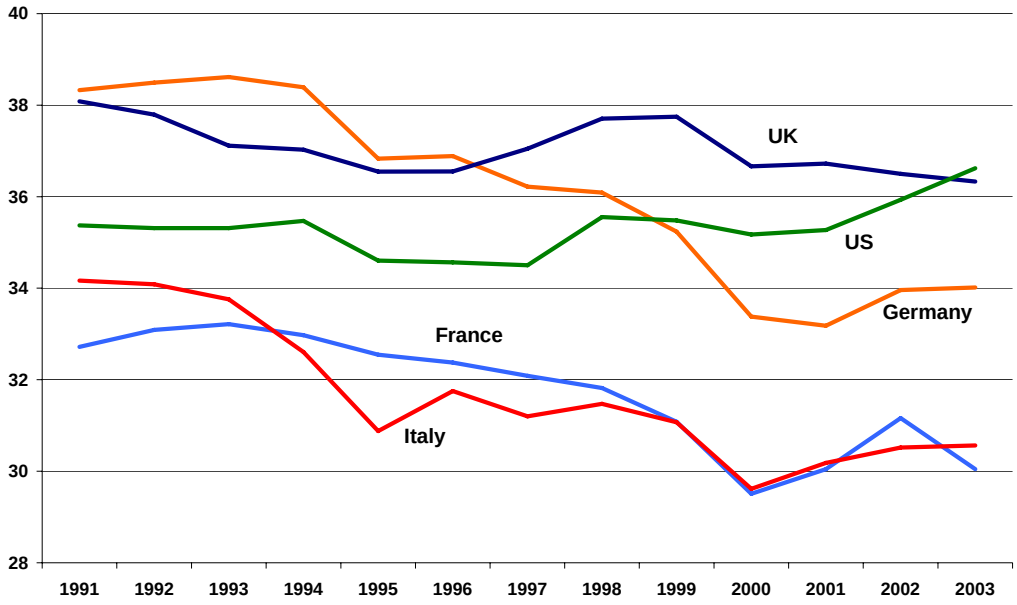
share amounts to 33 percent, 25 percent and 25 percent respectively.[17] In 2003, exports to EU-15 countries amounted to 30.7 percent and to 5.2 percent with respect to the US. To put these numbers into proportion, the share of German imports and exports with EU-15 countries has stayed around 53 percent over the last 20 years. The United States have even fallen behind the Eastern European accession countries with "only" 8.5 percent in 2003. Japan has lost importance over time and only accrues for 2.6 percent of German trade volume – less than China with 3.6 percent in 2003.

For Germany, as well as for other countries, this development necessarily implies a reduction in the vertical integration of production, also known as international outsourcing. Sinn (2005a and 2005b) has called this effect the *bazaar effect*. Using this image as a caricature of reality, Sinn describes the fact that an increasing share of export value has been imported as intermediate products from foreign producers. The value added per unit in national industry is thus declining. This in itself is a normal development that reflects a higher degree of international division of labour and - un-

[17] Statistisches Bundesamt (2006), on request, calculations by the author.

der the condition of full employment - indicates gains from trade. Structural change is necessary to realise these gains. However, as will be discussed in later sections of this book, the evaluation of this phenomenon changes with rigid labour markets. For the time being, we just want to stress that Germany has experienced a period of relative deindustrialisation, that is the share of total value added in manufacturing declines relative to other sectors of the economy, especially the service sector. Compared to other industrialised countries, Germany is hit severely. Figure 2.5 shows that the share of gross value added in the manufacturing sector relative to its output value has fallen from 38.3 percent in 1991 to 34 percent in 2003. Although starting from a lower level, France and Italy faced a similarly sharp downward trend in the same period, while the UK was able to limit the decrease to less than two percentage points. The US constitutes a counterexample as its value added share rose from 35.4 to 36.6 percent.

Figure 2.5: Gross value added share of total output value in the manufacturing sector



Source: Calculations of the ifo Institute (2006) based on OECD Stan Database.

2.2 Capital markets and financial integration

2.2.1 Capital controls

As information belongs to one of the crucial ingredients in capital market transactions, the reduction in telecommunication costs stimulated a deeper market integration. Today, information is instantaneously available via the internet and thus eases asset trade. In addition to this trend, political barriers have also been removed over the last number of decades. Mussa and Goldstein (1993) provide a detailed overview about reforms in selected industrialised countries. Capital and exchange controls have been dismantled and domestic financial sectors liberalised. The fall of the Iron Curtain and the rise of Asian economies such as China brought formerly excluded regions onto the stage, as emerging markets reduced barriers to attract foreign capital. The Eastern Enlargement of the EU assured that the new members adjusted their legal systems to the EU standard, thus ensuring lower uncertainty and risks for foreign investors.

However, Mussa and Goldstein (1993) point out that there is no such thing as a global capital market. Even between the most advanced financial centres, cross-border capital movements are still restricted by differences in language and cultural habits. In addition, a home bias towards domestic products prevents international financial assets from being perfect substitutes. Moreover, uncertainty about exchange rate movements still imposes an additional uncertainty on expected returns. The higher the volatility of exchange rates, the less capital mobility there will be. Nevertheless, home biases and cultural barriers exist for all kinds of economic transactions. One can certainly conclude, that the integration of capital markets has progressed quite far and that financial transactions around the globe are easier than ever.

This is especially true if one disaggregates to certain regions. The European Union, for example, has removed the last obstacles to capital mobility since the start of the economic monetary union (EMU) in 1990. A further step was the introduction of the common currency in 1999 that repealed all remaining exchange rate uncertainty. Despite the cultural differences between the member states, the euro certainly created

a common European capital market between the monetary union member states. The clearest indication for this is the convergence of interest rates of the euro member states since the early 1990s.[18]

2.2.2 Capital flows from a historical perspective

The two waves of globalisation within the last 150 years are also reflected in the development of capital markets. Not surprisingly, different eras were coined by different monetary systems. Obstfeld and Taylor (2003) identify four periods between 1870 and today. The first lasted until 1914, with its main feature being the Gold Standard. An increasing number of countries participated in the fixed exchange rate regime where every currency could be pegged to the gold reserves. This was a great innovation as it guaranteed more stability by reducing exchange rate risk. Indeed, capital mobility leaped up until 1914. If we take the average values of current accounts relative to GDP for several countries (see Table 2.2), one can see that the levels of capital movements were only reached in the 1990s again. In the meantime, capital mobility was at a much lower level for most countries. We can use current account data because its balance reflects the counterpart of the capital account balance. Both accounts have to equate each other by definition.

Table 2.2: Capital flows since 1870, absolute average value of current account deficit

	UK	US	Argentina	Canada	France	Germany	Italy	Japan
1870-1889	4.6	0.7	18.7	7.0	2.4	1.7	1.2	0.6
1890-1913	4.6	1.0	6.2	7.0	1.3	1.5	1.8	2.1
1919-1926	2.7	1.7	4.9	2.5	2.8	2.4	4.2	2.1
1927-1931	1.9	0.7	3.7	2.7	1.4	2.0	1.5	0.6
1932-1939	1.1	0.4	1.6	2.6	1.0	0.6	0.7	1.0
1947-1959	1.2	0.6	2.3	2.3	1.5	2.0	1.4	1.3
1960-1973	0.8	0.5	1.0	1.2	0.6	1.0	2.1	1.0
1974-1989	1.5	1.4	1.9	1.7	0.8	2.1	1.3	1.8
1990-1996	2.6	1.2	2.0	4.0	0.7	2.7	1.6	2.1

Source: Taylor (1996), as quoted in Baldwin and Martin (1999).

[18] See Sinn (2004), p. 94.

World War I brought an end to the first wave of financial market integration. National policies focused on financing war expenses by imposing capital controls. Until 1945 - the second era in Obstfeld and Taylor's classification - capital flows fell in most countries. Especially after the Great Depression, countries further restricted the free movement of capital as it was common belief that too much (financial) market liberalisation had caused the greatest economic crisis. Even though the creation of the Bretton Woods institutions IMF and The World Bank was intended to stabilise the world financial system by returning to fixed exchange rates, capital flows reached their all time low in the 1950s and 1960s. However, this third period until 1971 brought a slow recovery. Only thereafter capital mobility increased again and reached pre-World War I levels in the 1990s.[19] These stylised facts are confirmed in several econometric studies.[20] Mussa and Goldstein (1993) conclude that "the international component of financial market activity has grown faster than either the domestic compenent or the value of world trade."[21]

The new feature: foreign direct investment

Equivalently to outsourcing of production to other companies, firms can also relocate parts of their production facilities abroad. This activity is called offshoring and aims at either better market access (horizontal FDI) or cost reduction through lower factor prices in the target country (vertical FDI). In fact, the recent trend in capital markets is the unprecedented growth in foreign direct investment. In 1996, FDI outflows were six times higher than in 1980, whereas domestic savings only doubled in absolute terms.[22] As Figure 2.6 illustrates, FDI inflows peaked in 2000 with an aggregated value of nearly 1.4 trillion dollars, equivalent to 20.8 percent of gross fixed capital formation. This underlines the growing importance of foreign capital for economic development. With regard to distribution, investments mainly flow between developed countries. Of the remaining small share, 90 percent of FDI to developing countries go

[19] There is a discussion in the literature whether pre-WWI levels have been reached in the early 1990s. While Sachs and Warner (1995) support this view, Zevin (1992) opposes it.

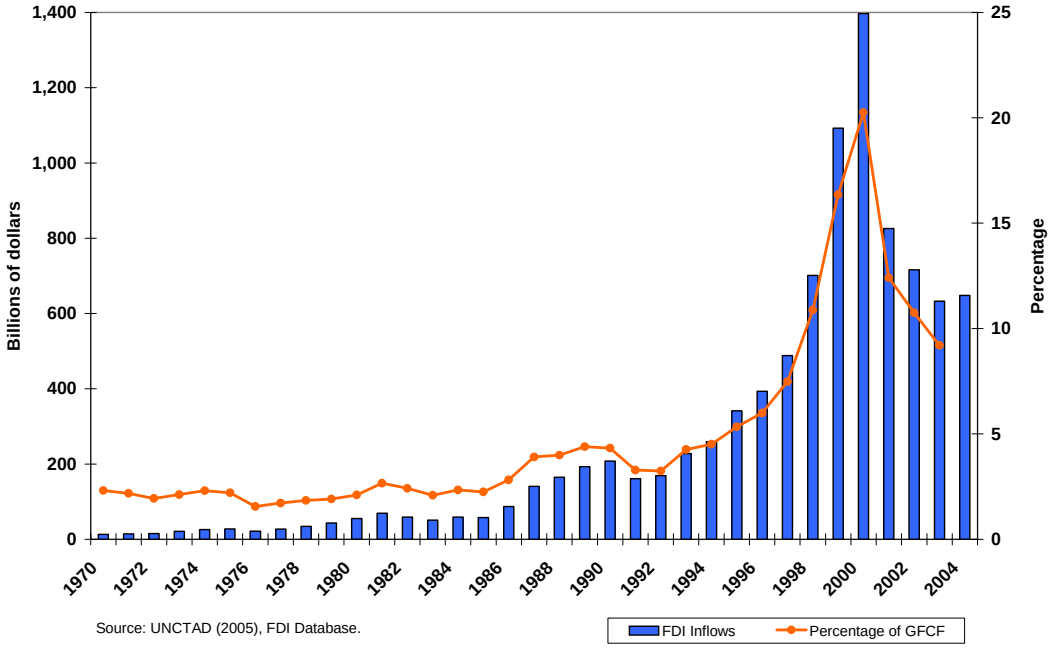
[20] See Taylor (1996) and Obstfeld and Taylor (1996) for a more thorough discussion.

[21] Mussa and Goldstein (1993), p. 7.

[22] UNCTAD (1997), p. 10.

to middle-income countries.[23]

Figure 2.6: Global FDI inflows and share in gross fixed capital formation, 1970-2004



Capital flows are pretty volatile and sensitive to business cycles and economic growth prospects. Since 1970 there have been four major downturns in the growth rate of FDI inflows. In 1976, foreign direct investments decreased by 21 percent, in 1982-83 by 14 percent a year on average, in 1991 by 24 percent and recently in 2001 and 2002 by 31 percent a year on average. But the booms following the busts have always compensated the decrease. However, the future prospects are unclear as the latest decline in FDI inflows has been continuing for three years. This has never happened before and represents the strongest downturn within the last 30 years. Nevertheless, the recent downturn has not changed the importance of foreign capital for domestic productivity and output. We have just seen an adjustment to "normal" levels. After three years of reduction FDI-inflows increased again in 2004.

The driving force behind this FDI development are mergers and acquisitions (M&A). In fact, M&A attribute for the major part of international capital movements. Dur-

[23] World Bank (2001), table 2.4.

ing the boom of the world economy in 2000, the market value of cross-border M&As exceeded one trillion dollars – about five times more than in the early 1990s.[24] As a consequence, the foreign share in national capital stocks increased tremendously in recent decades. In 2002, world FDI stock had risen to 7.1 trillion dollars, more than ten times higher than in 1980. The importance of the global FDI stock is underlined by the fact that foreign capital yielded an estimated value added of 3.4 trillion dollars in 2002 which is about ten percent of world GDP and twice as much as in 1982. "The world stock of FDI generated sales by foreign affiliates of an estimated 18 trillion dollars, compared with world exports of eight trillion dollars."[25] This comparison nicely illustrates the role that FDI plays in the global economy. Investors clearly have a global perspective when thinking about where to employ their capital. It is a new feature of globalisation that ownership of national capital stocks is more intertwined internationally than in earlier decades.

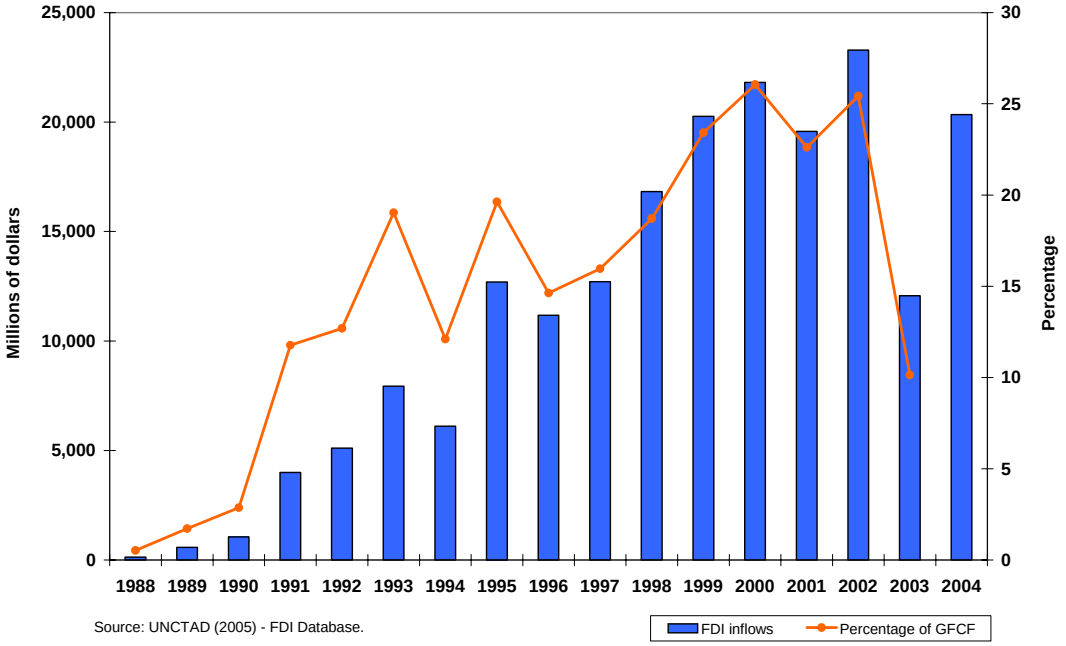
2.2.3 Eastern Europe and Germany's share in FDI

The growth rates of FDI inflows in Eastern Europe are not following the recent world trend. While the global downswing was huge in 2001 and 2002, FDI inflows to the ten new EU member states reached all time highs in 2002. This can be seen from Figure 2.7. Moreover, the rising share in gross fixed capital formation underlines the importance of foreign capital for the catching-up process that is at work since the fall of the Iron Curtain. The anticipated EU enlargement reduced risks for investors before the actual accession date on May 1, 2004 and created even more legal security since then.

According to UNCTAD (2003), FDI inflows into Eastern Europe were driven by a catching-up process. In 1995, inward FDI stock as a percentage of GDP only amounted to 5.3 percent in the CEECs whereas Western Europe reached a level of 13.4 percent, and the entire world 10.3 percent. In 2001, the ratio had climbed to 20.9 percent for

[24] For a recent summary of M&A development, see EEAG (2006).
[25] See UNCTAD (2003), p. 23.

Figure 2.7: FDI inflows and share in gross fixed capital formation, 10 new EU-members



Eastern European countries, to 22.5 percent for the world and 31.5 percent for Europe. Thus, FDI inward stock as a percentage of GDP increased from about 40 percent of the Western European level to about two thirds within six years. Some countries like Estonia or the Czech Republic even jumped from 14 to 65 percent within this time span and have exceeded levels of many industrialised economies.

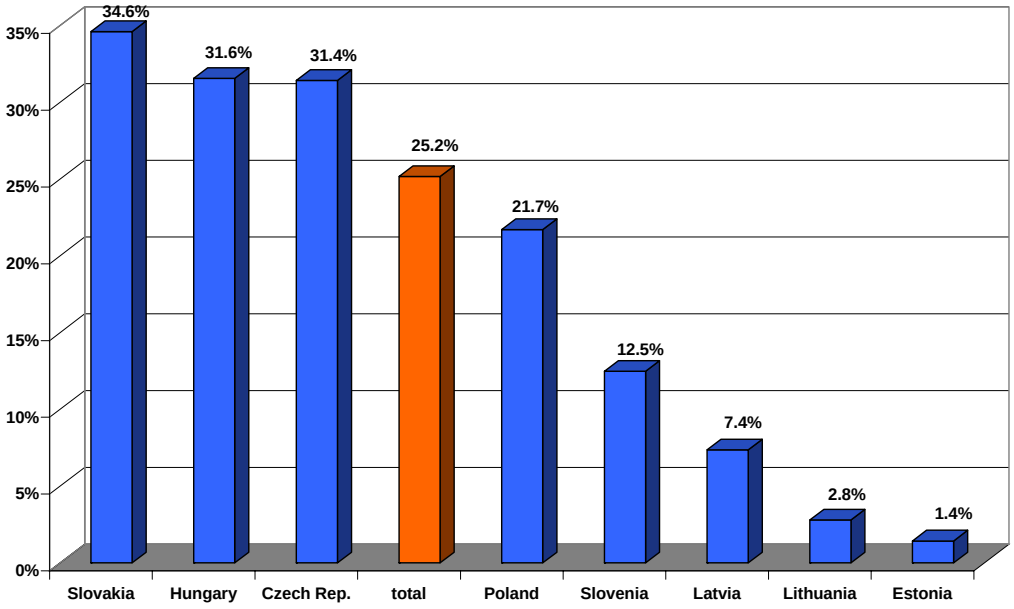
The trend in FDI inflows to Eastern Europe was mainly driven by German activity. In 1999, 18 percent of the inward stock in the group of CEECs[26] had their origin in Germany. The United States accounted for 16 percent, the Netherlands for 12 percent, UK and France for 6 percent each.[27] If one just takes the eight new EU members from this region, Germany's dominance was even more pronounced, with 25.2 percent of the total FDI inward stock accruing to German investors. However, the dominant position has deteriorated to about 20 percent in 2002, although German investment in Eastern

[26]The Central Eastern European Countries (CEEC) comprise Albania, Belarus, Bosnia-Herzegovina, Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Republic of Moldavia, Poland, Romania, Russian Federation, Serbia and Montenegro, Slovakia, Macedonia, Ukraine, (and predecessor states).

[27]UNCTAD (2000), World Investment Report 2000.

Europe is still growing from year to year in absolute terms. Figure 2.8 reveals that, for the year 1999, German investors were particularly strongly represented in Slovakia, Hungary and the Czech Republic.

Figure 2.8: German share of total FDI inward stock, Eastern European EU-members, 1999



Source: UNCTAD FDI Database and Deutsche Bundesbank (2004), own calculations.

According to a survey undertaken by the German Chambers of Trade and Commerce (DIHK) among 10,000 German firms for the period 2000 to 2002, 18 percent of companies in the industry sector had shifted parts of their production sites abroad. This figure was even higher in previous years: about 25 percent between 1990 and 1995 and 19 percent thereafter.[28] Among the main motives, 45 percent mentioned lower labour costs in the target region, while 38 percent named taxes and social security contributions that could be saved outside Germany. Concerning employment creation abroad, 656,000 people were working for a German parent company in Eastern European EU member countries in 2003.[29] Another study by the Institute for the German Economy (2002) found that nearly 60 percent of German companies that employ between 1,000

[28] DIHK (2003), p. 5.
[29] Deutsche Bundesbank (2005).

and 5,000 workers have already invested abroad. For larger companies, the share even exceeds 80 percent. These impressive numbers leave no doubt that foreign direct investment is a key element of economic integration. Obviously, Germany plays a major role in this game.

2.3 Migration - the integration of labour markets

2.3.1 Migration policies

Regulation of migration flows is a recent phenomenon in human history. The first immigration control was initiated in England in 1793, although little was regulated compared to modern migration laws. The United States implemented the first regulation in 1875 to exclude prostitutes and convicts from legal immigration. Generally speaking, however, the free flow of people was possible because many workers were needed in the course of the industrialisation era. Stalker (1994) divides the last 150 years into four periods. The first period, from 1860-1914, was characterised by low regulation and mass migration from Europe to the US, Canada and Australia, just to mention the most important host countries. Between 1914 and 1945, security reasons provoked many European states to impose stricter controls for foreigners. However, economic depression and ethnic reasons were also put forward as reasons for stricter controls. After World War II, migration rules remained in place, but were applied more liberally. Developed countries had a high demand for workers and pursued an active immigration policy. In the 1960s and early 1970s, Germany permitted the immigration of Turks who were needed in the coal and steel industry at the Ruhr. After 1974 - which marks the beginning of the fourth era in Stalker's classification - labour markets experienced sharply increasing unemployment rates. Thus, politicians kept away foreign workers from national markets in order to avoid further pressure. However, the demand for skilled workers needed to be satisfied by foreigners in some countries. Hence, modern immigration laws account for these needs and clearly regulate who is welcome and who is not.

With the Treaty of Rome in 1957, the six founding countries of the European Community - Germany, Italy, France, Belgium, Luxembourg and the Netherlands - institutionalised the free movement of goods, services, capital and people between them. However, free labour flows were generally not possible before 1968. But also thereafter, many crucial details imposed restrictions on migrants within Europe. For instance, the imperfect harmonisation of the educational system de facto reduces job opportunities in other member states.[30] Furthermore, language barriers still seem to be a major obstacle for a high degree of labour mobility.

Following the Eastern enlargement of the EU in 2004, free migration of workers from the new EU member countries to the old members can be restricted up until 2011. Access to the labour market depends on national law and bilateral agreements. After two years, EU-15 countries are required to announce whether they intend to continue with national legislation for another three years. It is intended that these transitional agreements should end five years after accession. However, pre-2004 member states can apply for an extension of another two years if the national labour market "experiences serious disturbances (or a threat thereof)."[31] An extension possibility will not be allowed after 2011. Hence, there will be no legal restriction to a European labour market.

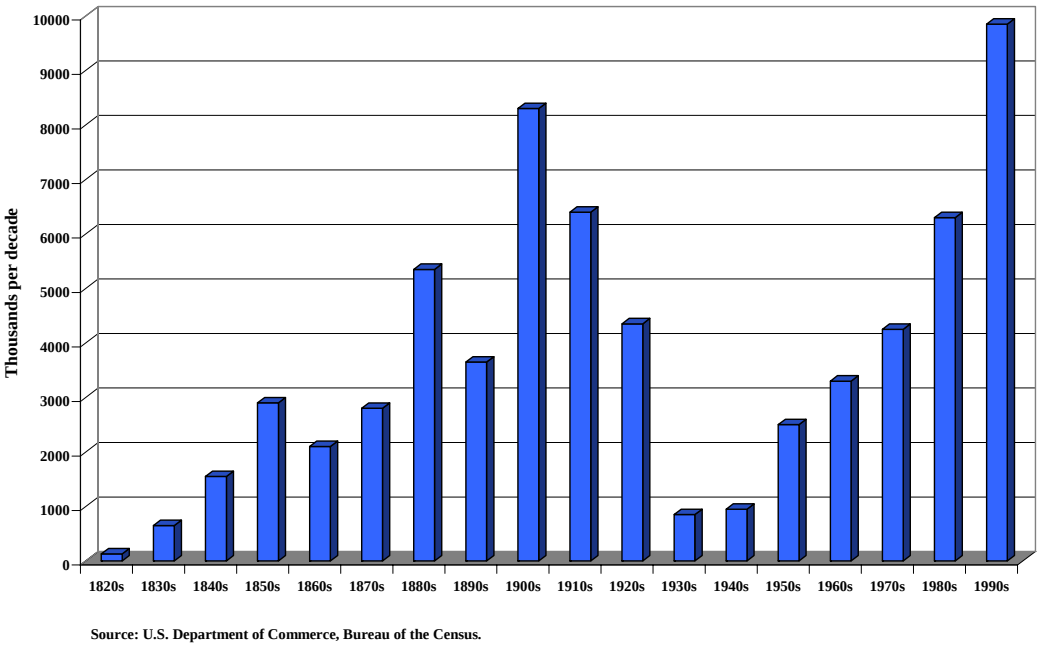
2.3.2 Migration flows from a historical perspective

To quote Adam Smith: "Man is of all sorts the most difficult to be transported."[32] The factor of production that has to cross borders is embodied in human beings. Migration implies that people have to give up their social environment and bear significant uncertainty and risk. Although wage differences are the main determinant in explaining migration flows, people do not only react to higher wages in the target region. The probability of receiving a job or network migration constitute other important factors. Nevertheless, the higher pay must at least compensate for the migration costs, assimi-

[30] Biffl (2001).
[31] European Commission (2003c).
[32] Cited as in Chiswick and Hatton (2003), p. 65.

lating to a different culture or new investments in social networks. Despite all barriers, migration has taken place on a very large scale in human history. For the United States, Figure 2.9 confirms that there have been eras of mass migration within the last 150 years. In absolute terms, the 1990s were characterised by higher immigration levels than the previous peak that occured at the turn to the 20th century.

Figure 2.9: Immigration to the United States since 1820

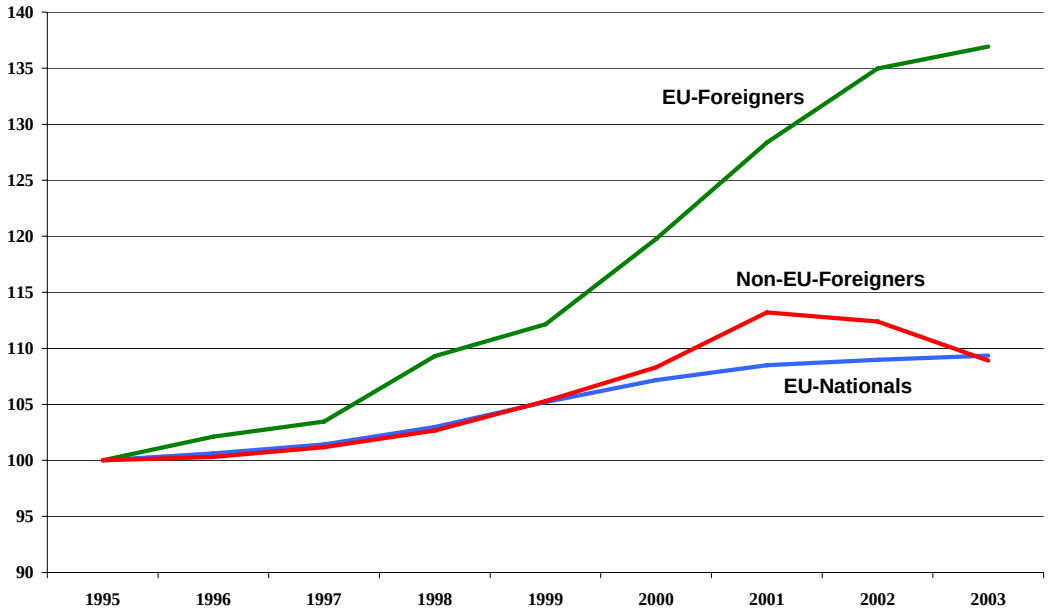


Famine and revolution were the driving forces behind the mass migration from Europe to the US in the 1840s and 1850s. In the following decades, a sharp decline in migration costs due to the invention of the steam boat was responsible for increasing migration flows.[33] In line with economic recession and a period of disintegration, migration flows fell dramatically in the inter-war period. For the US, this was due to migration quotas restricting the inflow of foreigners. During these years, net migration for the US even became negative as remigration to Europe exceeded immigration. The second half of the 20th century brought about growing migration flows again.

[33]Not only direct costs were cut, but also opportunity costs fell since travel time was reduced from five weeks in the 1840s to 12 days in 1913 and 9 days in the 1960s. See Chiswick and Hatton (2003) and McDonald and Shomowitz (1990, 1991) for further details.

This was due to further decreasing transport costs, namely by the shift from sea to air transport, and lower communication costs. Both factors combined decreased migration costs substantially. However, by that time many countries had implemented migration laws that were still in place after World War II. A key change – compared to the previous century – was the decline of the European continent and the rise of Latin America and parts of Asia as sources of emigration. The inflows to the United States originated more from these new source regions whereas Europe underwent an economic upswing that increased the demand for labour. Although US immigration exceeded 19th century levels in absolute terms, the relative levels were unrivalled. In proportion to the population, immigrants to the US accounted for 12 percent in the 1850s and 11 percent in the 1900s compared to only 4 percent in the 1990s.

Figure 2.10: Employment by nationalities in EU-15 (1995=100)

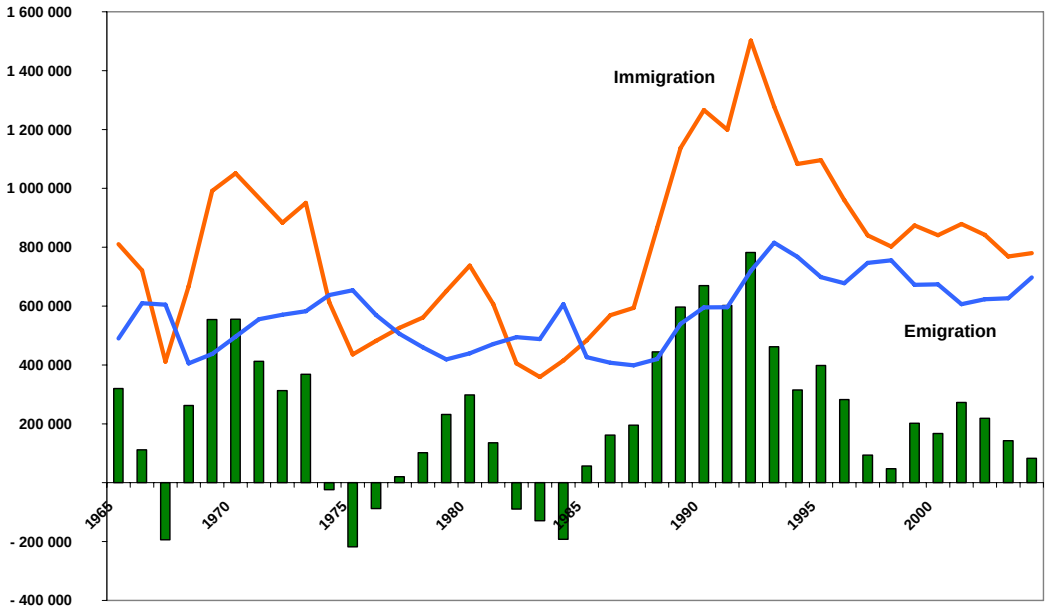


Source: EUROSTAT, on request, July 2004.

With respect to Europe, intra- and international migration always used to be rather low. Although wage differentials are still persistent, the share of EU-foreigners in total population has remained stable at about 1.5 percent. Only countries like Luxembourg

(31 percent) and Belgium (5.5 percent) need to be mentioned as outliers.[34] However, employment of EU-foreigners within Europe has increased by nearly 40 percent since 1995 whereas employment of EU15-nationals grew by only 10 percent (see Figure 2.10). This indicates a deeper integration of labour markets in recent years. However, the stock of foreign EU employees has remained stable at around 2-3 percent of total employment since 1970 and only increased slightly to about 3.5 percent recently. Vis-à-vis this number, it appears far fetched to talk about a fully integrated European labour market.[35]

Figure 2.11: German migration pattern since 1965



Source: Statistisches Bundesamt (2005): Migration Statistics 2004.

Germany's role changed from a sending country in the 19th century to a host country after the Second World War. Labour demand was higher than national supply, so that the government initiated guest worker programmes in the 1960s. On average, net immigration amounted to 240,000 people in this decade.[36] By 1973, one in nine workers was foreign-born. Between 1988 and 1992, Germany faced a second era of

[34] Brücker, Alvarez-Plata and Siliverstovs (2003) and OECD (2004b), table 1.8.
[35] Labour market issues are extensively discussed in chapter 3.
[36] Brücker, Trabold, Trübswetter and Weise (2003).

strong net immigration. This can partly be ascribed to skyrocketing numbers of asylum seekers, but also to migration flows from Eastern Europe after the fall of the Iron Curtain. From the following year on, Germany harmonised asylum laws with European standards which led to a drastic reduction of immigration of asylum seekers. The migration pattern since 1965 is shown in Figure 2.11.

2.3.3 Migration potential from Eastern Europe

As the most important determinant for labour migration is the wage differential between the sending and the target country, strong repercussions have been feared due to the Eastern Enlargement of the EU in 2004. Compared to previous enlargements to the south and the south-west, wages in the new member states relative to the old member states are much lower than in Spain, Portugal or Greece at their time of accession. While the latter group of countries had average wages of about 50 percent of EU member countries, Eastern European states only pay wages of one seventh of German wages.[37] Between 1950 and 1970, about 3 percent of the population of southern European countries immigrated to western and northern European states. After 1970, the share rose to 4 percent. Assuming an identical migration pattern, this implies immigration to the old member states of up to 6 million people in the long run.[38]

Some econometric studies have estimated the migration potential under alternative scenarios using more sophisticated arithmetical means. According to a report of the Ifo Institute for Economic Research, 3.2 to 4 million migrants can be expected from the five largest countries Poland, Czech Republic, Slovakia, Hungary and Romania within the first 15 years after accession.[39] If the smaller countries are added, even 4 to 5 million people would come. Altogether, with an assumed labour mobility from the first day of membership, 250,000 to 300,000 Eastern European citizens might emigrate per year.[40] On the same grounds, the European Integration Consortium (2000) estimated a net

[37] Institute for the German Economy (2005), p. 141.

[38] Stalker (1994), pp. 212-13. A similar result can be found in Layard et al. (1992).

[39] Romania only had the status of an accession country (in 2004) whereas the other four have already gained full membership.

[40] Sinn et al. (2001).

migration to the old member states of 930 thousand people within the first three years, a little less than in the Ifo study. In the long run, however, the differences are much bigger. The Consortium only expects that 1.9 million citizens will have migrated after 15 years. Bauer and Zimmermann (1999) forecast that, in the long run, 2-3 percent of the population will move to the West. With a current population of roughly 75 million, this would result in a total immigration of 1.5 to 2.3 million people from the eight new Eastern European member countries.[41]

Brücker et al. (2000) expect initial inflows to Germany of 220,000 migrants per year with a decreasing trend in consecutive years. They are referring to the eight new Eastern European EU member countries plus Romania and Bulgaria, which will accede in 2007. The population from these 10 countries that resides in the EU-15 would rise from about 550,000 today to 1.9 million in 2010, 2.4 million in 2020 and 2.5 million in 2030. Without Bulgaria and Romania, the yearly inflows would not exceed 150,000, however. In a different study, Brücker, Trabold, Trübswetter and Weise (2003) argue that the total number of foreigners in Germany will only increase from 7.3 million (2000) to about 8 million within the following three decades. However, the composition will change. The share of citizens from Eastern European member countries can be expected to be much higher in 2030.

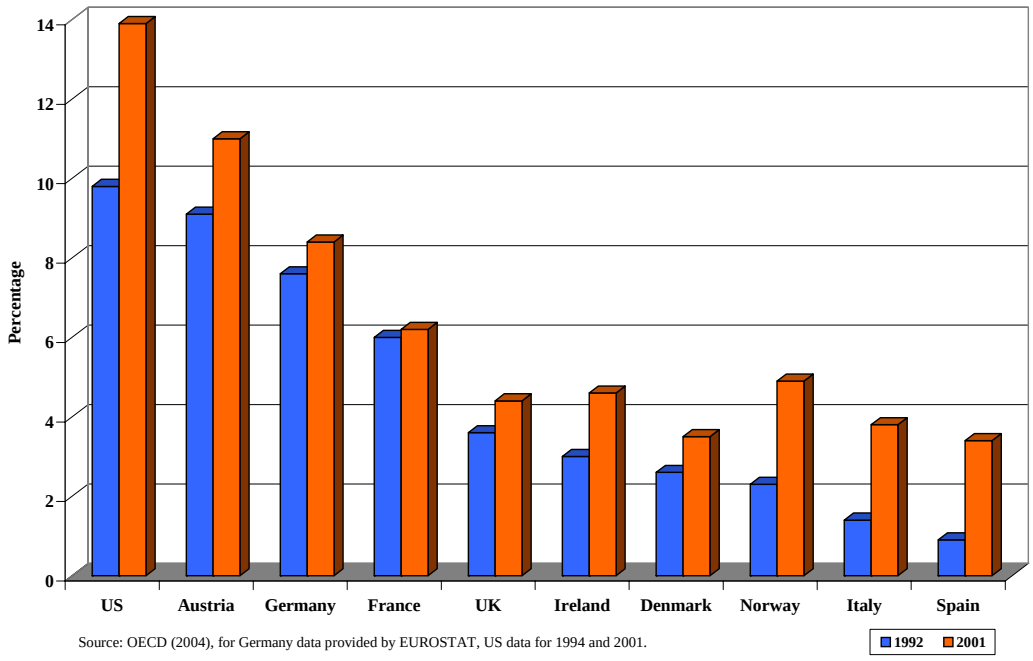
All studies argue that the impact on the labour market will be strongest in the first years after mobility is installed. However, a mass exodus of foreign workers to the richer EU member states is generally denied. Concerning the distribution of migrants across target countries in Western Europe, one can assume that Germany and Austria can be expected to bear the heaviest burden. If the share of Eastern Europeans who already live in the EU-15 remained constant, then two thirds of the total emigration would have to be borne by Germany due to network migration. The second largest country affected would be Austria with 11 percent of total migration flows.

[41] If Bulgaria and Romania are added and perfect labour mobility is assumed, the numbers increase to about six million.

2.3.4 Immigration and labour markets

Despite the immigration into developed countries in the 1990s, relative numbers still reside at very low levels. Therefore, the impact on national labour markets seems to be negligible. However, Figure 2.12 reports that the share of foreign workers in the total labour force has increased substantially in major industrialised countries.

Figure 2.12: Stock of foreign and foreign-born labour force as a share of total labour force



Source: OECD (2004), for Germany data provided by EUROSTAT, US data for 1994 and 2001.

The US typically shows a very high ratio of foreign workers which further increased to nearly 14 percent in 2001.[42] Germany also belongs to the group of countries that is characterised by a relatively high share of foreign workers. In 2001, more than eight percent of the work force were either foreign or foreign-born. Starting from significantly lower levels, Italy and Spain were affected relatively intensively by immigration in the 1990s. The share of the foreign-born labour force jumped up by 270 percent in Spain and by 170 percent in Italy between 1992 and 2001.

[42] Countries like Luxembourg or Switzerland have higher shares, but are smaller and not comparable to large economies like the US, France, Germany or the UK.

Table 2.3: Foreign and national population classified by level of education, 2000-01 average, in percent

	Lower Secondary		Upper Secondary		Third level	
Country	Foreigners	Nationals	Foreigners	Nationals	Foreigners	Nationals
Austria	41.8	21.4	43.5	64.3	14.7	14.4
Belgium	54.4	39.9	24.5	32.0	21.2	28.2
Denmark	21.6	20.0	51.1	53.9	27.7	26.1
France	66.7	34.9	19.6	42.3	13.7	22.7
Germany	48.5	15.1	36.1	60.4	15.4	24.5
Greece	40.3	48.9	41.2	34.1	18.5	16.9
Italy	55.0	55.8	32.1	34.4	13.9	9.8
Netherlands	50.8	32.6	27.6	42.8	21.6	24.6
Norway	15.7	14.4	44.1	53.2	40.2	32.4
Portugal	69.5	79.6	19.8	11.0	10.7	9.4
Spain	44.6	62.4	25.9	15.5	29.5	22.1
Sweden	29.1	22.4	40.3	48.0	30.6	29.7
Switzerland	33.6	10.5	42.6	64.4	23.8	25.1
UK	30.1	18.8	29.1	53.3	40.8	27.9
Czech Rep.	22.6	13.7	48.5	74.8	28.9	11.4
Hungary	18.6	30.5	52.2	55.7	29.1	13.8
Slovak Rep.	14.5	15.7	68.6	73.8	16.9	10.4
US	30.1	9.3	24.7	33.7	45.2	57.1
Canada	22.2	23.1	54.9	60.3	22.9	16.6

Source: OECD (2003a), Table 1.11, p. 45.

To trace this analysis a little further, we can take a look at the type of jobs immigrants get. It is evident from the data that immigrants possess a below average level of education compared to that of nationals. In France, for instance, two thirds of the foreign population has gained a lower secondary education, whereas only one third of French citizens possess such an education. A similar picture evolves for Germany, Austria, Belgium, the Netherlands and the United States (see Table 2.3).[43] Assuming that education determines job opportunities, immigration has specifically increased competition in low-skilled sectors. Indeed, in industries like mining, manufacturing and energy, construction or trade, foreign workers are represented more than proportionately. In Germany, 32.8 percent of all employees who work in mining, manufacturing

[43] OECD (2003a), p. 45.

and energy, are foreigners, 26.5 percent in Austria and 18 percent in France.[44]

A different pattern exists in Eastern European countries. Regarding low-skilled workers, these countries are sending rather than target regions. With respect to qualified employees, though, Eastern Europe seems to be an attractive region. As Table 2.3 reports, foreigners are relatively better educated than nationals. Also, the United Kingdom and Norway mainly attract highly educated people. The share of the foreign population with a university degree reaches more than 40 percent in these countries.

2.4 Conclusions

This chapter has argued that globalisation of national markets had already been quite pronounced in the past. However, the fall of the Iron Curtain and China's rise have created an additional stimulus. Commodity markets have never been more integrated, and short-term capital mobility, as well as M&A activity, reached unprecedented levels in recent years. The main reason for this trend is the continuous reduction of both political and technological trade barriers over the last decades.

With its geo-strategical location, Germany has been particularly affected by the collapse of the Communist Bloc. Apart from the high increase in trade flows with these economies, German entrepreneurs belong to the largest investors in Eastern Europe. Moreover, there is no doubt that Germany will host the largest fraction of Eastern European immigration due to both geographical and cultural proximity. These developments in general exercise a substantial adjustment pressure - not only for Germany but for all countries participating in global market exchange.

As we want to study the impact of globalisation in the presence of imperfect labour markets, the next chapter provides an overview of labour market institutions and labour market performance in selected countries. The analysis should serve as the motivation for our central assumption of rigid labour markets.

[44] OECD (2003a), p. 63.

Chapter 3

Labour markets - institutions and performance

The labour market belongs to one of the most important markets in an economy. In order to absorb adjustment pressure and achieve necessary changes in the economic structure, labour markets need to function appropriately. These adjustments take place via bankruptcies or contraction of less efficient firms and expansion of more efficient or entry of new firms. This necessarily implies hiring and firing of employees and thus demands a high flexibility of labour markets with regard to employment protection. In Germany, for instance, about 8 million people entered into and left unemployment in 2004 alone. This makes up more than 20 percent of total employment. Moreover, it constitutes only a lower bound because direct job changes (without the "detour" via unemployment) are not included here.[1] This impressive figure underlines the importance of employment protection legislation for labour market flexibility.

Adjustment also takes place via changes in (relative) wages. If commodity prices of certain products recede due to low-wage competition from abroad, wages might need to adjust downwards in order to avoid firm bankruptcies. Hence, if labour market institutions prevent market wages from falling below a certain floor, unemployment emerges as a residual adjustment mechanism, and the absorbtion of exogenous shocks

[1] Bundesagentur für Arbeit (2006), on request.

cannot take place in a first-best fashion.

Most economic models assume that labour markets function perfectly, that is, full employment always prevails. However, reality tells a different story. Labour markets are far away from being perfect markets, and even in the least regulated labour market, adjustment needs time. In all countries, governments intervene to avoid certain market outcomes. However, these interventions exercise a fundamental influence on market outcome, be it the wage structure, employment and unemployment levels or the duration of unemployment. As this book focuses on the impact of globalisation when labour markets are rigid, it is worthwile to take a closer look at the degree of labour market regulation in various countries.

It turns out that there are substantial differences across nations. Whereas countries like the UK or the US choose to interfere less with market forces, many continental European states have typically imposed generous welfare states which distort labour supply decisions to a large extent. However, several continental European countries have reduced their unemployment rates over the last decade by both demanding more participation and granting generous welfare benefits at the same time.

This chapter starts with a survey of labour market institutions in OECD countries and Eastern Europe. The second part observes major labour market reforms in selected economies. Finally, we want to link national institutions to labour market performance. We compare labour costs, relative earnings, unemployment and employment trends, the pattern of unemployment and working time across countries.

3.1 Labour market institutions

3.1.1 Trade unions and employers' organisations

A single employee might negotiate her contract with the employer directly. In many cases, however, employees are represented by trade unions that set certain frameworks or negotiate contracts for entire firms or industries. Similarly, a single firm might

delegate these negotiations to the employers' associaton. It is obvious that these organisations change the weight of participating parties in the bargaining process and thus might lead to other market outcomes. For instance, powerful trade unions behave as monopolists and set wages above full employment levels. Also, trade unions might protect workers who possess a job by negotiating strict dismissal rules while excluding the unemployed.

The picture concerning trade union membership in Western European countries is mixed.[2] France, Ireland, Italy and Norway have experienced an increase in membership numbers between 1993 and 2003, in some cases very sharply. Many countries remained at their 1993 level, whereas Germany, for example, faced an overall loss of about 4.4 million members between 1991 and 2003 - a reduction of 38 percent.[3] In Greece and the UK, membership receded by about 10 percent between 1993 and 2003. The dissimilar patterns can be explained by varying developments in living standards and unemployment rates in European countries. Additionally, a decline in traditionally highly unionised industries and the rise of lower-unionisation services employment have clearly enhanced this development.

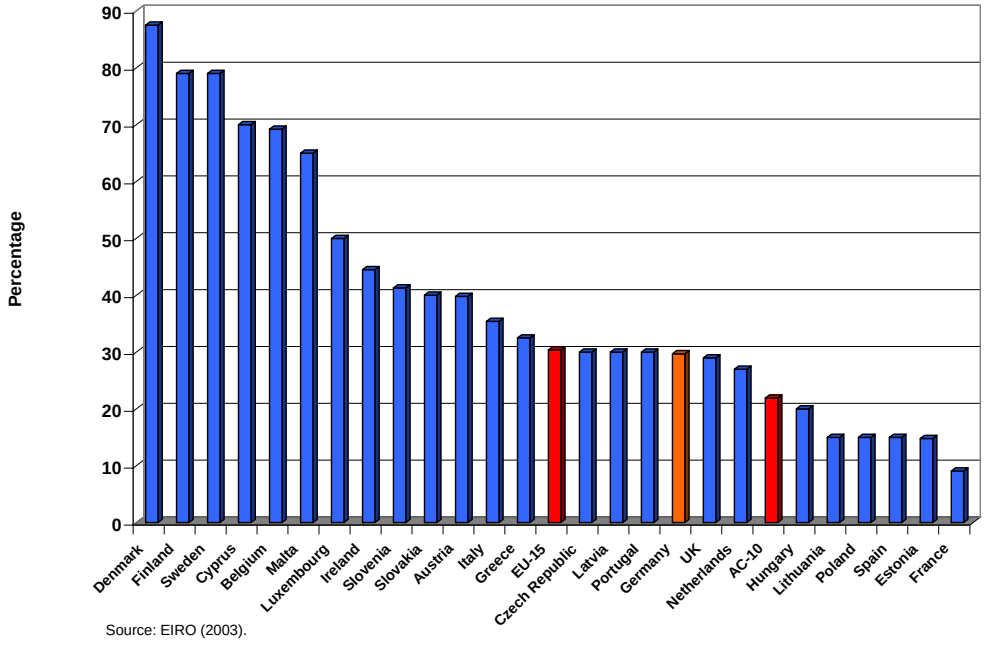
With regard to Eastern European countries, the situation is fundamentally different. Most countries of the former Soviet Bloc experienced a collapse of the old trade union organisations. As trade union membership was compulsory during the communist era, a normalisation process began in which many former trade union members opted out. Polish, Slovak and Bulgarian trade unions lost about 70 percent of their members within ten years. In their 2002 report, *"Industrial Relations in Europe"*, the European Commission ascribed the steep decline in membership numbers to factors such as structural change, rising rates of unemployment, falling living standards and the evolution of small and medium sized companies with a lower or no workers' representation.

A glance at trade union densities in Figure 3.1 allows further insights. The ratio describes the absolute number of members relative to total employment. In 2002,

[2] According to EIRO (2004a).

[3] Deutscher Gewerkschaftsbund, by request 2005, own calculations.

Figure 3.1: Trade union density in the EU, 2002



the Nordic countries Denmark, Finland and Sweden exhibited highest densities with about 80 to 90 percent of all employees being represented by a trade union. Germany ranks slightly below the EU-15 average with 29.7 percent. With regard to the new EU members, Malta, Cyprus, Slovenia and Slovakia are the only countries ranking above the EU-15 average. All others feature lower relative membership. As a reference value, the trade union density in the US amounted to 13.2 percent in 2002 - at the lower edge of this distribution.[4]

The trade unions' counterpart in the social dialogue are the employers' organisations. Basically, there are bodies representing employers' interests and bodies representing business and trade interests. Several countries have installed a single organisation for both parts, whereas some countries, like Germany, have two single organisations. Another feature is the separation of representation by sectors such as industry, services and agriculture.[5]

[4] EIRO (2003).

[5] As in Finland, Greece or Portugal. For further details, see EIRO (2002).

In contrast to the long tradition of company representation in Western Europe, the new EU member states had to start this process from the beginning because the communist regime only allowed state-owned enterprises. As everything was decided by government authorities, there was no need for own representative bodies. The transition crises substantially hampered the development of employers' organisations. As big companies went bankrupt and were replaced by many smaller firms, coordination became much more difficult. The European Commission (2003a) estimates that 30 to 40 percent of industrial enterprises are represented by an organisation, but only 2 to 5 percent of all firms. Due to history and tradition, these young organisations lack a strong influence in the social dialogue. Although trade unions and employers' organisations intend to discuss labour market issues within their spheres autonomously in the future, the governments currently still play a central role in negotiations.[6]

3.1.2 Bargaining systems

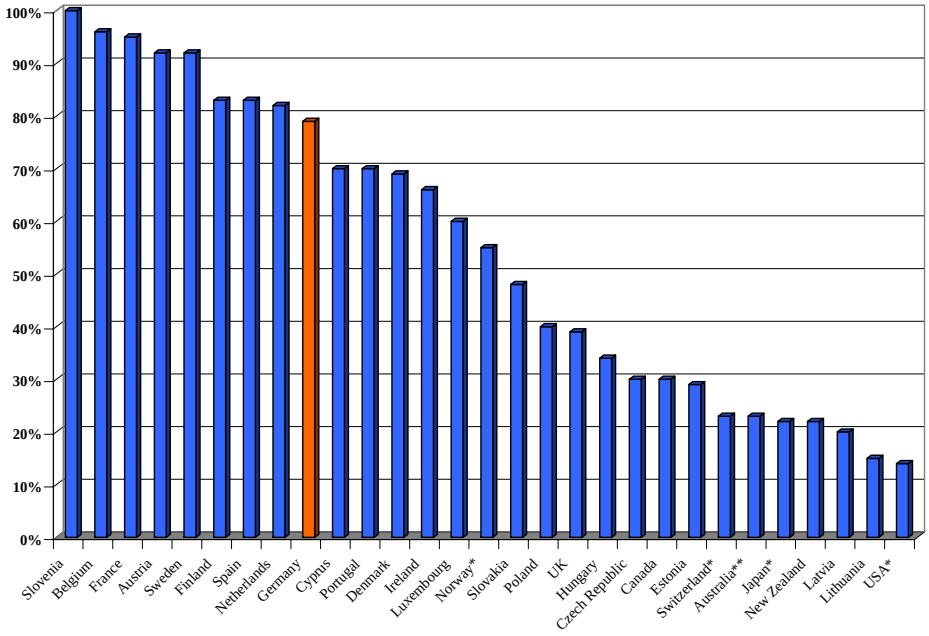
The size of trade unions and employers' organisations provides a first impression of the distribution of power in the bargaining process. Yet, how this process is organised is another story. The degree of centralisation and the extent to which collective bargaining results apply to firms and employees - the so-called coverage rate - are crucial ingredients. Both a large coverage and a high degree of centralisation might be detrimental for labour market flexibility. Negotiating wages on the national level makes it more difficult to account for differences between regions or firms. Consequently, wages might be too high for low productivity firms and cause bankruptcy.

Figure 3.2 shows collective bargaining coverage in percent of total employment for OECD- and new EU-member countries. Not surprisingly, the United Kingdom and the United States can be found at the lower end of the scale with 36 and 14 percent, respectively, whereas continental European countries are earmarked by comparably high coverage rates.[7] The Nordic countries Sweden and Finland, as well as Belgium,

[6] Funk and Lesch (2004).

[7] The coverage rate has been decreasing in Germany over the last years and is much higher in Western Germany, IAB (2002). See also Ochel (2001) for cross-country time series.

Figure 3.2: Collective bargaining coverage, 2000



Source: European Commission (2003a) for EU countries; EEAG (2004) for non-EU countries. *1996-98, **2001

France and Austria, exhibit highest coverage above 80 percent of total employment. Germany also ranks in the upper part of the distribution with 79 percent. The new Eastern European member states are instead more comparable to the Anglo-American pattern. Only Slovenia is the exception as the leader of the ranking.

The degree of centralisation differs markedly between countries. Bargaining takes place on the national level in Belgium, Finland and Ireland. For most EU countries, however, the sector is the dominant level. In the UK and in the US, negotiations even take place on the company level. The recent trend in many EU member states indicates a tendency towards a more decentralised wage formation. Italy and Denmark serve as good examples.[8] However, decentralisation of wage bargaining as in the United Kingdom does still not seem to be in reach for continental Europe. The situation in Eastern Europe again looks similar to the UK and the US. Here, wages are also negotiated on the enterprise level in most cases. Slovenia and Slovakia are the exceptions with pay setting at the sectoral level. Tables 3.1 and 3.2 provide a detailed overview.

[8] European Commission (2003), p. 77.

Table 3.1: Summary characteristics of national wage formation systems in EU-15

	Trade union density, 2000	Collective bargaining coverage, 2000	Duration of agreements	Bargaining level (dominant form)
Austria	30 %	92 %	1 year	sectoral
Belgium	69 %	96 %	2 years	national
Denmark	88 %	69 %	4 years	national/ sectoral
Finland	79 %	83 %	2 years	national
France	9 %	95 %	1 year	company
Germany	30 %	79 %	2 years	sectoral
Greece	33 %	n.a.	2 years	sectoral
Ireland	45 %	66 %	2 years	national
Italy	35 %	n.a.	varying	sectoral
Luxemb.	50 %	60 %	varying	sectoral/ company
Netherl.	27 %	82 %	varying	sectoral
Portugal	40 %	70 %	1 year	sectoral
Spain	15 %	83 %	3 years	sectoral
Sweden	79 %	92 %	3 years	sectoral
UK	29 %	39 %	varying	company

Source: European Commission (2003a), Table 27. Trade union density for Portugal refers to 1998, for Germany and Italy to 1999; collective bargaining coverage for Ireland and Luxembourg based on estimates from national experts.

Table 3.2: Summary characteristics of national wage formation systems in new EU member countries

	Trade union density, 2000	Coll. bargaining coverage, 2000	Bargaining level (dominant form)
Cyprus	70 %	65-70 %	sectoral
Czech Republic	30 %	25-30 %	company
Estonia	15 %	29 %	company
Hungary	20 %	34 %	company
Latvia	30 %	<20 %	company
Lithuania	15 %	10-15 %	company
Malta	65 %	n.a.	company
Poland	15 %	40 %	company
Slovakia	40 %	48 %	sectoral
Slovenia	41 %	100 %	sectoral

Source: European Commission (2003a), Table 27.

The evaluation of the new EU member states' pay setting systems is not unambiguous in the literature. The European Economic Advisory Group (2004) finds a high conformity with the less regulated Anglo-Saxon system. Kohl and Platzer (2003) suggest a unique Central Eastern European industrial relations model, whereas Belke and Hebler (2002) instead group the CEECs to continental Western European countries like Germany and France. However, Belke and Hebler also incorporate unemployment benefits and dismissal rules which have already converged towards the high European regulation level.[9]

3.1.3 Minimum wages and implicit wage floors

The outcome of wage negotiations can be restricted by wage floors. The majority of EU countries has installed statutory minimum wages. The US serves as another prominent example. Concerning the theoretical implications, it depends on the market structure whether minimum wages reduce or increase employment. With monopsonistic markets, a minimum wage above the prevailing market level might well increase unemployment and reduce the surplus of the monopson. Thereby, welfare rises. A prominent representative of this view is Alan Manning (2003a and 2003b). The main argument states that the division of labour has become so specialised that many firms within their segments in fact behave as monopsonists. However, an economy is made up of many sectors that are characterised by different productivities and hence, different wages. Therefore, a minimum wage that might have positive effects in one sector could be too high for a low-productivity branch and exercabates detrimental effects. Another argument against this view says that minimum wages are only relevant for the low-skilled workers in the lowest part of the wage distribution. As specialised skills do not play a role here, one can assume that labour markets can rather be described by the perfect competition model. Then, the market clearing wage implies a Pareto optimum and setting a statutory minimum above this level unavoidably creates unemployment and welfare losses.

[9] For a summary, see Funk and Lesch (2004).

Apart from minimum wages, benefit payments can cause similar effects. Social security payments define workers' reservation wages and thereby create an implicit wage floor. Assuming perfect labour markets for low-wage workers, policy makers generally face a fundamental trade-off when setting rules in this field. A more generous benefit system or a higher minimum wage are intended to compress the income distribution, that is more equality, but pari passu might reduce incentives to either employ workers or for workers themselves to supply labour, that is less efficiency. While minimum wages refer to the demand side, social benefits have an impact on the supply of labour. Both aspects will be discussed in the following section.

Minimum wages

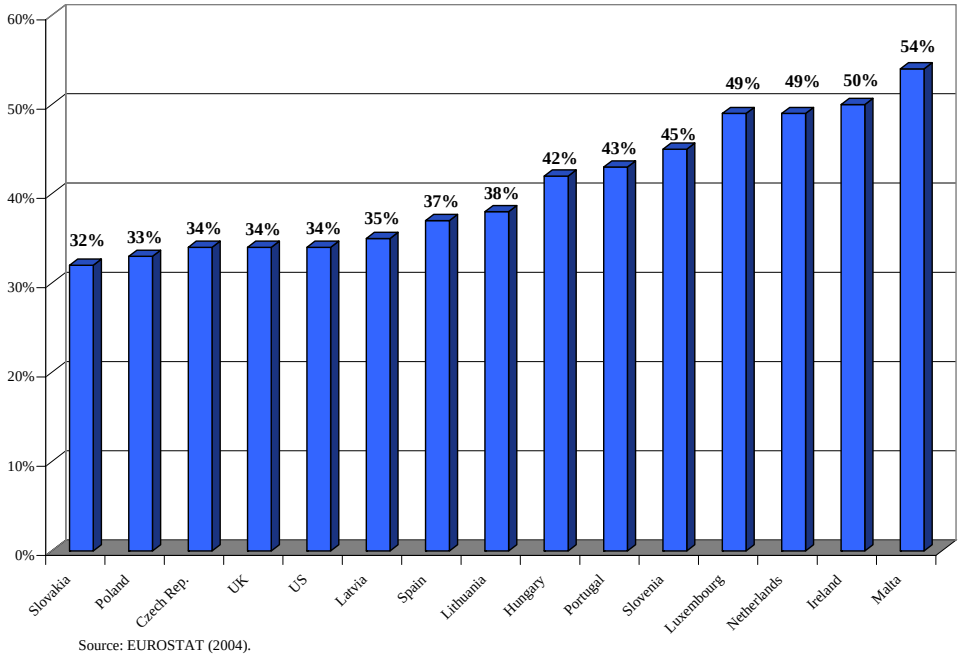
Within the enlarged European Union, 18 out of 25 countries have introduced a statutory minimum wage – nearly all of the new members (except for Cyprus) and nine of the old member states.[10] Also the United States, usually not recognised as having regulation in place, have protected the low-skilled by a statutory wage rate set on the federal level. With regard to levels, Luxembourg, for instance, guraranteed the highest minimum wage (1,237 €) whereas Lithuania established the lowest (281 €) in 2004. The statutory minimum wage in the US amounted to 727 € and in the UK to 1,083 €. France, the Netherlands and Belgium are ranked just below Luxembourg. However, if one corrects for purchasing power, the gap between the highest and the lowest minimum wages shrinks significantly.[11]

As all these economies are characterised by different average wages, the absolute numbers do not provide an insight into whether statutory minimum wages can potentially be binding for a large fraction of the work force. Figure 3.3 reports minimum wages as a percentage of average monthly gross earnings in industry and services. It is evident that the guaranteed minimum pay is relatively low in Eastern European countries, the UK and the United States (30-40 percent), while it is 49 percent in the

[10] Among the nine old EU member states are Belgium, Greece, Spain, France, Ireland, Luxembourg, Netherlands, Portugal and the UK. In other countries like Germany, minimum pay is negotiated among social partners and is not accounted for in this context. An overview is given in EUROSTAT (1998).

[11] EUROSTAT (2004), figures for this calculation refer to January 2004.

Figure 3.3: Minimum wages relative to average wages, 2002



Source: EUROSTAT (2004).

Netherlands and 50 percent in Ireland. From a historical perspective, real minimum wages relative to average wages in manufacturing have decreased in a wide range of countries, for instance in the US, the Netherlands, Belgium, Greece, Portugal, Spain and the Czech Republic. However, Luxembourg, France and Poland even increased their statutory minimum pay whereas in Hungary and Japan, the level remained the same.[12]

As a consequence, the share of full-time workers earning the minimum wage differs markedly between countries. The US, the UK and Ireland are characterised by small fractions of 1.5, 1.9 and 2.1 percent, respectively. Ireland's high relative minimum wage does currently not impose a restriction on wage flexibility because the economic boom of recent years has boosted market wages for most workers above the minimum level. Hungary, France, Luxembourg and Latvia are ranked at the upper end of the scale with shares of 11.4, 14, 15.1 and 15.4 percent, respectively.[13] Hence, it seems obvious that

[12] OECD (1998), p. 41. Time series for Poland, Hungary and the Czech Republic refer to the 1990s, for other OECD members to the period 1970 to 1996.

[13] EUROSTAT (2004), see also European Commission (2003a), pp. 79-80. Other studies like OECD

Table 3.3: Minimum wage systems in selected OECD countries

Country	Determination	Variation by	Rates for young employees
Austria	legally binding collective agreement at industry level	industry, job tenure, region, dependants, age	embodied in industry agreements
Belgium	unions and employers	age, job tenure	small reductions for <23
Canada	by statute at the federal and provincial levels	industry	reduced rates have been abolished
CZ	by statute	n.a.	only reductions for minors
Denmark	collective agreements	industry, age	40% for <18
Finland	collective agreements	age, occupation, industry, region	n.a.
France	government, constrained by formula	age, training	80% (age 16), 90% (age 17)+ schemes+30-75% for trainees
Germany	collective agreements	age, qualifications, trainee status, region	part of industry agreements
Greece	collective agreements	manual/non-manual, job tenure, marital status, qualifications	lower rates for short job tenure
Hungary	by statute	n.a.	no reduced rates
Ireland	joint labour committees in 16 low-paying industries	age, industry, region, occupation, job tenure	63% (<18); 81% (<21) in hotels
Italy	collective agreements	age, industry, job tenure	part of industry agreements
Japan	by statute for each of the 47 prefectures	working hours, stauts, industry	no reduced rates
L	statutory minimum wages	age, skill, family characteristics	70% for <21
NL	statutory minimum wage	age	34.5% (age 16), rising to 84% (age 22)
Norway	collective agreements	industry, age, job tenure, job	n.a.
Poland	by statute	n.a.	no reduced rates
Portugal	statutory minimum wage	age, trainee status, industry	75 percent (<18)
Spain	statutory minimum wage	age, homeworkers, casual workers	66% (<18)
Sweden	collective agreements	age, industry,tenure, occupation	85% (<24)
Switzerl.	collective agreements on industry level	age, industry	part of industry agreements
UK	pre-1993 by Wage Councils by industry (now only agriculture)	age, industry	pre-1993 no minimum wage for <21
US	federal minimum wage (higher in some states)	limited youth sub-minimum	no reduction

Sources: Dolado et al. (1996) and OECD (1999b).

Note: Minimum wages are defined in a broader sense than in the text. Also countries where minimum wages are part of negotiations between social partners are included in the table.

minimum wages in English speaking countries as well as in some Eastern European states do not restrict labour market flexibility to a significant extent. In France, just to mention a counter-example, flexibility of low wages is restricted for a substantially larger share of the workforce.

Employment effects of minimum wages are both widely and controversially discussed in the literature. While Dolado et al. (1996) do not regard minimum wages as a more serious constraint on the labour market than in the 1960s, Nickell and Bell (1995) and Card and Krueger (1995) explain the rise in unemployment rates by trends against the less-skilled in connection with imperfect wage adjustments. However, Card and Krueger (1995) do not find large employment effects of the federal minimum wage in the US. The overall effect on employment seems to be rather small. What is clear, though, is the negative impact on the employment of young workers.[14] Therefore, many European countries account for that by means of lower minimum wages for the young. The variability in this respect is higher in Europe than it is in the United States.[15] Table 3.3 provides a detailed overview about minimum wage systems in selected OECD countries.

Unemployment benefits

While the empirical evidence of minimum wages' employment effect is not clearcut, there is considerable support for the theory that the generosity of the benefit system has a negative impact on employment.[16] As replacement payments determine workers' reservation wages, higher benefits reduce the incentive to become re-employed and accept low-paid jobs. Moreover, the unemployment spell continues with higher replacement payments, as unemployed workers can afford to wait for a better job offer or take higher risks when negotiating wages.[17] Basically, the impact of benefit systems is similar to that of minimum wages, only that they work via the supply side of labour.

(1999b) have different figures as other references are used. However, the ranking basically remains identical.

[14] See Brown et al. (1982) and Brown (1999) .

[15] Dolado et al. (1996), p. 357.

[16] OECD (1994b), chapter 8. See also Nickell (1997).

[17] See Layard (1988) and Johnson and Layard (1986).

The institutional design of unemployment insurance varies substantially across countries. While Finland, Ireland, Poland and the UK pay fixed amounts (calculated as a percentage of average production workers' income), most governments determine replacement rates as a fraction of previous gross earnings. In a few cases like Austria, the Czech Republic and Germany, unemployment benefits guarantee a certain amount of previous net income. In Denmark, social security contributions must be deducted.

Table 3.4: Average of net replacement rates (NRR) over last 60 months, 2002

		No children		Two children	
Country	Overall average	Single person	One-earner married couple	Lone parent	One-earner married couple
Italy	5	5	5	6	6
US	6	6	6	5	5
Korea	6	6	6	7	6
Czech Rep.	9	4	4	13	13
Japan	13	7	7	27	10
Canada	20	11	12	27	28
Luxembourg	25	17	17	33	33
Poland	26	21	21	31	29
Greece	26	22	23	29	29
Spain	30	29	28	32	31
Switzerland	31	30	30	33	33
Sweden	32	17	17	50	42
UK	33	34	34	32	32
Hungary	36	32	32	40	39
Slovak Rep.	37	28	33	42	45
Portugal	48	44	46	51	51
Ireland	49	35	53	47	61
Norway	54	39	40	80	57
Austria	62	52	55	70	73
Netherlands	65	60	67	64	70
Germany	67	57	54	81	76
Denmark	67	58	64	75	73
France	68	62	64	74	74
Finland	69	60	64	77	73
Belgium	69	66	67	74	69

Source: OECD (2004d): Table 3.3b.

Due to the very complex and country-specific designs it is impossible to generate a ranking by benefit generosity in an easy way. In order to get a better understanding of

the unemployment benefit system's generosity, the OECD (2004) has calculated average net replacement rates (NRR) over 5 years of unemployment. Table 3.4 reports these NRRs for four different family types. Italy leads the ranking with a net replacement rate of only 5 percent. Apart from this outlier, European countries generally feature high in replacement levels. Austria, the Netherlands, Germany, Denmark, France, Finland and Belgium all provide income replacements above 60 percent of previous net earnings. On the other hand, unemployment protection is rather low in the US (6 percent) or Japan (13 percent). Eastern European countries like the Czech Republic, Poland or Hungary rank in the less generous part of the distribution with 9, 26 and 36 percent respectively. The overall picture does not change substantially with family types.

Social assistance

People who do not qualify for unemployment benefits, and who lack resources to make their living, fall back on governments' social assistance. Concerning the impact of social assistance on labour supply, the same reasoning applies as in the previous section. The more generous these welfare payments are designed, the less attractive it is to accept a low-paid job. Across OECD countries, the picture is very mixed and benefits differ immensely with family types. Table 3.5 provides information on the determination of social assistance and the maximum amounts with respect to different family types. As benefits differ substantially across regions, the second column clarifies how this variation is accounted for in this classification. "National rates" means that benefits are identical across regions within a country, whereas "national guidelines" are taken if these recommendations are enforced in different ways. When social benefits vary across regions, "national averages" are taken, if known. Otherwise the figures refer to a representative jurisdiction.[18] While lack of resources is the main criterion for eligibility, some countries impose further conditions. A US citizen can only receive social assistance if he or she is actively looking for work, or participates in employment, training or workfare.

[18] See OECD (2004d), p. 28.

Table 3.5: Social assistance benefits, 2002

Country	Determination	Maximum amounts (% of APW) Head of household	Spouse/ partner	Per child
Austria	national average	19	12	6
Belgium	national rates	23	8	4-10
Canada	regionally	16	12	4-5
Czech Rep.	national rates	24	17	13-17
Denmark	national rates	31	31	10
Finland	national average	16	11	9-12
France	national rates	20	9	0-9
Germany	national rates	11	9	5-10
Hungary	national guidelines	16	n.a.	n.a.
Iceland	regionally	31	25	n.a.
Ireland	national guidelines	24	16	3
Italy	regionally	16	9	7-8
Japan	regionally	24	13	6-7
Korea	national rates	16	10	9-10
Luxembourg	national rates	36	18	3
Netherlands	national rates	30	13	n.a.
Norway	regionally adjusted national rates	30	7	4-16
Poland	social worker discretion	21	n.a.	n.a.
Portugal	national rates	20	20	10
Slovak Rep.	national rates	27	12	8
Spain	regionally	27	3	3
Sweden	national guidelines	16	11	7-12
Switzerland	national guidelines	22	12	6; 12
UK	national rates	11	8	10
US	national rates	5	4	4

Source: OECD (2004d): Table 1.4.
Note: APW=average production worker

With regard to maximum benefits, the distribution ranges from five percent of an average production worker's salary in the US to 36 percent in Luxembourg. If households earn additional income, benefits are reduced by 50 percent (Portugal), 75 percent (Canada) or 100 percent in most countries. However, some states like Denmark, the UK or Germany have implemented disregards. Only if these amounts are exceeded, benefits are reduced by the prevailing rates. In addition, the maximum amount a household can receive depends on the size and the structure of the family.

A second adult in the household may only get 11 percent in addition of the head of household (Spain) or up to 100 percent like in Denmark or Portugal. If just one child is present, total benefits do not rise at all in France whereas social assistance increases by more than 70 percent in the US, the UK and Germany.

Despite the detailed information, an overall evaluation of the system's generosity remains difficult because interactions with other benefit schemes must be taken into account. Furthermore, some countries grant extra payments on top for rent or clothing which are not reflected in Table 3.5. Nevertheless, an impression the reader might get is that the United States and the United Kingdom feature with a rather low generosity while contintental European states are characterised by higher welfare payments.

3.1.4 Employment protection legislation (EPL)

Another important field of labour market regulation comprises rules for the hiring and firing of workers. Once established to enhance employment conditions, EPL also imposes additional costs on firms for hiring employees. Theoretically, two effects stand vis-à-vis. On the one hand, EPL reduces inflows into unemployment and thus protects job owners, whereas on the other hand, it makes reentry into the job market more difficult for outsiders. A priori, the net effect is ambiguous and subject to empirical investigation. According to OECD (2004c), EPL has benefited workers with some years of work experience while young people and prime-age women are discriminated by such policies. From a welfare perspective, there must be an optimal degree of EPL if higher job security increases employees' efforts and co-operation. Thus, EPL may enhance economic efficiency as long as labour market flexibility is not restricted too much.

The relation between EPL and employment has gained attention after Lazear's seminal paper in 1990. For 22 developed countries over the years 1956 to 1984, he finds that a regime shift from no severance pay to obligatory three months salary compensation would reduce the employment-population-ratio by one percent. In France, for instance, 59 percent of unemployment can be explained by changes in severance pay requirements. In order to capture the degree of EPL, the OECD (1999a, 2004c) has

developed an index that allows a ranking of countries. For that purpose, three areas are distinguished, namely regular employment, temporary employment and additional rules for collective dismissals. Out of these sub-indices, the OECD has derived an overall EPL index between zero and six with six being the highest protection level.

Regular employment and collective dismissals

Although temporary forms of employment have increased in OECD countries in recent years, regular employment is still by far the most dominant form.[19] Therefore, protection for regular contracts takes up the main part of the EPL index. According to OECD (1999a), three broad sub-areas can be identified in this context: Procedural requirements that an employer must meet to terminate the contract, regulation of notice and severance pay, and penalties for unfair dismissals. From these categories the OECD develops a sub-indicator revealing the protection of regular employment. With regard to procedural requirements, the ranking takes into consideration whether a written statement mentioning reasons for dismissal is required, whether a third party must be consulted or whether a third party even has to approve the company's decision. The Netherlands have implemented the strictest rules, whereas Canada and the United States can be found at the other end of the scale. The picture is basically the same for notice and severance pay requirements. All OECD countries have set formal rules for length of notice, but only two thirds prescribe severance payments. Here, Southern European countries dictate the strictest rules. In Italy and Portugal, companies have to pay a severance of 18 to 20 monthly salaries to their employees if they have worked for the company for 20 years. Canada and the US have not regulated that issue at all. Concerning the last category, unfair dismissals, many countries have laws that make dismissals illegal for specific reasons such as gender or race. The least restrictive legislation to dismiss employees for any reason can be found in the US, followed by the UK and Switzerland. Germany ranks 23rd out of 28 OECD countries, Hungary and Poland rank 11th and 12th, respectively. The Czech and Slovak Republic have similar regulation as Germany. This sub-indicator is shown in column 4 in Table

[19] OECD (2002b), chapter 3.

3.6 for all countries. Again, the English speaking economies are characterised by the least restrictive regulation whereas continental European states have protected their employees the most.

When it comes to collective dismissals, all countries have introduced additonal, generally stricter rules on top of individual dismissal regulation. Surprisingly, also the US, Canada and the UK reach relatively high index values of 2.9. Sweden and Italy constitute the end with indices of 4.5 and 4.9, respectively. This ranking can be found in the last column of Table 3.6.

Temporary employment

One method to make the labour market more flexible without touching the dismissal legislation is to allow for temporary work. Thereby, employers take a lower risk because they do not have to pay severance packages or consider length of notice periods. Short-time work, fixed-term contracts and the recognition of temporary work agencies (TWA) are possible ways to go. In fact, all countries allow fixed-term contracts. Many however, restrict them to so-called objective reasons such as time-limited projects, seasonal work or replacement of employees who are temporarily absent.[20] The US, Canada and the UK literally do not regulate, whereas Germany for instance, has specified by law how many consecutive fixed-term contracts an employee can be given until he must receive a permanent one. The ranking in this category shows a huge gap between the group of less regulated countries and Southern European countries such as Greece, Italy, Portugal and Spain. In between, one can find Central and Western European states, whereas France compares more to Southern Europe and Nordic countries. Eastern European EU members like Poland, the Czech Republic and Hungary have similar regulations to the US. The Czech and Slovak Republic have installed a very lax regulation. They reach an index of 0.5 and 0.3, respectively. Hungary follows with a value of 1.1. Table 3.6 also reveals the complete ranking of this sub-index.

[20] OECD (1999a), p. 59.

Table 3.6: Summary indicators of the strictness of employment protection legislation (EPL), 2003

Rank	Country	Overall EPL	Regular employment	Temporary employment	Collective dismissal
1	US	0.2	0.2 (1)	0.3 (1)	2.9 (10)
2	UK	0.7	1.1 (2)	0.4 (3)	2.9 (10)
3	Canada	0.8	1.3 (4)	0.3 (1)	2.9 (10)
4	Ireland	1.1	1.6 (7)	0.6 (6)	2.4 (6)
	Switzerland	1.1	1.2 (3)	1.1 (8)	3.9 (23)
6	Australia	1.2	1.5 (5)	0.9 (7)	2.9 (10)
7	Denmark	1.4	1.5 (5)	1.4 (14)	3.9 (23)
8	Hungary	1.5	1.9 (11)	1.1 (8)	2.9 (10)
	New Zealand	1.5	1.7 (8)	1.3 (11)	0.4 (1)
10	Poland	1.7	2.2 (12)	1.3 (11)	4.1 (25)
11	Japan	1.8	2.4 (16)	1.3 (11)	1.5 (2)
12	Austria	1.9	2.4 (16)	1.5 (15)	3.3 (18)
	Czech Rep.	1.9	3.3 (26)	0.5 (5)	2.1 (4)
	Italy	1.9	1.8 (10)	2.1 (20)	4.9 (28)
	Slovak Rep.	1.9	3.5 (27)	0.4 (3)	2.5 (8)
16	Finland	2.0	2.2 (12)	1.9 (19)	2.6 (9)
	Korea	2.0	2.4 (16)	1.7 (17)	1.9 (3)
18	Netherlands	2.1	3.1 (25)	1.2 (10)	3.0 (16)
19	Belgium	2.2	1.7 (8)	2.6 (21)	4.1 (25)
	Germany	2.2	2.7 (23)	1.8 (18)	3.8 (21)
	Sweden	2.2	2.9 (24)	1.6 (16)	4.5 (27)
22	Norway	2.6	2.3 (14)	2.9 (23)	2.9 (10)
23	Greece	2.8	2.4 (16)	3.3 (24)	3.3 (18)
24	France	3.0	2.5 (20)	3.6 (26)	2.1 (4)
25	Mexico	3.1	2.3 (14)	4.0 (27)	3.8 (21)
	Spain	3.1	2.6 (21)	3.5 (25)	3.1 (17)
27	Portugal	3.5	4.3 (28)	2.8 (22)	3.6 (20)
28	Turkey	3.7	2.6 (21)	4.9 (28)	2.4 (6)

Source: OECD (2004c), Table 2.A2.4, p. 117.

Summary indicators of strictness of employment protection legislation

In order to construct on overall cardinal index, the OECD proceeds in four steps. First of all, the entire set of information items - which have been gathered in sub-indices as described above - has to be translated into the scale between zero (no regulation) and six (maximum regulation). On the consecutive stage, weighted averages are constructed to generate aggregated information, out of which the sub-indices (stage 3) are formed as unweighted averages. The three areas described above are finally merged to the overall EPL index as reported in Table 3.6.[21] The weights used should reflect repetitive information already covered in other items or an economically stronger impact of certain institutional features on the strictness of regulation.

The overall situation of strictness in employment protection legislation closely resembles the ranking by sub-indices. The US, the UK, Canada, Ireland and Switzerland offer the least restrictive legislation. Denmark leads other major European countries with an overall index of 1.4. Germany ranks 19th, whereas Eastern European members such as Hungary or the Czech Republic can be found in the midfield with values of 1.5 and 1.9, respectively. The strictest regulation has been implemented in France, Spain and Portugal. In these countries, both high protection against individual dismissal and strict rules for temporary employment are at work.

Recent figures also allow an evaluation of changes in EPL strictness over time. Over the last number of decades, a convergence process could be observed without having changed the relative position of most countries. Only France and Italy form exceptions in this regard. While Italy has substantially deregulated its labour market since the 1980s and now ranks in the middle of the spectrum, France has drifted in the opposite direction. The US and the UK have provided and still provide the least strict labour market regulation. High EPL states relaxed their rules, thus converging to the leaders of the ranking. While Portugal and Spain undertook comprehensive reforms with regard to both regular and temporary employment, most other countries reformed partially and specifically targeted temporary work regulations.[22]

[21] For details, refer to OECD (1999a), chapter 2, Annex 2.B.
[22] OECD (1999a).

3.1.5 Regulation of holidays and working time

Working time and holiday regulation - issues that are not covered in OECD's EPL indexation - are negotiated between social partners. In some countries, the government is involved as a third party as well (tripartite bargaining). The outcome however, must meet certain standards which are generally set by government authorities alone. The statutory maximum working day must not be longer than 13 hours in Ireland, the UK, Greece, Italy, Cyprus and Denmark. In some countries like Austria and France, the maximum amounts to ten hours, whereas Germany has even set its maximum to eight hours.[23] This figure simply says that workers must not be forced to work longer than average. With regard to the statutory maximum working week, the normal limit is 48 hours. However, several countries like Austria, Spain and several Eastern European countries have set 40 hours as the maximum. Annual paid leave is also regulated by governments. The statutory annual paid leave is 20 days in most countries, only a few like France or Austria allow 25. Of course, these standards do not reflect how many hours are being worked and how many days workers can take off. This will be discussed in section 3.3 below.

3.1.6 Overall evaluation of labour market flexibility

In institutional comparisons, it is quite hard to come up with a clear and transparent figure by which countries can be unambiguously ranked. So far, we have discussed labour market institutions in several respects in order to get an impression of labour market flexibility. The index for strictness in employment protection legislation calculated by the OECD was an exception as it provided a cardinal measure. From the facts we concluded that Anglo-Saxon countries seem to possess a rather flexible labour market compared to Western European economies. In the latter, employment protection is stricter, unions have a stronger influence in the wage-setting process and benefit schemes are more generous.[24] However, this description by itself does not provide ev-

[23] EIRO (2004b).

[24] See also Blau and Kahn (1999), p. 1448.

idence that labour markets have more difficulties in absorbing external shocks like an increase in low-wage competition from former communist countries or other emerging markets. Therefore, it is worthwhile to survey some empirical work.

Nickell (1997) identifies labour market institutions as a main determinant of unemployment, whereas other rigidities have no observable impact on unemployment. To the former group of features, Nickell counts generous unemployment benefits that are paid without time limits and desist from pressure on the unemployed to find a new job or strong influence of unions combined with collective bargaining on a central level. Siebert (1997) also draws a clear connection between labour market institutions and unemployment. He makes the expansion of the welfare state responsible for persistent unemployment in many countries, especially Germany, as adjustments to adverse shocks could not be compensated in the same way as in the United States. These shocks comprise the two oil crises, implications from international competition with newly industrialised economies as well as technological progress.

According to the IMD World Competitiveness Yearbook (2005) labour market regulations have been assessed by executives that represent a cross-section of the business community in each country. With regard to regulations such as hiring and firing practices and minimum wage constraints, Germany reaches only 1.88 out of 10 points and ranks last out of 60 participating countries.[25] This means that business activity is hindered most in this country. Surprisingly, Denmark heads the list with a score of 7.79. The US comes 10th, the UK 26th. Most continental European countries appear in the lower half of the ranking. When it comes to incentives to look for new employment, Germany also performs badly. Only Argentina shows a more generous unemployment scheme. The pattern is pretty similar to the previous ranking. Continental European states gather at the end of the list. Surprisingly, the US only reaches place 45 out of 60 in this category.[26]

The OECD (1994b) has calculated two elasticities that describe the degree of labour market rigidity: one is the response of labour demand on changes in real wages, the

[25] Contrary to the EPL index, a low value indicates poor performance.

[26] International Institute for Management Development IMD (2004), Tables 2.4.16 and 2.4.17.

Table 3.7: Long-term employment elasticity and long-term real wage response

	Long-term employment elasticity	Median lag (years)		Long-term real wage response	Median lag (years)
US	-1.0	1.0	US	-1.0	1.0
Canada	-0.9	1.0	UK	-1.0	1.0
France	-1.0	2.0	France	-3.5	1.5
Germany	-1.0	2.0	Finland	-6.0	2.0
Finland	-1.0	3.0	Italy	-3.5	2.0
Japan	-0.8	3.0	Sweden	-10.0	2.5
UK	-1.0	4.0	Japan	-5.0	3.0
Italy	-0.5	5.0	Canada	-2.0	3.5
Sweden	-0.9	7.0	Germany	-3.0	4.0

Source: OECD (1994b), pp. 1-5.

other figure reflects the response of wages on changes in labour demand (extent of unemployment). According to Table 3.7 that reports these figures for selected OECD countries, a one percent increase in the real wage reduces labour demand by one percent in the long run and vice versa. The big difference across countries however, can be found in the adjustment speed. While half of the adjustment is completed after only one year in the US and Canada, the same process takes twice as long in Germany and France. Surprisingly, the UK needs four years for half of the adjustment. In Italy and Sweden the adjustment takes even longer. The long-term real wage response to a one percent change in unemployment, as reported in the right part of the table, is extraordinarily high in Sweden and is also at a relatively high level in Finland and Japan. What is more important however, is once again the adjustment speed. In that respect, the United States rank at the top of the list next to the United Kingdom. Germany shows the poorest performance with a median lag of four years. These results provide further evidence for what we had suspected before: wages tend to adjust faster in the US and the UK thus indicating a higher flexibility of the labour market.

With regard to the new Eastern European EU member states - for which similar indicators do not exist (yet) - unionisation is lower than in Western Europe and collective bargaining mainly takes place at the company level. Concerning the generosity of

the unemployment benefit system, data are only available for Poland, Czech Republic, Slovakia and Hungary. Hungary has the most generous system of the four, but still rather ungenerous relative to the old members of the European Union. As decentralised bargaining and ungenerous benefit systems are major determinants of labour market flexibility[27], one can assume that Eastern Europe shows a higher flexibility than other European countries, although the low regulation of Anglo-Saxon countries might not be reached.

3.2 Labour market reforms in selected countries

To complement the discussion of institutional labour market features, this section provides a brief overview of major labour market reforms in selected European economies. It turns out that the political response to increasing unemployment trends since the oil crises in the 1970s has differed across countries both in timing and direction.

Denmark

In 1994, a comprehensive labour market reform initiated by the Social Democratic Prime Minister Rasmussen, came into force. What is known as the *flexicurity* approach combines flexibility (high job mobility due to low employment protection), social security (due to a generous welfare system) and active labour market programmes.[28] Dismissal rules were reduced to a minimum so that employees can literally be fired without delay. In addition, the insured unemployed have become subject to a two-period system with a strong emphasis on activation in the second period. Unemployment benefits were initially only granted for up to 4 years (previously 9 years) in the first period. If someone is still unemployed after the first period, he or she directly switches to the second stage where authorities offer compulsory job training. Refusal to participate in these programmes causes significant cuts in benefits. Whereas the first stage was reduced to one year by 1999 and for young employees below 25 years even

[27] Nickell (1997).
[28] OECD (2004c), pp. 97-98.

to six months, the second period still spans three years. The recent 2003 reform *More people into employment* entirely abolished the two-period scheme. Active job seeking may be requested from the first day of unemployment while the maximum duration of benefit payments still amounts to 4 years.

Another aspect of recent labour market reforms has been the shift from a rule based to an individual action plan system where individual needs of the unemployed are better taken into consideration. This programme is specifically designed to fight long-term unemployment.[29] Overall, the Danish approach has often been seen as a third way between low labour market regulation of Anglo-Saxon economies and stricter EPL and more generous welfare schemes in other continental European states.

Netherlands

In 1982, government authorities and social partners agreed to give up wage indexation, to moderate wage claims, to remove obstacles to temporary work and to introduce full social-security coverage for part-time workers. In addition, working time was reduced, provided that this did not lead to an increase in labour costs or a reduction in firms' operating hours. This consensus became popular as the Wassenaar Agreement. Since then, the Dutch *consensus model* – that is, lack of industrial strife and wage developments in line with productivity improvements – has often been cited as a key factor for improved employment performance.[30]

In 1986-87, the unemployment insurance system was significantly curtailed. The duration of benefits was reduced from thirty to six months for younger workers and the replacement rate was lowered from 80 to 70 percent. As benefits are linked to the minimum wage, lowering the minimum wage also reduced the minimum benefit. By 1998, the minimum benefit had been pared to 60 percent of the average wage, a decline of 9 percentage points since the early 1980s. In addition, in 1995 the government tightened the eligibility standards for benefits, requiring a longer period of employment. Recipients are now also expected to accept any "suitable" job offer. Those who refuse to

[29] Madsen (1999).
[30] See Tille and Yi (2001).

do so receive reduced benefits. Finally, what constitutes a suitable offer is interpreted more liberally for recipients who have had relatively long unemployment spells - a change in the rules that is designed to induce the unemployed to intensify their job search as time passes. In the 1990s, active labour market policies to fight long-term unemployment and new early retirement regulations complemented the reforms of the 1980s.

Sweden

In 1991 wage bargaining under public supervision became more decentralised. In the same year, the government curtailed pre-tax unemployment benefits from 90 to 75 percent of previous gross earnings (later increased again to 80 percent). In 2001 and 2002, ceilings on unemployment benefits were raised in two steps. Since 1996, benefit sanctions can be extended from 20 to 60 days if someone declines a job or training offer. Social assistance recipients can now be required to undertake education or training as well. Beneficiaries of welfare payments are required to participate in activation programmes after 27 months of unemployment. This regulation also comprises part-time employment since 2001. With respect to employment protection legislation, fixed-term contracts for up to 12 months were introduced in 1997, without restriction concerning the nature of the work.

Sweden is renowned for its extensive active labour market policies (ALMP) which were further strengthened during the last years. In 1995, the government implemented subsidies for social security contributions if a firm hired an unemployed person. Long-term unemployment was combatted by individual programmes for persons at risk. In 1998, special activation for people under 24 became compulsory after 100 days of unemployment. Concerning the targeting of ALMPs a 50 percent wage subsidiy for firms hiring long-term unemployed over 60 and intensified effort for training of low-skilled, long-term unemployed over 55 was supposed to increase employment prospects for these groups.[31]

[31] Brandt, Burniaux and Duval (2005).

United Kingdom

British Prime Minster Margaret Thatcher fundamentally reformed labour market institutions in the 1980s. In several Employment Acts the "Iron Lady" forcefully broke up trade unions' power. Moreover, work incentives were increased through a modification of welfare payments. Unemployment benefits dropped or were even entirely abolished for young people. Unemployed workers had to be interviewed every six months about their progress in job seeking. Another direction of the Thatcher reforms aimed at a lower weight of the government in the market economy. Many state-owned enterprises were privatised, government employment reduced and tax rates lowered.[32]

More recently, notification requirements for collective dismissals have been relaxed and maximum duration of fixed-term contracts were reduced to 4 years (before unlimited) in 2000. Since 1999, unemployment benefits are granted only for a period up to 6 months (previously 12 months) if spouses are working. In 1998, the British government initiated the *New Deal for Young People* which conditioned the entitlement of unemployment benefits on the participation in activation programmes 6 months after dismissal. This regulation was later extended to employees older than 25 years, long-term unemployed and disabled people. Active labour market programmes targeted at more and better training, subsidised work with the voluntary sector, design of a job search plan and compulsory interviews every two weeks. To account for high unemployment rates among the young, reduced minimum wage rates for 18-21 year-old work force members were introduced in 1999.[33]

Germany

Germany's welfare state expanded tremendously in the 1970s and became even more generous thereafter. The evident labour market problems that especially emerged after German Unification were comprehensively adressed in Chancellor Schröder's speech on March 14, 2003, where he proposed the *Agenda 2010*. Apart from other reform proposals, the concept focused on the liberalisiation of the labour market. The so-

[32] Blanchflower and Freeman (1993).
[33] Brandt, Burniaux and Duval (2005).

called Hartz-reform makes up the core of this package. Hartz I and II which came into force on January 1, 2003, introduced Ich-AGs (unemployed can apply for public financial support if they plan self-employment), Minijobs (firms neither pay taxes nor social security contributions up to a monthly salary of 400 euro per employee) and Personnel-Service-Agencies within the Public Employment Service (PES) to improve job placement of unemployed workers. Hartz III (in place since January 1, 2004) aims at the restructuring of the German Public Employment Service in the fashion of more decentralisation and more service orientation. The final goal was to place unemployed workers on free positions more efficiently at lower costs. Hartz IV was the most hotly debated regulation and caused country-wide demonstrations. From January 1, 2005, unemployment and social assistance were merged bringing about a level of social assistance that was in fact lower than the previous one. Unemployment insurance which guarantees about two thirds of previous net earnings is only granted up to 12 months (previously 24 months) since. Exceptions exist for older persons above 55 who are entitled to receive unemployment insurance benefits for up to 18 months. Thereafter, the unemployed are only entitled to the lower benefits.

After a relaxation and retightening of dismissal rules in 1996 and 1999, dismissal protection was only active in companies that employed more than 10 people. Restrictions on fixed-term contracts were reduced in the sense that longer periods and more renewals were possible. Private temporary work agencies received more freedom for job placement in several steps till 2004. In 2002 and 2005 sanctions for job offer denials became tighter. Since 2002, a special programme for unemployed over the age of 50 - the so-called Job-AQTIV regulation - is supposed to reduce high unemployment rates in this age group. Individual profiling, job rotation, intensified training and better access to temporary work are the key instruments to achieve this goal.

Italy

In Italy, employment protection legislation was eased in several steps since 1997. Fixed-term contracts are no longer automatically transformed into contracts with indefinite duration and low-skilled workers can now be hired more easily. Private temporary

work agencies were allowed in 1998, although restrictions on job placements were entirely abolished as recently as 2003. In addition, administrative obligations for hiring employees were relieved in 2002.

With regard to unemployment benefits, replacement rates have been increased to 60 percent of average gross earnings of the previous three months. Although the maximum duration has been extended from six to twelve months in 2003, it is still relatively short from a European perspective. In addition, replacement ratios automatically decline to 40 and 30 percent respectively in the last two quarters of entitlement. Another new regulation allots benefits conditional on participation in training.[34]

France

Labour market reforms in France have rather tightened regulation. In 2002, severance entitlements were raised, conditions for lay-offs generally tightened - but temporarily suspended again afterwards. Furthermore, firms now must pay higher premia to employees if a temporary contract is not transformed into a permanent one. In addition, the steady decrease of unemployment benefits over the coverage period was slowed down and entirely abolished in 2001. The maximum duration of unemployment entitlements shrank from 30 to 23 months in 2003.

In 2000, weekly working hours were reduced from 39 to 35 and more money was allocated towards active labour market programmes. Recent demonstrations in France against the *Contrat Première Embauche* have underlined the difficulty in undertaking substantial reforms that might break the crusted structure. Thousands of French protested against the government's intention to introduce a probation period of two years for young employees below 25. Thereby, dismissal rules would have effectively been abolished for this age group. The protesters succeeded when President Chirac withdrew the law and proposed more active labour market policies instead.

[34] Brandt, Burniaux and Duval (2005).

3.3 Labour market performance

After having discussed labour market institutions, this section provides an overview of labour market performance and trends in recent years. We take a look at labour costs and unemployment rates in international perspective and discuss the pattern of unemployment in selected economies. It turns out that countries with laxer labour market regulations exhibit lower unemployment rates or decreasing trends.

3.3.1 Labour costs

Although it is still not common in public debate, economists do not question the negative relationship between labour costs and labour demand. Nickell and Symons (1990) and Newell and Symons (1989) are just two examples from the vast literature on this issue. In a more recent study, the OECD (2004c) discusses in detail the labour market developments since the 1970s and arrives at the same conclusion.

Nevertheless, international wage differentials reflect differences in the marginal value product of labour. Hence, a higher wage in country A relative to country B may well be compatible with full employment. Whether wage rates have developed in line with the marginal value product of labour can only be seen from the development of the natural unemployment rate. Therefore, this section abstains from an evaluation and simply reports the level of labour costs. The whole picture emerges in the following section.

In international comparison, Germany possesses the third largest labour costs of manufacturing workers. In 2004, employees in this sector earned 26.32 euro per hour on average.[35] This level is only outweighed by Denmark (28.14 euro) and Norway (27.31 euro). The other two Scandinavian countries Finland (24.88 euro) and Sweden (23.32 euro) also belong to the upper end of the wage distribution in the EU-15. From the set of more developed economies, France (20.74 euro) and the UK (19.89 euro) instead pay moderate wages. Italy lags behind with 17.24 euro per hour. Of course,

[35] Data according to the Institute of the German Economy (2006), p. 142.

the less developed Greece (10.42 euro) and Portugal (7.21 euro) can be found on the final two ranks. As reference numbers, manufacturing workers in the US and Japan earn 18.76 and 17.95 euro per hour, respectively. However, with regard to German labour costs, one has to mention that - since 2000 - the increase fell short of other developed economies. While the labour cost index climbed by 15 percent until 2005, other EU-15 countries like Denmark (18.4 percent), Sweden (22.1 percent) or the UK (22.5 percent) exhibited higher growth rates.[36]

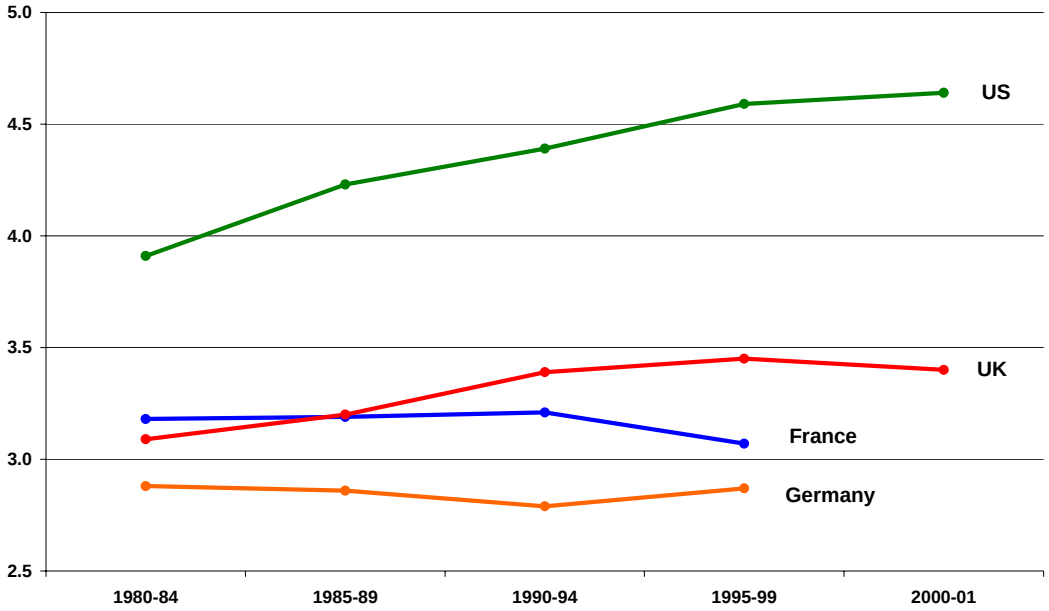
Within the enlarged European Union a sharp contrast exists between the old and the new member countries when it comes to manufacturing wages. In the Czech Republic, workers receive 4.30 euro per hour on average, 4.04 euro in Hungary and 3.22 euro in Poland. This is about one seventh of the German wage level. Of course, labour productivity is much lower in the eastern part of the EU, but the figures impressively illustrate that there is a strong incentive for specialisation and wage competition. This aspect will be focused on in more detail in subsequent chapters.

A very important aspect concerning wages is the earnings dispersion across skill groups. Exogenous shocks such as technological progress or globalisation are likely to favour high-skilled employees relative to low-skilled workers. Thus, relative wages of the high-skilled can be expected to rise over time. Figure 3.4 illustrates the development of relative wages for four countries since 1980. Here, relative wages are defined as the ratio of workers' earnings in the 90th percentile of the distribution relative to the 10th percentile.[37] For the four countries depicted in Figure 3.4, we can only observe an upwards trend in relative earnings for the US and the UK. France and Germany at best keep their relative earnings constant. A closer look at the numbers even reveals that the earnings distribution has become slightly more compressed over time. A plausible explanation is that minimum wages and implicit wage floors like social benefits prevented an adjustment of relative wages in the latter countries.[38]

Assuming that these four countries were hit by the two shocks to a similar extent,

[36] EUROSTAT (2006), on request.
[37] OECD (1994b), p. 4.
[38] OECD (1996), p. 63 and Wood (1994), p. 253.

Figure 3.4: Trends in earnings dispersion, 1980-2001



Source: OECD Employment Outlook 2004, Table 3.2, p. 141. 90-10 ratios of gross earnings for full-time employees.

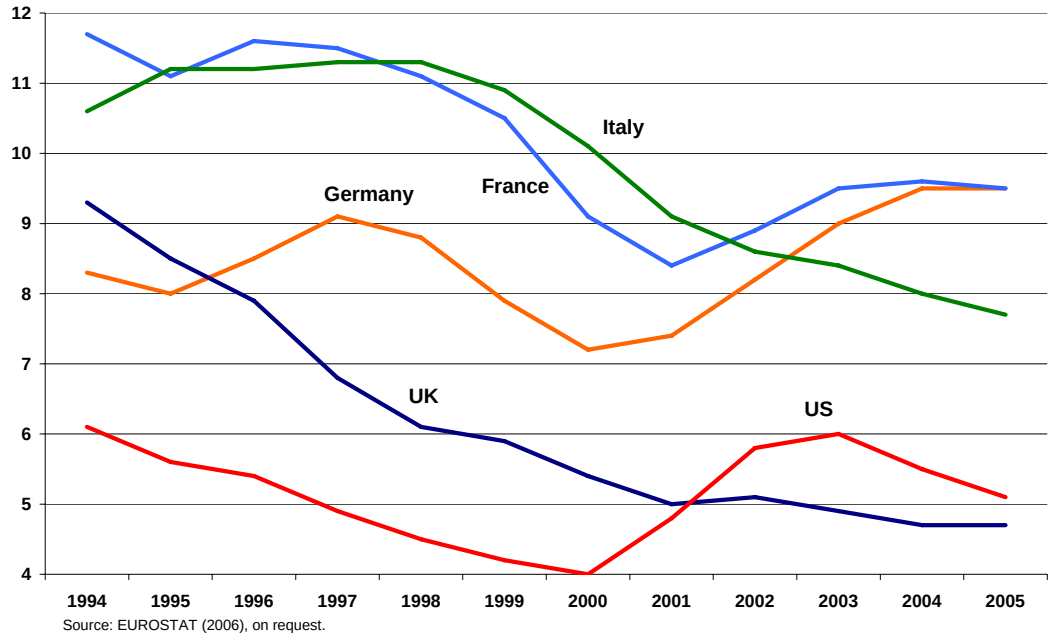
we can expect an increasing trend in unemployment rates in Germany and France. This will be discussed in the following section below. Yet there is another aspect that can be learned from Figure 3.4. Although both the UK and the US exhibit an upwards trend, relative earnings are still lower in the UK. The German and French levels even fall short of them. As labour market institutions restrict wage flexibility rather in the lower part of the wage distribution, a higher compression might hint towards higher unemployment rates of the low-skilled.

3.3.2 Unemployment and employment trends

As we might have expected after the discussion of labour market institutions, unemployment rates in deed differ substantially across countries. As Figure 3.5 illustrates, the US traditionally maintained low unemployment rates around 5 percent whereas the UK brought down its figure from two-digit-levels to about 5 percent as well in recent years. In contrast to these countries - that are characterised by a rather low degree of

labour market regulation - most continental European states perform worse. France and Germany reached 9.5 percent in 2005 while France converged to that figure from above.[39] At least for the German case, there is evidence that the implementation of more generous welfare entitlements explain a large fraction of high unemployment.[40] In addition, the clear upwards trend since 1970, when only 150,000 Germans were unemployed, delivers another argument that the nature of German unemployment must be mostly structural.

Figure 3.5: Harmonised unemployment rates



Italy successfully brought down its unemployment rate to 7.7 percent in 2005 from more than 11 percent in the late 1990s. There are other success stories. After thorough labour market reforms, Austria (5.2 percent), Denmark (4.8 percent) and the Netherlands (4.7 percent) have established low US unemployment levels for many years now. Other countries with previously high unemployment rates have brought down their figures significantly within the last ten years: Spain from 19.5 percent in 1994 to 9.2

[39] Data according to EUROSTAT (2006), on request.
[40] See for example Nickell (1997), Franz (1999) and Franz and Koenig (1986).

percent in 2005, Finland from 16.6 to 8.4 percent and Ireland from 14.3 to 4.3 percent within the same time span.

Eastern European countries have mostly reduced their unemployment figures to Western European levels after they have overcome their transition crises. The only exceptions are Poland with 17 percent and Slovakia with 15.9 percent in January 2006.[41] Latvia (8.2 percent), the Czech Republic (7.7 percent), Hungary (7.6 percent) and Lithuania (6.9 percent) have clearly lower unemployment rates than Germany or France. Slovenia and Estonia perform best among the new EU members with an unemployment rate of 6.3 percent. Bulgaria (9.9 percent) and Romania (7.7 percent) show decreasing trends and one-digit figures.

With regard to employment, all EU-15 countries were able to increase employment between 1993 and 2004 - except for Germany where employment levels decreased by one percentage point.[42] Austria (2.7 percent), Sweden (6.1 percent) and Portugal (8.4 percent) experienced rather moderate increases. Spain (46.8 percent) and Ireland (60.7 percent) constitute the outliers with an EU-15 average of 11.3 percent.

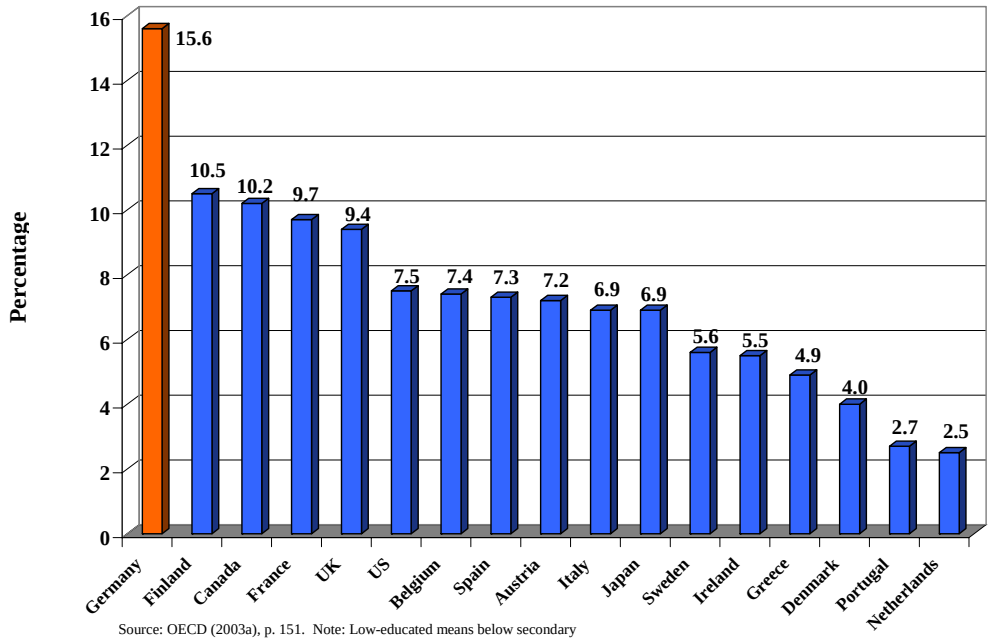
As we have argued in the first part of this chapter, strict employment protection legislation (EPL) exhibits a positive impact on long-term unemployment. Furthermore, minimum wages prevent low-paid jobs from evolving or welfare benefits make low-paid jobs unattractive. As a consequence, the duration of unemployment tends to rise. We now relate the institutional part of this chapter to the real outcome of labour markets in this respect. Expectedly, long-term unemployment[43] makes up a small fraction of total unemployment in countries with low EPL and vice versa. In the US, for instance, only 11.8 percent of all unemployed were looking for a new job for at least 12 months in 2003.[44] In Denmark, the share amounts to 19.9, in the UK and Austria to 23 and 24.5 percent, respectively. While the OECD average reaches 30.1 percent, Germany is located at the upper end of the ranking with 50 percent. Only Italy (56.5 percent) and Greece (58.2 percent) show larger shares. Long-term unemployment represents a

[41] Data according to EUROSTAT, seasonally adjusted.
[42] EUROSTAT (2006), on request.
[43] 12 months of unemployment or more.
[44] OECD (2004c), Statistical Appendix.

comparably more serious problem in Eastern European EU member states. According to the European Commission (2003b) for the year 2001, the fraction oscillates between 45 and 60 percent. Hungary (44.8 percent) and Estonia (46.6 percent) perform best in this group, Latvia and Slovenia worst with shares around 60 percent.

The unemployment rates of different skill groups describe another important pattern. Generally, high-skilled workers earn higher wages and are less likely to become unemployed. Wage flexibility in this income group is generally high enough to sustain low unemployment rates. On the contrary, low-skilled workforce members often regard welfare payments as attractive income alternatives - especially if these can be upgraded by additional income in the shadow economy. Hence, labour market regulations like minimum wages or welfare benefits make wages in the lower part of the distribution more inflexible. Unemployment must be the remaining adjustment mechanism.

Figure 3.6: Unemployment rates of the low-educated, 2001



Source: OECD (2003a), p. 151. Note: Low-educated means below secondary

In fact, there are fundamental differences in the unemployment rates of low-skilled workers across countries. Figure 3.6 proxies the group of low-skilled by all workers who possess less than a secondary education. It turns out that Germany has an exceptionally high unemployment rate of this skill group in international comparison. While 15.6 percent of the low-educated were unemployed in Germany in 2001, the second worst performer was Finland with 10.5 percent. France and the UK reached 9.7 and 9.4 percent respectively. Portugal (2.7 percent) and the Netherlands (2.5 percent) literally have no problem in this regard. What is not shown in the figure, unemployment rates of workers with a secondary education or higher, do not show such a clear difference across countries.[45]

Germany seems to have an extraordinarily large low-skilled unemployment problem. The rising trend of total unemployment over the last 35 years is clearly mirrored in the development of low-skilled unemployment. In 1983, the total unemployment rate was announced at 7.6 percent, the same figure as in 1988 and in 2000.[46] However, the unemployment rate of the low-educated was 13.3, 16.4 and 19.4 percent respectively.

3.3.3 Hours worked, paid leave and strikes

In 2003, the range of hours worked per year varied from 1,938 hours in Greece to 1,337 hours in Norway.[47] This means, that on average, a Greek employee worked 45 percent more than his Norwegian colleague. Spain, Canada, the US and the UK range between 1,800 and 1,673 hours per year. Denmark (1,475 hours), France (1,453 hours), Germany (1,446 hours) and the Netherlands (1,354 hours) constitute the group with the lowest annualy working time.[48]

The Dutch employees also belong to the privileged with regard to paid leave. Their employers pay 31.3 days on average per year. Only the Swedes can take more days

[45] OECD (2003a), p. 151.
[46] According to the definition of the Bundesagentur für Arbeit.
[47] OECD (2004a).
[48] OECD (2004a). See also EIRO (2004b). Althoutgh the figures are different, the ranking basically remains the same.

off, namely 33 per year. Germany follows with 29.1 days and Italy with 28. On the contrary, people in Eastern European countries mostly do not get more than 20 days per year.[49]

A clear trend that has evolved over the years is that negotiations of social partners have become more constructive. Compromises were found more often than in earlier years, thus reducing working time that fell victim to strikes. In Italy, more than 1,500 days per 1,000 workers were lost due to strikes between 1970 and 1979 whereas this number shrank to 158 in the 1990s. Spain had the highest loss in the last decade with 276 days. Germany traditionally faced little serious conflicts between employers and employees. In the 1970s, 52 days were lost whereas only 11 days per 1,000 workers in the 1990s.[50]

3.4 Conclusions

Despite the complicacy of institutional comparisons and especially the construction of rankings, this chapter has provided a clear-cut impression about labour market regulation in various countries. It turned out that strict employment protection legislation exercises a positive impact on unemployment spells and that generous (unconditional) welfare benefits and binding minimum wages tend to cause higher unemployment rates, especially of the low-skilled. It has also become apparent that all governments intervene in the functioning of labour markets - although to different extents. The general pattern that evolved from the preceding analysis classifies Anglo-Saxon countries as low-regulated, whereas some continental European economies, typically the larger ones like Germany or France, have installed extensive and rather strict regulations.

As a consequence, the pattern of labour market outcome differs accordingly. While the UK and the US experienced a rising trend in earnings inequality, their unemployment rates either remained on a lower level or started to decline. On the other hand, France and Germany did not exhibit higher inequality of relative earnings (due

[49] EIRO (2004b).
[50] Institute for the German Economy (2005), p. 143.

to stronger trade union power and generous welfare entitlements), but show substantially higher unemployment rates. In the case of Germany, unemployment has been increasing from literally zero in 1970 to about five million in 2006.

However, there is a third pattern combining generous welfare payments with decent labour market performance. In Denmark, for instance, dismissal rules have literally been abolished and (rather generous) unemployment benefits are only granted under the condition of active job seeking and training. Otherwise, recipients' benefits can be curtailed. As a result, Denmark reduced its unemployment rate substantially from the mid-1990s to date. The Netherlands or Sweden constitute other examples.

Although only little data is available for Eastern Europe and institutions have been subject to fundamental changes in recent years, labour market regulations rather fit into the Anglo-Saxon category. Except for Poland and Slovakia, that still exhibit unemployment rates above 15 percent, all Eastern European EU member states have brought down unemployment to one digit figures.

The two previous chapters have provided evidence twofold: Firstly, globalisation forces have gathered strength in recent years. And secondly, labour markets in some countries, especially in larger contintal European ones, do not seem to be flexible enough to absorb the emerging adjustment pressure. This delivers a sound foundation to study the implications of globalisation when labour markets are rigid. The next chapter marks the beginning of the theoretical analysis.

Chapter 4

Factor mobility with rigid wages - a simple model

This chapter delivers a first theoretical step to approach this book's topic. We set up a simple MacDougall-Kemp model to gain insights into the mechanism of market integration with imperfect labour markets. Apart from trade, factor mobility is one of the fundamental channels through which market integration takes place. Theoretical models suggest that free movement of production factors exhibits factor price equalisation in a constant returns to scale framework as capital-labour ratios converge. Concerning the evaluation of this process, most studies point out that market integration promises welfare gains because integrated factor markets ensure a more efficient allocation.[1] However, this result only holds under the condition of perfect factor markets. With regard to labour marktes, though, this might not be true.

Although some would object that factor price equalisation is no more than a theoretical construct and turned out to be inconsistent with empirical observations, there is substantial evidence that convergence is a real world phenomenon. It is no surprise that factor price equalisation cannot be observed because transport or migration costs prevent this, even in theory. What matters here, is that convergence takes place. According to Barro and Sala-i-Martin (1991, 1992), not only per-capita income, but also

[1] See, for instance, Obstfeld (1998).

capital-labour ratios have been converging over time - although at a very slow pace. For 16 OECD countries, Wolff (1991) also finds evidence for an assimilation of capital intensities in the long run. Furthermore, the monetary integration of Europe provides a good recent example for the convergence of interest rates. Of course, a large fraction of this development must be attributed to the decline in exchange rate uncertainty and risk-premia, but capital allocation certainly improved as a consequence. Due to higher returns, labour intensive countries in the euro area received relatively more investment than capital intensive economies. Thereby, the common currency enhanced the convergence of capital-labour ratios.

Becker et al. (2004) provide evidence for labour market implications of capital mobility. Using the FDI database of the German Bundesbank, they find that German and Eastern European manufacturing workers are substitutes, and that a wage increase in Germany has a positive effect on the creation of jobs in Eastern European countries, and vice versa.

While capital mobility is very pronounced, migration flows do not compare. The empirical literature on the impact of immigration on national wages generally only finds small effects. LaLonde and Topel (1991) and Borjas (1994) conclude that there is little evidence for strong adverse effects on national labour markets. According to Friedberg and Hunt (1995), most studies reason that a 10 percent increase in the fraction of immigrants in the population reduces wages by only one percent. Even migration shocks like the exodus of 125,000 Cubans between April and September 1980 to Miami (Card 1990), or the return of 900,000 French after Algerian independence in 1962 (Hunt 1992), did not affect labour market outcome markedly.

Despite the small effects, the empirical literature has detected winners and losers of immigration. When disaggregating the workforce into different skill-levels, Borjas et al. (1997) show that lower educated workers are affected most. In his study for the US labour market, Jaeger (1996) finds that the high-skilled benefit from immigration, whereas the low-skilled have to accept a decline in wages. The work of DeNew and Zimmermann (1994), who show positive income effects for white collar workers

and the opposite effect for blue collar workers, heads in the same direction. Akbari and DeVoretz (1992) find similar results for labour-intensive industries in Canada. It generally turns out that the data confirms complementarity of labour and capital, or between different skill-levels, whereas immigrants and (low-skilled) workers seem to be substitutes. Although most studies attribute only little impact of migration on the convergence of wages, Borjas (1994) points out that econometric studies are afflicted with many problems. Hence, the results should be interpreted cautiously.

The model we employ describes two countries producing one good under constant returns to scale with the inputs capital and labour. We assume both jurisdictions to be of equal size (in terms of workforce), but one country possesses more capital than the other and downwardly rigid wages. Apart from this, other factor and especially goods markets are perfectly competitive. The reason for rigid wages might either be due to a statutory minimum or to welfare payments that determine a reservation wage. For simplicity reasons, we stick to the former motivation to avoid explicit modeling of the welfare state. In addition, we assume that both countries' labour markets are cleared in autarky. Despite the simplicity of the approach, later chapters prove that the results also hold in more complex settings.

We show that unemployment emerges as a residual adjustment mechanism and national output declines if wages are prevented from downward adjustment in the capital abundant country. Capital movements are pathologically higher than with flexible wages, implying an inefficient capital allocation. It also turns out that the welfare loss is borne by workers in the rigid wage country alone. This is ironic, as the minimum wage was installed to protect this group from low-wage competition in the first place. It would thus be preferable for this economy to allow less factor mobility. Workers in the foreign economy, however, benefit by excessive capital imports that boost their labour productivity. If in addition to rigid wages a distorting capital tax is implemented in the rigid wage country, unemployment increases further and so do welfare losses. Identical results can be achieved by labour migration. Then, excessive migration from the labour-abundant (low-wage) country to the high-wage region takes

place. Equilibrium unemployment and wage rates are identical to the first scenario. However, a tax on domestic labour only leads to distributive effects because workers have no incentive to avoid the tax by emigrating as long as the net wage is higher than abroad. The bottom line of this chapter is that it is not advisable to work against market forces. Wage rigidities should be abolished to achieve a first-best market outcome. For distributive reasons, other policies like a wage subsidy system can better ensure lower earnings dispersion.

The outline of the chapter is as follows. The next section introduces the model. Then, the basic autarky situation is presented, as well as the results of factor mobility with flexible wages. This scenario should serve as the reference for later extensions with rigid wages. Section 4.4 introduces minimum wages and studies their impact in the presence of capital and labour mobility. Furthermore, the effects of basic tax instruments are analysed. Section 4.5 concludes and briefly discusses policy implications.

4.1 The model

The model depicts two economies, home (H) and foreign (F), that produce one homogeneous good with the inputs capital (K) and labour (L). A one good model allows us to suppress relative price changes and focus on the impact of factor mobility on factor prices only. Thus, we set the commodity price to unity in both jurisdictions. A deviation from this price is prevented by means of potential arbitrage. The two countries differ in terms of their relative factor endowments $k^i = K^i/L^i$ with $i \in \{H, F\}$. We assume home to be relatively more abundantly endowed with capital, so $k^H > k^F$. As a first step, both regions are supposed to be symmetric with regard to their labour force. The implications of relaxing this assumption will be discussed later in this chapter. Capital can be interpreted as both real and human capital. Both countries possess the same constant returns to scale technology that can be described by a neoclassical production function with the usual properties. Output in country i is denoted by $f^i\left(K^i, L^i\right) = Y^i$. Marginal products are positive, but rise with diminishing rates, so

$f_K > 0$, $f_L > 0$ and $f_{KK} < 0$, $f_{LL} < 0$. As it turns out, the crucial property in this setup is the complementary relationship between capital and labour which is formally depicted by $f_{KL} > 0$ and $f_{LK} > 0$. In addition, firms act under perfect competition, thus making zero profits and paying factors their marginal product. Constant returns to scale technology enables us to express factor prices as functions of capital-labour ratios alone:

$$w^i = \lambda(k^i) \qquad \text{with } \lambda' > 0 \tag{4.1}$$

$$r^i = \mu\left(k^i\right) \qquad \text{with } \mu' < 0. \tag{4.2}$$

Eqs. (4.1) and (4.2) show that a higher capital-labour ratio makes workers more productive and enables firms to pay higher wages. The opposite is true for capital. From the relative endowments in the respective countries we can then derive factor prices directly. As $k^H > k^F$, we know that $w^H > w^F$ and $r^H < r^F$.

The relationship between endowments and factor prices can be nicely illustrated by means of the Lerner diagram in Figure 4.1. With capital and labour on the axes, $pf^i\left(K^i, L^i\right) = 1$ describes the unit value isoquant, that is the geometrical location where the value of output equals unity for different capital-labour ratios. As we have normalised the commodity price to unity, the unit value isoquant describes all combinations of capital and labour that produce one unit of output. In order to determine factor prices, we need to introduce the unit cost line. Each firm has the following unit cost function

$$C = wL + rK = 1.$$

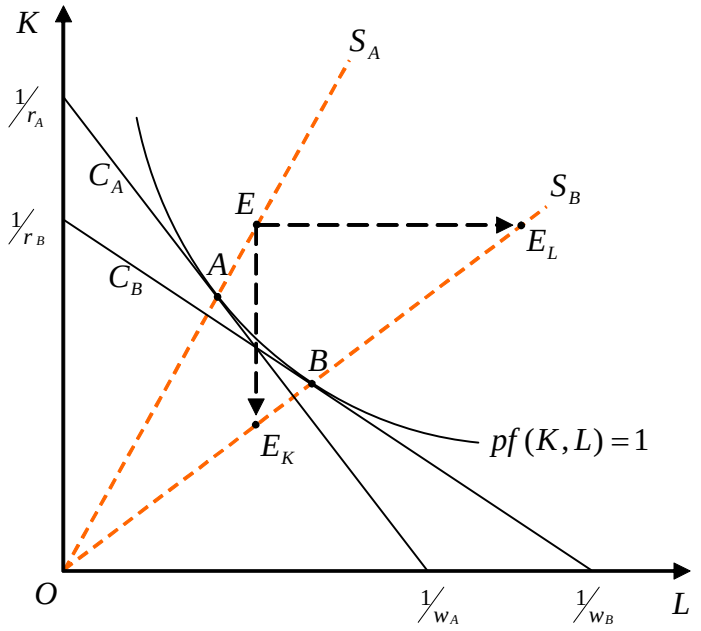
Solving for K yields

$$K = \frac{1}{r} - \frac{w}{r}L.$$

If costs for one unit (value) of output are unity firms make zero profits. Hence, the tangency point between the unit value isoquant and the unit cost function determines the equilibrium. In Figure 4.1, E marks the endowment point and thereby the capital-labour ratio. This ratio is constant along the ray S_A. The unit cost line that is tangent

to the unit value isoquant is denoted by C_A. There must be unique values of w and r to ensure zero profits. They can be read from the intersections with the axes as the inverse. The slope expresses the factor price ratio w/r.

Figure 4.1: Endowments and factor prices



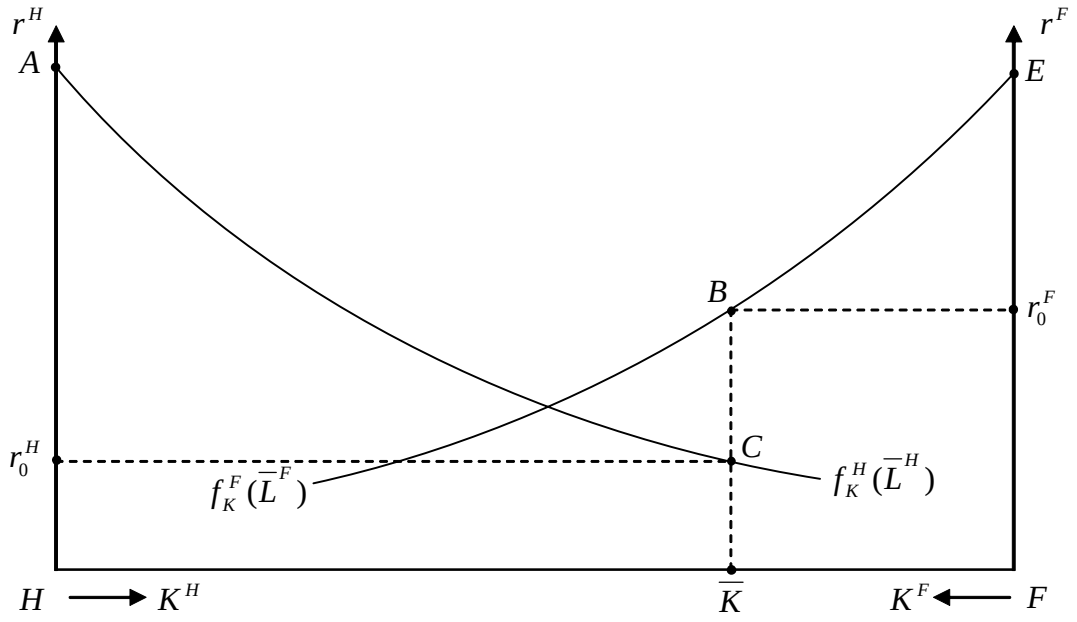
How does a change in endowments impact factor prices? As long as endowments change without altering the ratio, factor prices do not change. This would be indicated by a movement from E along the ray S_A. If, however, either the labour force or the capital stock change, zero profits are no longer ensured at given factor prices. Figure 4.1 depicts two examples, an increase in the labour force and a reduction in the capital stock, indicated by EE_L and EE_K, respectively. The unit value isoquant and the original unit cost line are no longer tangent because revenues exceed costs. With commodity prices normalised to unity, factor prices have to change in order to ensure zero profits. The unit cost line rotates anti-clockwise to C_B until revenues and costs are equated. In the Lerner diagram, this is ensured in point B. Clearly, the wage rate has fallen whereas the capital return has increased. As both E_L and E_K are located on the same ray S_B, labour migration and capital mobility can both bring about the

same result. Factor prices are identical in E_L and E_K.

4.2 Autarky

The MacDougall-Kemp model that is graphically displayed in Figure 4.2 permits the analysis of efficiency and income distribution with respect to both countries. The width of the box represents the world capital endowment whereof $H\overline{K}$ is the capital stock of home, and $\overline{K}F$ the foreign counterpart. The downward sloping curves represent the marginal productivity of capital for a given labour input, $f_K^H(\overline{L}^H)$ for home and $f_K^F(\overline{L}^F)$ for foreign. They are identical and homogeneous of degree zero. As $k_H > k_F$ we know that the marginal productivity of capital must be lower in home than in foreign. Thus, there is an interest rate differential between the two jurisdictions, $r_0^H < r_0^F$, indicating an inefficient allocation.

Figure 4.2: Autarky



Home's GDP can be described by the integral of $f_K^H(\overline{L}^H)$ between the boundaries H and $\overline{K}$. This is the value of output for given K^i and L^i. According to Euler's Theorem

we know that $pY = f_L L + f_K K$. In home, $Hr_0^H C\overline{K}$ denotes income of capital owners whereas the residual $Y - f_K K = f_L L$ reflects wage income if $p = 1$. In the figure, this is represented by the area ACr_0^H. The same analysis applies to foreign. Workers share the income BEr_0^F while capital owners earn $\overline{K}Br_0^F F$.

4.3 Integration with flexible wages

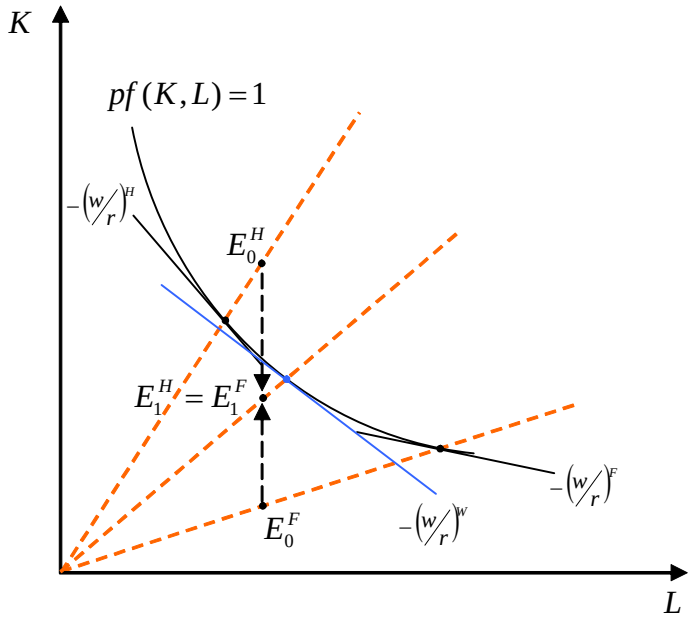
Before implementing rigid wages into the basic model, it is helpful to recall the mechanism of the MacDougall-Kemp model with flexible wages. As both capital and labour mobility can potentially change (relative) factor endowments, we take a look at both separately. The results of this section serve as a reference for the subsequent analysis with rigid wages.

4.3.1 Capital mobility

Due to the factor price differential in autarky, home's capital owners who maximise their return on capital have an incentive to relocate this factor to foreign. For the time being, workers are assumed to be immobile. Capital movements come to a halt when marginal returns are equated in both countries. This is ensured by concavity of production technologies. As a matter of fact, not only interest rates but also wages will be equal in equilibrium as capital-labour ratios must be identical. Figure 4.3 provides further clarification.

The Lerner diagram now depicts both countries, home and foreign, which are characterised by different relative endowments and hence, different absolute and relative factor prices. E_0^H is the endowment point of home, where the dashed line describes the capital-labour ratio. Equivalently, foreign's endowment is E_0^F. For simplicity reasons, we have assumed labour forces to be of equal size in both countries. From these relative endowments, factor prices can be derived from the unit cost curves which have to be tangent to the unit value isoquant. Before opening up the borders the slope $-\left(\frac{w}{r}\right)^H$

Figure 4.3: Capital mobility I

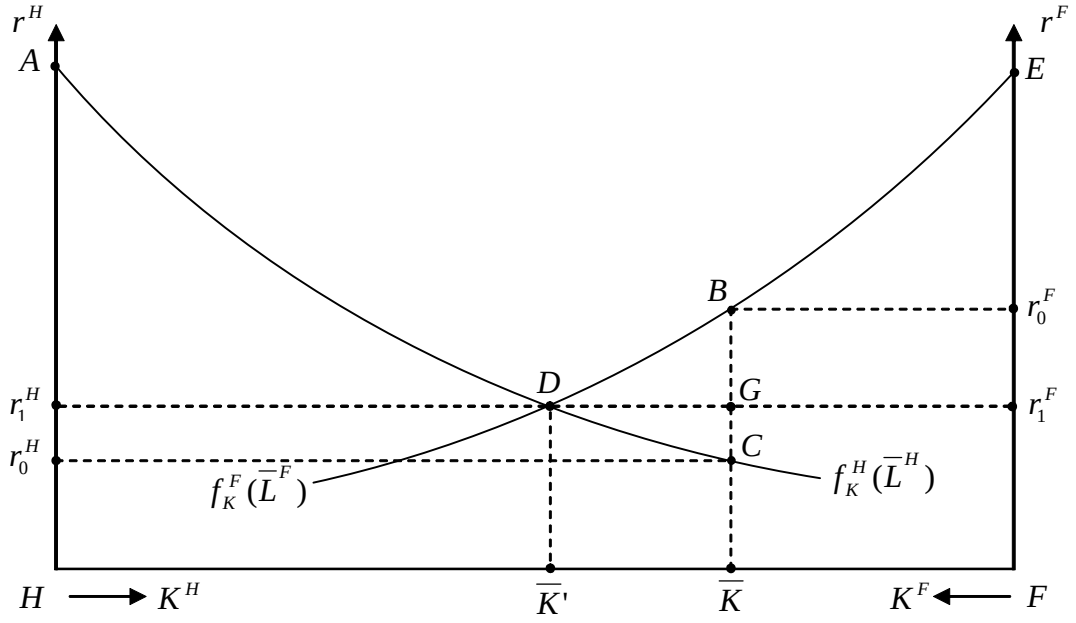


indicates relative factor prices for home and $-\left(\frac{w}{r}\right)^F$ for foreign. Similar to Figure 4.1 above, we can derive absolute factor prices from the intersection of the unit cost curve with the respective axes. The Lerner diagram illustrates what we have discussed before. As $k^H > k^F$, $r^H < r^F$ and $w^H > w^F$.

This factor price differential shrinks if capital is allowed to be shifted to the high return region. Indicated by the dashed arrows, capital exports of home (which are identical to capital imports of foreign) reduce the capital stock in home and increase it in foreign while the labour force remains unchanged in both jurisdictions. In equilibrium, $E_1^H = E_1^F$. As a consequence, factor prices change to guarantee zero profits. In home w/r declines whereas the opposite movement takes place in foreign. $-(w/r)^W$ indicates that factor prices have been equated across regions. With a flatter slope for home and a steeper one for foreign, wages relative to capital returns have declined in home and increased in foreign.

We can get further insights about this mechanism by means of the factor box in Figure 4.4. With the autarky allocation of capital, $H\overline{K}$ units are employed in home and

Figure 4.4: Capital mobility II



$\overline{K}F$ units in foreign. Due to the interest rate differential $\overline{K}'\overline{K}$ units of capital change their country of employment, namely from home to foreign. Thereby, capital returns converge to the common level $r_1^H = r_1^F$. What impact does this have on efficiency and distribution? Output clearly reaches a maximum if marginal productivities are equated across regions. Both countries are better off if we take aggregated national output as a measure. In home, output increases from $AC\overline{K}H$ to $ADG\overline{K}H$, whereof ADr_1^H is labour income and $r_1^H G\overline{K}H$ capital income. The increase of DGC entirely accrues to capital owners who in addition also benefit from a redistribution of factor returns from labour to capital, namely $r_1^H DCr_0^H$. With both capital and labour being fully employed, wage rates must have fallen.

The same reasoning applies to foreign. Without capital imports, national income was represented by the area $BEF\overline{K}$. The increase in the capital stock makes workers more productive and boosts national output to $DEFKG$. Contrary to the capital exporting country, labour income increases, specifically from BEr_0^F to DEr_1^F. Capital owners, however, lose their exclusive position and face competition from home's capital.

Due to less scarcity, capital income shrinks from $Br_0^F F\overline{K}$ to $Gr_1^F F\overline{K}$. The remaining part $DG\overline{KK}'$ falls onto capital owners in home who have employed their capital in foreign now.

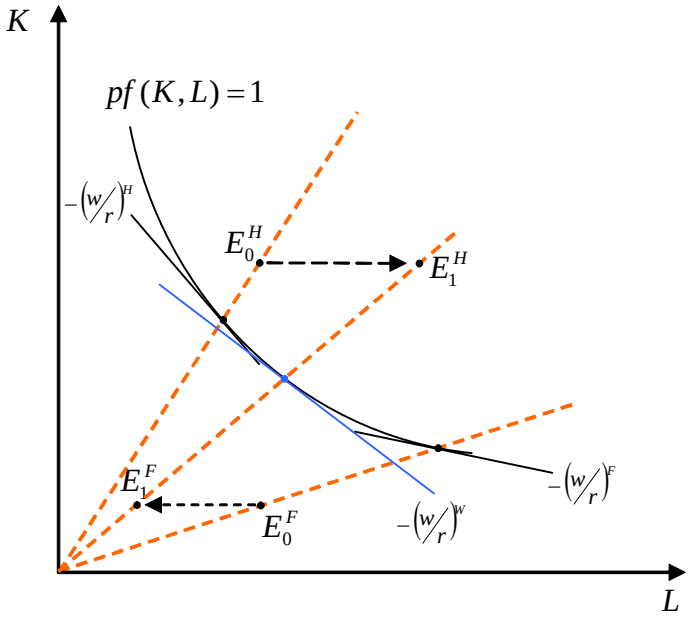
The essence of this simple analysis reveals the core implications of globalisation forces working in the direction of factor price equalisation. With flexible labour markets, both countries benefit from more efficient factor allocation and thus, higher income. However, there are winners and losers within countries. In home, capital owners gain as they can employ capital in labour-abundant regions with a higher return. As this decreases the capital intensity, labour productivity and hence, wages decline. Workers clearly lose from this process. Nevertheless, the net effect is positive and the winners can theoretically compensate the losers. The same mechanism takes place in foreign, just with opposite signs. Here, workers benefit while capital owners lose. There is also a net output gain in foreign.

4.3.2 Labour mobility

These results can also be achieved in scenario with mobile workers and immobile capital. Again, we start from a situation where the capital-labour ratio in home is higher than in foreign, that is $r_0^H < r_0^F$ and $w_0^H > w_0^F$. Accordingly, home's endowment point E_0^H is located on the steeper ray relative to E_0^F in Figure 4.5. As a consequence, foreign workers have an incentive to migrate to the relative capital abundant country that pays higher wages. This movement is represented by the two dashed arrows in the diagram. If labour migrates from foreign to home, the labour force declines in foreign (movement from E_o^H to E_1^H) and rises in home (movement from E_o^F to E_1^F) simultaneously. Although the absolute amount of capital is higher in home, the relative factor endowments are equated after migration has taken place. Both endowments are located on the same dashed ray. The migration incentive of diverging wages has fully vanished because factor prices are identical in both countries.

With regard to efficiency and distribution, Figure 4.6 facilitates the analysis. As we focus on labour mobility, it makes sense to picture labour rather than capital on

Figure 4.5: Labour mobility I

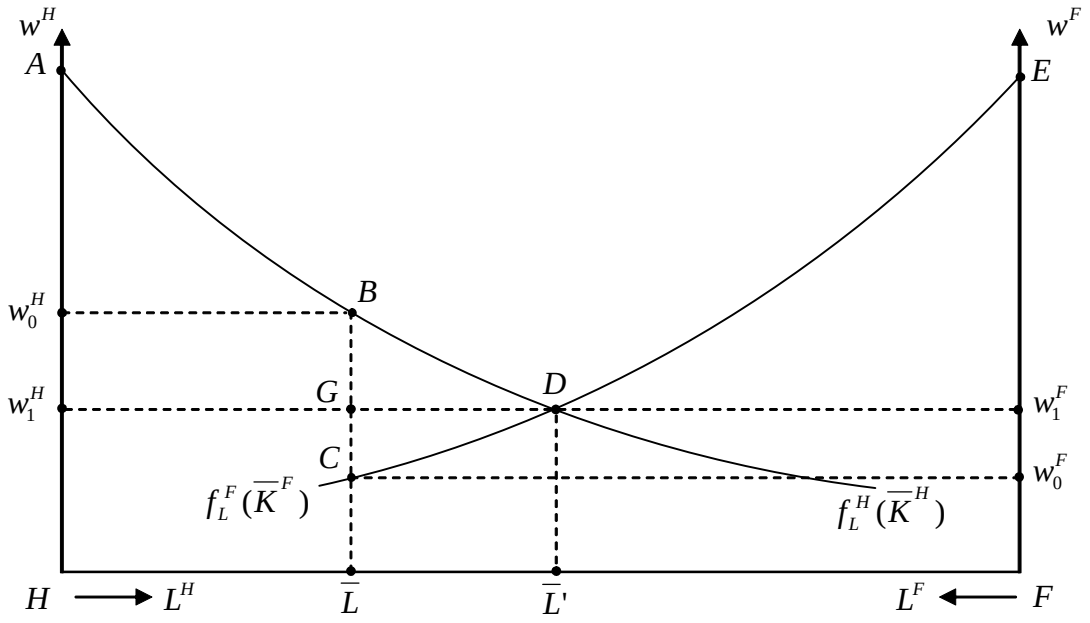


the horizontal axis. Hence, the partial derivatives of the production function are taken with respect to labour instead of capital. Home is endowed with the amount $H\overline{L}$ while there are $\overline{L}F$ foreign workers. In autarky, w_0^H denotes wages in the capital abundant region while w_0^F describes the lower wage level in foreign. GDP in home is made up of labour income $w_0^H B\overline{L}H$ and capital income ABw_0^H. Equivalently for foreign, workers receive $Cw_0^F F\overline{L}$ whereas capital owners get the residual CEw_0^F.

Allowing for labour mobility sets off migration from foreign to home. Diminishing returns guarantee a stable equilibrium D with equal wages and equal interest rates in both regions. According to Figure 4.6, $\overline{LL}'$ workers cross borders to work in the capital abundant country. Migration costs are not considered. Migration comes to a halt when wages are equated, that is if $k_1^H = k_1^F$. As a consequence, wages in home are depressed and workers in foreign are left better off as wages rise. As in the previous case with capital mobility, both countries benefit on an aggregated level. While output in home rises to $AD\overline{L}'H$, labour income of national workers has declined by $w_0^H BGw_1^H$ to $w_1^H G\overline{L}H$. Immigrant workers earn $GD\overline{L}'\overline{L}$. Capital owners in home benefit because their income increases by $w_0^H BDw_1^H$. Foreign workers gain $CGw_1^F w_0^F$ while capital

owners lose $CDw_1^F w_0^F$. Thus, there is a global output gain shown by BDC. The losses of the losers are smaller than the gains of the winners. Nevertheless, it remains true that workers in the originally capital abundant country face a deterioration of wages.

Figure 4.6: Labour mobility II



The result of this section is identical to the previous case with mobile capital and immobile labour. The relatively scarce factor in each country has to bear the losses that are outweighed by the gains of the relatively abundant factor. Globalisation has the potential to increase output in a Kaldor-Hicksian sense. Although there are winners and losers in each jurisdiction, the winners can potentially compensate the losers and are still better off. The inherent problem to be solved is how to compensate the losers.

4.4 Integration with rigid wages

One way to protect workers in developed economies from low-wage competition is to enforce minimum wages. Thereby, the decrease of wages in home, as suggested by the previous analysis, must not take place. For simplicity reasons, we assume

that autarky wage levels are identical to this statutory minimum and that, initially, full employment prevails in both jurisdictions.[2] Relaxing these assumptions does not change the results qualitatively. Only in terms of quantity does more wage flexibility cause less unemployment, of course.

To make minimum wages and potential equilibrium unemployment plausible, we assume that the unemployed receive welfare payments in a non-distorting lump-sum fashion. Thereby, we can abstain from explicit modeling of the welfare state to keep things as simple as possible.

4.4.1 Endowments, wages and unemployment

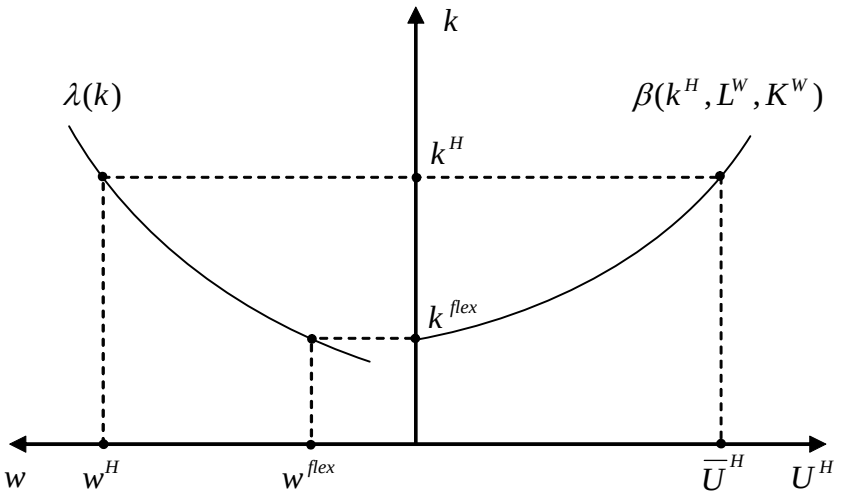
The underlying mechanism of this model with rigid wages is the following. Due to constant returns to scale, factor prices can be expressed as a function of the capital-labour ratio k alone. If home wants to maintain its high wage then the capital-labour ratio k^H must not change. However, as capital exports or labour immigration take place to benefit from factor price differentials, capital-labour ratios converge. As a consequence, k can only be kept constant if parts of the labour force become unemployed as long as capital is always fully employed. Say, if 10 percent of the capital stock relocates, 10 percent of the labour force has to become unemployed to keep k^H constant. Figure 4.7 illustrates this relationship for home.[3]

The left part of the diagram shows the link between the wage rate w and the relative factor endowment k. The higher the capital intensity (capital per worker) the higher marginal labour productivity and, due to perfect competition, the higher the wage rate. Thus, the slope of $\lambda(k)$ must be negative. The right part illustrates the relationship between relative endowments and unemployment in home. As we have assumed, home exhibits full employment of both capital and labour in autarky. Hence, the relative endowment k^H translates into the autarky wage rate w^H with zero unemployment. As foreign is endowed with relatively more labour, home's capital-labour ratio must decline

[2] In this setup, the minimum wage is defined in both nominal and real terms as the price is normalised to unity.

[3] The idea for this graphical illustration is taken from Davis (1998).

Figure 4.7: Relation between wages, endowments, and unemployment



in the integration equilibrium if full employment should prevail. This mechanism is depicted in the left part of the figure. If k^H declines to k_{flex} then wages unavoidably must fall to w_{flex} as well. In this case, unemployment would clearly be zero. If, however, w^H is the minimum wage, then the capital-labour ratio aggregated across both regions must be identical to k^H rather than k_{flex}. Only then, home's firms can still pay w^H. This, however, can only be achieved by unemployment in home.

A numerical example might further illustrate this: Let home be endowed with 1200 units of capital and 1000 units of labour. Foreign possesses 720 units of capital and also 1000 units of labour. Hence, $k^H = 1.2$, $k^F = 0.72$, and $k_{flex} = 0.96$. Each of these endowments imply different wage rates, $w^H > w_{flex} > w^F$. If home's wage rate should be kept constant, relative (employed) world endowments k^W have to be equated to $k^H = 1.2$ in both countries. Again, this implies that factor prices are equated as well, but to home's autarky level.

$$k^W = \frac{K^H + K^F}{L^H + L^F - U^H} = k^H = k^F = 1.2$$

$$k^W = \frac{1200 + 720}{1000 + 1000 - U^H} = k^H = k^F = 1.2$$

Solving for U^H yields

$$U^H = 400.$$

In this example, 40 percent of the labour force in home has to become unemployed in order to equate both countries' relative endowments to the autarky level in the rigid wage country.

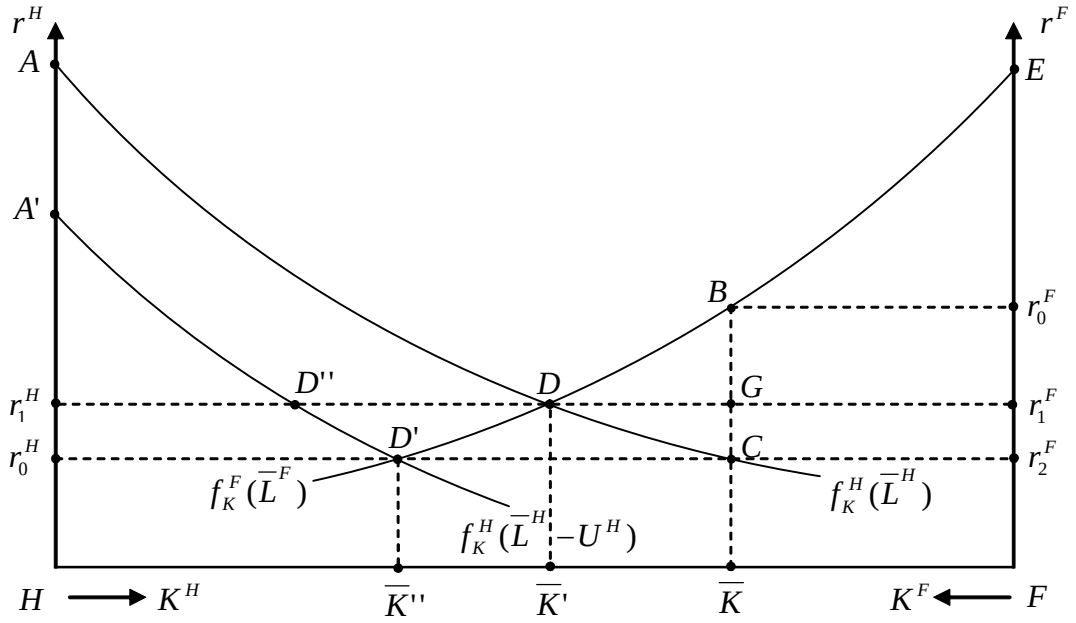
Finally, we take a closer look at the function $U^H = \beta(k^H, L^W, K^W)$. It states that unemployment depends on home's capital-labour ratio, the aggregated global labour force and the aggregated global capital stock. The more unequal the capital-labour ratios and the more unequal the factor endowments in absolute terms between both countries, the higher must be unemployment in home to keep the relative endowment and the minimum wage rate constant. Thus, $\beta(\cdot)$ is steep if both differences are rather small whereas the function must be plotted flatter if home is small and the rest of the world possesses a substantially lower relative capital endowment. Hence, for small economies that decide to open their borders for factor flows and that want to defend their high wages at the same time, the outcome will be catastrophic. A small capital abundant economy could never defend its wages. In other words, home could never ensure that k^W will be equal to k^H as its labour force is simply not large enough. This underlines the immense pressure on national labour markets with rigid wages and low-wage competition from abroad.

4.4.2 Capital mobility

The implications of capital mobility with downwards rigid wages for the volume of capital flows, factor prices and output can be analysed by means of Figure 4.8. Starting from C and B, which reflect the autarky equilibria in home and foreign, capital shifts to foreign. This is indicated by the movement from $\overline{K}$ to the left on the horizontal axis. In order to keep wages constant, k^H must stay the same and hence, marginal productivity of capital. As capital owners cannot be forced to employ their capital in home, $1/k^H$ workers become unemployed for every unit of capital exports in order to

keep k^H constant. Unemployment can be read off from the diagram indirectly. The marginal productivity curves of capital are plotted for constant labour input. This, however, cannot be maintained and thus, leads to a downwards shift of f_K^H. For every unit of capital less labour is employed, thereby reducing the marginal productivity of capital. f_K^H shifts in until there is an intersection of both marginal productivity curves at r_0^H. D' rather than D denotes the new equilibrium.

Figure 4.8: Capital mobility with rigid wages



As the diagram reveals, capital returns have been equated to a global level $r_0^H = r_2^F$. From this fact we know that $k^H = k^F$ and hence, $w^H = w^F$. Despite unemployment in home, there is still factor price equalisation. However, unemployment increases the equilibrium wage rate and decreases the equilibrium capital return. Figure 4.8 also reveals that capital flows are higher than in the reference situation with flexible wages. Unemployment in home prevents the marginal productivity of capital from increasing and thus, drives more capital out of the country. This must be true as for the allocation $\overline{K}'$ a positive capital return differential remains between both jurisdictions. Hence, the convergence process is extended artificially. Result 4.1 summarises the main insights.

Result 4.1 *The volume of capital exports to the labour abundant country will be higher with rigid wages relative to a flexible wage scenario in order to achieve a global capital-labour ratio that is equal to home's relative autarky endowment. This ensures factor price equalisation at home's autarky level.*

With regard to output, there are no longer gains for *both* countries. Compared to the flexible wage equilibrium, world GDP is lower by $ADD'A'$. Home gets $A'D'C\overline{K}H$ whereof $A'D'r_0^H$ accrues to workers who have not lost their job. Capital owners earn $r_0^H C\overline{K}H$ - composed of $r_0^H D'\overline{K}''H$ in home and $D'C\overline{KK}''$ in foreign. Foreign's income can be described by the area $D'EF\overline{K}C$. Workers receive $D'Er_2^F$ while capital owners get $Cr_2^F F\overline{K}$. Taking the integrated equilibrium with flexible wages as a benchmark, efficiency has clearly deteriorated due to the market imperfection in home. Compared to autarky, though, the picture seems to be ambiguous from this depiction. BCD could be gained whereas $ADD'A'$ is lost. However, we know that the rigid wage country marginally loses with every unit of capital being relocated. Recall that unemployment makes sure that factor prices remain constant. Hence, home's income also declines with regard to autarky. Thus, a closed economy guarantees higher income than a scenario with international capital mobility and rigid wages.

Workers in foreign are the only group that benefits from home's wage rigidity. Other groups either lose or do not gain. Intuitively, pathologically too high capital imports boost labour productivity and thus allow firms to pay higher wages. Foreign capital owners, though, face a deterioration of their capital return because more capital is employed in the economy. In home, capital owners are equally well off as in autarky, but worse off than with flexible wages. Now, they only receive the autarky return r_0^H rather than r_1^H. The main losers of the process - and this is the ironic part of the story - are workers in home who were supposed to be protected against the forces of globalisation as they bear the entire output loss themselves. Compared to flexible wages, home's output loss ($AD'GCD'A'$) is even higher than the aggregated output loss ($ADD'A'$) because foreign benefits from the other country's wage rigidity on a net basis ($D'DC'C$). Result 4.2 summarises.

Result 4.2 *Capital mobility produces output losses if wages are rigid. This happens via an increase in unemployment. For the capital abundant country, autarky implies a higher output level than capital market integration. Foreign benefits from home's wage rigidity in terms of higher income. Compared to autarky, workers in home who should be protected from the forces of globalisation by downwards rigid wages bear the entire output loss themselves through unemployment.*

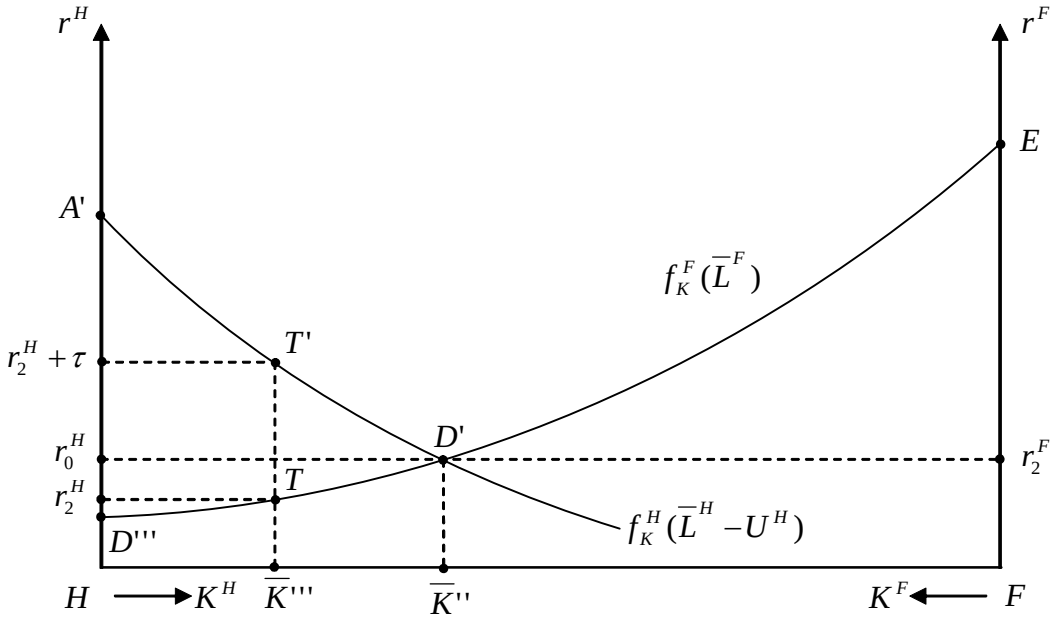
Tax instruments

While lump-sum taxation is always an unproblematic instrument, as it does not distort efficiency, it is also very unrealistic. In fact, distorting taxes play a more important role in reality. Therefore, we study the impact of both a distorting capital and labour tax in the presence of rigid wages and capital mobility.

Capital tax The government decides to implement a capital tax τ. For simplicity reasons, let us start in the integration equilibrium D'. The unit tax is represented by the distance TT' in Figure 4.9 and drives a wedge between the interest rate and the marginal return of capital. Thus, there is an unavoidable output loss if elasticities are larger than zero. Capital now has to earn the interest rate plus the tax rate. The new equilibrium condition is $f_K^H - \tau = f_K^F$. As the net return in foreign is initially higher than in home, capital will relocate from home to foreign until the net marginal returns are identical in both regions again. This is indicated by the movement from $\overline{K}''$ to $\overline{K}'''$. The market interest rate has fallen to r_2^H in both jurisdictions. $r_2^H + \tau$ represents the gross interest rate in home. The question arises, however, whether this is a stable equilibrium. With flexible wages relative to D', this would certainly be the case. $T'D'T$ would describe the additional output loss and the relocation implies a shift of the tax burden onto labour. The capital-labour ratio falls and so do wages. The latter, however, cannot take place if wages must not fall below their statutory minimum. In order to prevent the marginal productivity of labour - and thus wages - from falling, (more) unemployment emerges. The marginal productivity curve of capital shifts in further. Hence, the increase in unemployment as a reaction to capital exports prevents marginal

productivity of capital from increasing - just as in the transition from autarky to free capital mobility. The incentive for capital to flee the country that has introduced a tax is kept upright until the last unit of capital has left the region. Equilibrium is depicted by the corner solution D'''.

Figure 4.9: Capital tax with capital mobility and rigid wages



As a result, home's income has receded to zero whereas foreign's labour force benefits from the excessive inflow of capital boosting its productivity. In the new equilibrium, the world interest rate (which is equal to the national interest rate in foreign) has settled down to the level D'''. Hence, capital income is earned in foreign only. Foreign workers benefit further due to even more capital imports.

Proposition 4.1 *If real wages are downwards rigid, a distorting capital tax drives the entire capital stock out of the country. Unemployment in home reaches 100 percent and income collapses to zero.*

Proof. See Appendix 4.A. ■

Of course, this corner solution is far from being a true picture of reality. How-

ever, it impressively illustrates the detrimental impact of rigid wages if distorting tax instruments are in place.

Labour tax What are the implications if the government imposes a tax on wages? The key is whether the net or the gross wage are subject to the minimum. If the gross wage should be kept constant and workers bear the tax burden through lower disposable incomes, there will be no further effect on marginal productivities. The capital-labour ratio remains constant, that is the capital return does not change either. However, the entire burden is carried by workers who earn a lower net income. There will be no (further) unemployment because wages can be regarded as "flexible".

However, if the minimum wage fixes disposable income (or trade unions want the gross wage to increase by τ), the story is different. Marginal productivity of labour has to rise as the tax has to be earned additionally. Therefore, a higher capital-labour ratio must be achieved. As foreign capital does not have an incentive to relocate to home (because of equal marginal returns in both regions), some workers have to be pushed out of employment in the rigid wage country. The increase in marginal labour productivity, however, goes along with a decrease in marginal capital productivity because additional unemployment generates a downwards pressure on the interest rate in home. This creates an incentive for capital to move from home to foreign to maximise capital income. The same vicious circle as in the previous section has been set-off now if the higher gross wage rate is defended in home. The entire labour force is obliged to become unemployed. In this case, capital is driven out of the country indirectly, but also entirely. The tax on labour now yields unemployment as a first step which then leads to lower marginal returns of capital and hence, capital exports. The indirect channel is due to the immobility of labour.

Proposition 4.2 *With capital mobility and a unit tax on wages, unemployment only arises if net wages are downwards rigid. In this case, the same equilibrium arises as with a distorting capital tax. If only gross wages matter, then workers face a deterioration of their disposable income, but no (additional) unemployment occurs.*

Proof. See Appendix 4.B. ■

Intuitively, a distorting tax, whether on labour or on capital, forces workers to bear at least a part of the burden. This burden implies lower (net) wages. Thus, if labour refuses to bear this burden, unemployment evolves and leads to a corner solution. The bottom line is that workers have no choice but to bear the burden: either through a decline of wages or through unemployment. Also a welfare state cannot cushion this effect if only distorting taxes are available.

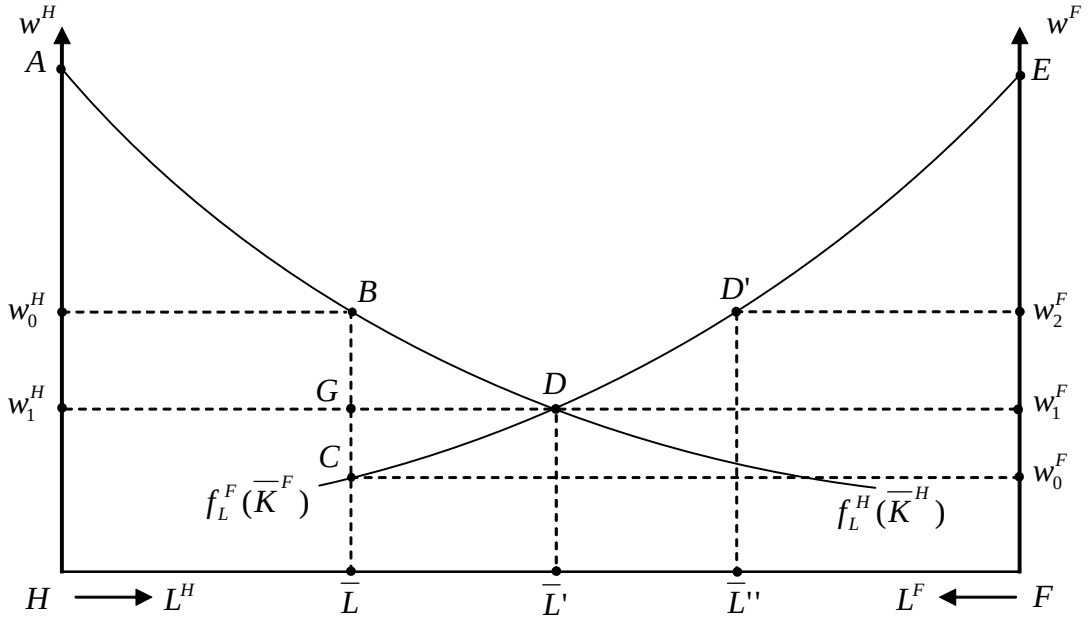
4.4.3 Labour mobility

Now we turn to the impact of downwards rigid wages if labour is the only mobile factor. Again, we employ the graphical illustration of the MacDougall-Kemp model as shown in Figure 4.10. Contrary to the previous section, the aggregated labour endowment rather than the aggregated capital stock is depicted on the horizontal axis. The downward sloping curves illustrate the marginal productivity of labour in both home and foreign. In equilibrium, this must be equal to the wage rate which can be read off the vertical axes. Again, the initial capital-labour ratio in home exceeds the equivalent ratio in foreign. Consequently, $w^H > w^F$ provides an incentive for workers in foreign to migrate to the high wage region. For simplicity reasons, migration costs are not considered as they only reduce the volume of migration, but do not change the basic results qualitatively.

Recall that, in autarky, $\overline{L}$ describes the allocation of labour, that is $H\overline{L}$ workers are employed in home and $\overline{L}F$ workers in foreign. At a given capital stock in the respective country, wages reach the level w_0^H in home and w_0^F in foreign. $\overline{LL}'$ workers would immigrate into home if wages were flexible. Apart from redistribution of factor income, this would yield an output gain of BDC. With rigid wages, the capital-labour ratio must be identical in both home's autarky and the integration equilibrium. However, immigration creates a downwards pressure on k^H and an upwards pressure on k^F with the discussed implications for factor prices. Hence, for every immigrant in home, one worker needs to become unemployed if we assume that immigrants get a job and

citizens of home are entitled to receive some kind of compensation benefits.[4] Moreover, excessive migration results because factor prices are equated to home's autarky level. Thereby, the migration incentive is kept upright for more foreign workers as wages do not decline in the target region. This, however, can only be achieved through unemployment.

Figure 4.10: Labour migration with rigid wages



These results can also be retraced from Figure 4.10. The foreign wage level only rises to $w_0^H = w_2^F$, if $\overline{LL}''$ workers emigrate - this is an excessive migration of $\overline{L}'\overline{L}''$. Foreign would move along $f_L^F(\overline{K}^F)$ from C to D'. Integration equilibrium is denoted by B and D' respectively. $\overline{LL}''$ workers are unemployed which exactly matches the number of migrants. With regard to welfare relative to the flexible wage integration equilibrium, world GDP is lower by the area $BDD'\overline{L}''\overline{L}$, which under the model assumption resembles the welfare loss. Now, also the diagram unambiguously reveals that aggregated GDP is lower than in autarky, namely by $CD'\overline{L}''\overline{L}$. GDP remains the same in home, but with a higher labour force after immigration. This implies a lower output

[4] See Sinn (2004) for a similar analysis.

per capita. If we assume that all migrants find a job in the target region, per capita income for foreigners has increased as they earn higher wages. This increase clearly outweighs the reduction in capital returns.[5] For citizens in home, income declines if people are crowded out of the labour market. The following result summarises the main findings of this part.

Result 4.3 *With labour mobility, rigid wages in the capital abundant country yield excessive migration. It is pathological because per capita output is lower than in both autarky and the integrated equilibrium with flexible wages. If we assume migrants to certainly find a job in home, the output loss only has to be borne by workers in home.*

It is not surprising that the result resembles the one with capital mobility because both mechanisms work in the direction of factor price equalisation. If national wages are defended, the same amount of unemployment and the same output loss occur.

Tax instruments

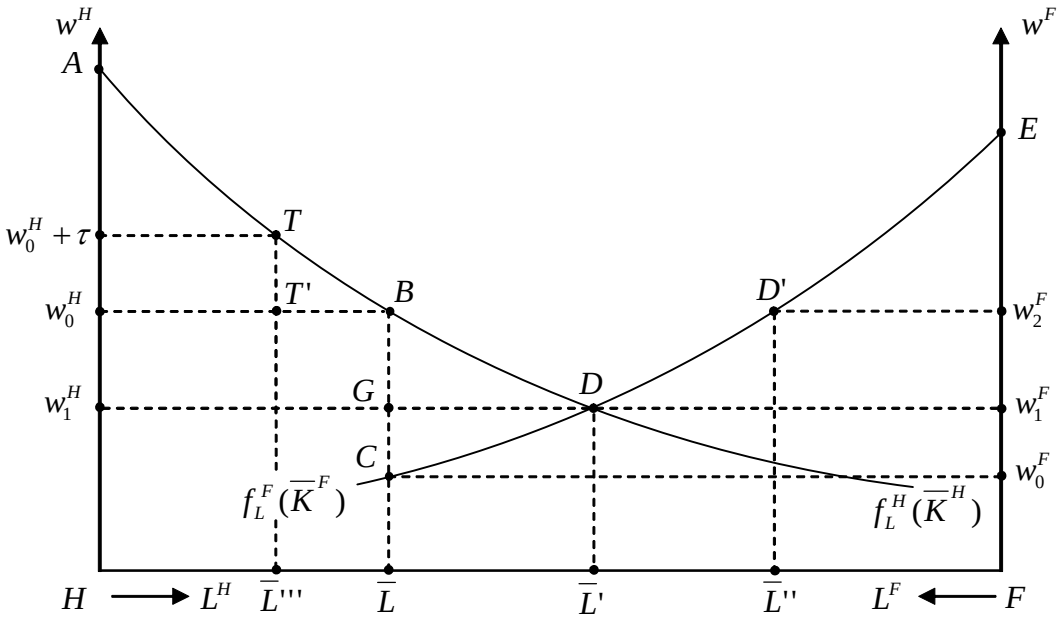
Similar to the previous section, we also study the implications of distorting tax instruments when labour is the only mobile factor and wages in home must not fall. Both a capital and a labour tax are considered successively.

Capital tax A unit tax on capital reduces its net return by the tax rate τ. However, as capital is assumed to be immobile in this scenario, the tax burden cannot be shifted onto labour. Hence, capital-labour ratios remain constant and so do marginal productivities and wages. Therefore, a capital tax does not further derogate efficiency. Income can be redistributed from capital owners to unemployed workers. As the wage differential is unaffected, the same immigration can be expected as without a tax.

[5] This fact is unambiguously clear from the analysis in the previous section.

Labour tax If the tax is levied on workers and if gross wages in home should remain constant, the migration incentive decreases as the net wage shrinks by τ. Hence, the tax works as an instrument to reduce excess migration. In the extreme case of a tax that resembles the wage differential, $\tau = w_0^H - w_0^F$, no migration will take place and net wages are equated in both economies. Unemployment benefits that are financed by employees can persist. However, the average disposable income per capita is clearly lower than with flexible labour markets and migration.

Figure 4.11: Labour tax with labour mobility and rigid wages



If lobby groups want the wage to increase by τ to keep net wages constant, the capital-labour ratio has to increase to boost marginal productivity of labour. This situation is depicted in Figure 4.11. As capital is immobile, an increase in the employed relative factor endowment can only be reached through additional unemployment in home. Here, it would amount to $\overline{L}'''\overline{L}$. This reduces the marginal productivity of capital that has to bear the entire tax burden. If the gross wage increases by less than the tax rate, then both capital and labour have to bear a part of the burden. An additional burden arises through unemployment. This loss of income clearly falls

onto workers. With $\Delta w_0^H = \tau$, the migration incentive remains as high as without a labour tax since the net wage is equal to the gross wage before. Then, unemployment adds up to $\overline{LL}''$, which is the unemployment generated through immigration, plus the additional unemployment $\overline{L}'''\overline{L}$ generated by the tax. In this case, tax revenues amount to $\left(w_0^H + \tau\right) TT' w_0^H$. However, there is no corner solution as in the previous case with capital mobility and capital taxes. Result 4.4 summarises this section's major findings.

Result 4.4 *Capital immobility allows the government to tax this factor and generate revenues as capital cannot flee the country. With a tax on labour, workers can even fully shift the tax burden onto capital if wages rise by the tax rate. However, this comes at the cost of additional unemployment.*

4.4.4 Capital and labour mobility

How do the results change if both capital and labour are allowed to be mobile at the same time? The previous analysis has demonstrated that both capital and labour mobility by itself lead to identical results if distorting taxes are absent. Factor prices, the rate of unemployment and output losses are exactly the same in both cases. Therefore, nothing changes if both channels are at work simultaneously. Only under the assumption that the convergence process consumes a certain amount of time, we can expect the new integration equilibrium to be achieved faster. This might be bad news for politicians who rather need more than less time to carry out economic reforms to adjust to exogenous globalisation shocks.

With regard to the two distorting tax instruments discussed above, what can be concluded if both capital and labour are mobile simultaneously? With capital mobility, a tax on this factor would clearly yield a corner solution with the entire world capital stock being employed in foreign. This, of course, would not change if we additionally allowed for migration. Labour taxes alone are also capable of generating a corner solution, but only if gross wages were explicitly increased - at least by an epsilon - to compensate for the loss in disposable income. With fixed gross wages, though, an

interior solution would prevail. Allowing for labour migration in addition would not change the outcome as factor prices are already equated.

4.5 Conclusions and policy implications

The bottom line of this chapter is that a capital abundant country cannot defend its high wages against low-wage competition without substantial output losses. Lower wages might be necessary for full employment because capital exports or immigration reduce the marginal productivity of labour. On the other side, the low-wage economy benefits from the rigid wages in the other region through higher income. It also turned out that the output loss of the capital abundant country outweighs the additional output gain of the labour abundant economy. Ironically, workers who should have been protected from low-wage competition by a statutory minimum must bear these losses themselves by means of unemployment. Distorting taxes even make the situation worse by generating further income reductions.

Of course, the simple model partly exhibits extreme results that cannot be regarded as a true picture of reality. For instance, several obstacles to factor mobility like technological, political or also cultural barriers prevent full equalisation of factor prices. Hence, corner solutions that claim relocation of the entire capital stock will never be observed in the real world. Nevertheless, this model allowed basic insights which cannot be argued away by the preceding points. Although factor prices do not equate, globalisation of national markets improve factor allocation and must, as a consequence, lead to a convergence of factor prices - at least to some extent. However, if rigid labour markets prevent wages from adjusting to the market clearing level, that is if market integration causes unemployment, the rigid wage economy loses also on the margin. This country would clearly be better off without international transactions. Every factor unit that crosses the border implies a net loss for the rigid wage country. Obstacles to factor mobility just reduce the overall output loss.

Yet, another critique may point to the fact that minimum wages are binding only for

a small fraction of the labour force (the low-skilled) while workers with more skills earn market wages well above the statutory minimum. Then, the results only change quantitatively. The higher wage flexibility or the fewer workers affected by the minimum, the lower unemployment and output losses in equilibrium. Nevertheless, it remains true that a country can only defend its high wage level at the cost of becoming a net loser from market integration. The costs are higher with increasing dissimilarity between the integrating countries in terms of relative factor endowments and size. In the absence of frictions to factor mobility, a small country can by no means defend its high wages because its workforce is not large enough to equate relative world endowments to relative autarky endowments. This nicely illustrates the pressure of global market forces.

What policy recommendations can we infer from these results? There are basically two directions. As factor mobility reduces output in the presence of rigid wages, protection of national markets at least reduces output losses and can potentially ensure full employement. However, potential gains from an improved allocation of production factors would be foregone. A second direction addresses the root of the problem - the labour market rigidity. In order to gain from globalisation, it is unavoidable to let market forces install an efficient allocation. However, this necessarily implies a more unequal income distribution as especially (low-skilled) workers in developed countries face wage cuts. Only distributive policies that do not distort the efficient allocation can be regarded as a promising way out of this trade-off. The dilemma could be solved in two steps which must be implemented at the same time. Firstly, statutory minimum wages and unconditional replacement incomes by the welfare state must be abolished. This ensures an efficient market outcome and gains for all participating countries. Secondly, in order to avoid social tension due to a more unequal income distribution, a wage subsidy scheme should prevent impoverishment of large parts of the labour force by paying wage supplements up to a certain income. Many concepts have been developed that are all based on this idea. A more detailed discussion is relegated to the final chapter.

Appendix

4.A Proof of Proposition 4.1

$\lambda\left(k^H\right) = f_L^H = \overline{w}^H$ with $\lambda'\left(k^H\right) > 0$ and $\mu\left(k^H\right) = f_K^H = r^H$ with $\mu'\left(k^H\right) < 0$

After imposing the tax τ, $\mu\left(k^H\right) < r + \tau = \mu\left(k_{tax}\right)$

Assume that $L_{tax} > 0$, then $k_{tax} = \frac{K_{tax}}{L_{tax}} = \frac{K^H}{L^H}$ and hence, $\mu\left(k_{tax}\right) = \mu\left(k^H\right) = r < r + \tau$

Thus, $L_{tax} = K_{tax} = 0$ in equilibrium.

4.B Proof of Proposition 4.2

After imposing the tax τ, $\lambda\left(k^H\right) < \lambda\left(k_{tax}\right) = \overline{w}_{net} = w_{gross} - \tau$

Assume that $L_{tax} > 0$, then $k_{tax} = \frac{K_{tax}}{L_{tax}} = \frac{K^H}{L^H}$ and hence,

$\lambda\left(k_{tax}\right) = \lambda\left(k^H\right) = \overline{w}_{net} < \overline{w}_{net} + \tau$

Thus, $\mu\left(k_{tax}\right) < \mu\left(k^F\right)$ implying capital exports and a lower k^H.

Hence, $L_{tax} = K_{tax} = 0$ in equilibrium.

Chapter 5

The Heckscher-Ohlin model with rigid wages*

A central criticism of the previous chapter's approach might be that an economy cannot be properly described by a one-sector model. Therefore, we extend our analysis by a second sector to study the impact of relative price changes when wages are rigid. The workhorse model in this area is well known as the Heckscher-Ohlin model. We study the implications of both trade and factor mobility with respect to efficiency and distribution.

Although the Heckcher-Ohlin model has played, and is still playing a major role in the international trade literature, surprisingly little has been written on the impact of rigid wages in this setup. Nevertheless, Richard Brecher (1974a) already derived basic insights into the mechanism of the model more than 30 years ago. He showed that a capital abundant economy would lose from opening up for international trade if a binding minimum wage was installed. The country would not only lose relative to a flexible wage scenario with free commodity trade, but also relative to autarky. More recently, Davis (1998) used these insights to show that European unemployment props up American wages as both countries are linked via commodity trade. An exogenous shock caused by the integration of a third region with a lower capital-labour ratio gener-

*This chapter is based on Sinn and Seidel (2006).

ates downwards pressure on both American and European low-skilled wages. However, unemployment in Europe keeps world market wages on the previous level. Thereby, American workers reap the benefits of higher wages, while unemployment only emerges in Europe. Furthermore, wages can only be kept on their high level in both America and Europe if unemployment is twice as high as without a trade link to America (given that both regions are equally large). Oslington (2002) extends the existing analyses for the empirically important case where factor price equalisation does not hold. Thereby, he can incorporate the diverging wage and unemployment experiences in Europe and the US, respectively, in one model. However, the results of Brecher (1974) and Davis (1998) are only modified quantitatively. Krugman (1995) distinguishes between a European model where downwardly rigid wages produce unemployment and an American model where relative wages increase while full employment is sustained. His results resemble the ones by Brecher. In discussing Krugman's (1995) article, Srinivasan (1995) pointed out that trade flows are higher in a minimum wage-constrained trade equilibrium with unemployment. Landmann and Pflüger (1998) mention this outcome of the model as well.

However, the latter results are derived without discussing their policy implications. Especially with respect to the German situation, it is worthwhile to put this topic back on the economic policy agenda. Despite the sluggish economic growth over the last decade, many participants in the public policy debate point out that the extraordinary export performance proves Germany's international competitiveness and its gains from trade. This chapter's model puts forward a different perspective. If trade causes unemployment due to imperfect labour markets, every additional unit of export implies a welfare loss to the economy instead of a welfare gain!

We also go beyond the current results of the literature by looking at the small open economy case. This has neither been considered by Srinivasan nor Landmann and Pflüger. In this respect, we show that there is not necessarily a larger volume of trade compared to the flexible wage scenario without unemployment. The elasticities on both the demand and the supply side play a crucial role for the result.

Before getting into the pure theory of international trade, though, we extend the previous chapter's model with factor mobility by a second industry. We point out that a rigid wage economy that is relatively abundantly endowed with capital will export more of this factor than with flexible labour markets. Alternatively, excess immigration results if labour mobility is the only linkage between both countries. Consequently, the rigid wage economy loses from open borders. These results are exactly the ones we derived in Chapter 4.

The chapter is organised as follows. Next, we extend the analysis of the previous chapter by studying the implications of factor mobility in a two-sector economy when wages are downwardly rigid. Section 5.2 then focuses on trade as a substitute to achieve factor price equalisation. After setting out the basic mechanism, we distinguish explicitly between a large and a small open economy. Finally, Section 5.3 concludes and discusses policy measures to meet both efficiency and distribution goals.

5.1 Factor mobility in a two-sector economy

The model resembles our setup in Chapter 4 - the only difference being an additional sector. Still, both goods are homogeneous and produced under constant returns to scale with the inputs capital (K) and labour (L). Note that good x is more capital-intensive than good y, which means that relatively more capital is needed at given factor prices. Contrary to the previous chapter, relative prices play a central role here. We call p the relative price of good x in units of good y. One country, home (H), is assumed to possess relatively more capital than the second country, foreign (F). However, the labour force should be of equal size to map two large countries. Formally, this reads $k^H > k^F$ with $k^i = K^i/L^i$ and $i \in \{H, F\}$. Again, both regions are characterised by identical preferences and technology. The latter can be described by a neoclassical production function with the usual properties. Marginal products are positive, but rise with diminishing rates, so $f_K > 0$, $f_L > 0$ and $f_{KK} < 0$, $f_{LL} < 0$. Due to constant returns to scale, factor prices are determined by relative factor inputs. As $k^H > k^F$,

we know that $w^H > w^F$ and $r^H < r^F$. As in the previous chapter, we abstain from costs of factor mobility.

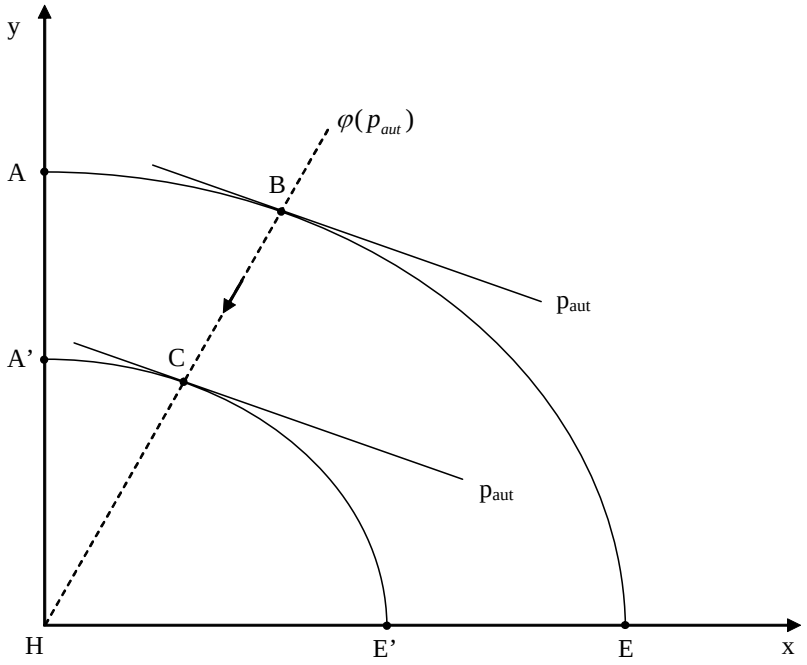
In a first step, let us assume labour markets to be flexible. As capital yields a higher return abroad, domestic capital will be exported. Thereby, capital-labour ratios and thus, both capital and labour remuneration converge in both countries. The convergence in relative endowments also leads to an equalisation of relative commodity prices. This comes about as home's opportunity costs of producing the capital intensive good increase. The opposite is true for foreign. Hence, p_x rises whereas p_y falls in home and vice versa in foreign until $\left(\frac{p_x}{p_y}\right)^H = \left(\frac{p_x}{p_y}\right)^F$. An efficient allocation of factors, that yields the maximum achievable output level, is reached when marginal returns in both sectors are equated. This is achieved by means of capital exports.

What happens if domestic wage rates are downwardly rigid?[1] As in the previous chapter, relative factor endowments must not change in order to prevent a modification of the wage rate and the capital return in home. Accordingly, relative prices that are determined via marginal productivities stay the same. Hence, it does not make a difference how the wage floor is defined – either in nominal terms or in real terms as in units of the labour intensive good y or the capital intensive good x. Figure 5.1 depicts the situation of the capital abundant country. In autarky, we start from a pareto-efficient general equilibrium where the marginal rate of substitution equals the marginal rate of transformation, denoted by B. Capital exports to the labour abundant region shifts in the production possibilities frontier. With full employment, the capital-labour ratio declines so that the economy is able to produce relatively more of the labour intensive commodity compared to autarky. In other words, the production possibilities frontier shifts in more with respect to good x than with respect to good y. With rigid wages, however, one unit of capital being exported forces $1/k^H$ units of labour to become unemployed in order to keep the capital-labour ratio constant. Otherwise, wages would decline. The same numerical example as in the previous chapter applies here. Recall that home was endowed with 1200 units of capital and 1000 units

[1] See also Brecher (1971).

of labour. Foreign possessed 720 units of capital and also 1000 units of labour. Hence, $k^H = 1.2$, $k^F = 0.72$, and $k_{flex} = 0.96$. In order to keep home's wages constant, relative (employed) world endowments k^W had to be equated to $k^H = 1.2$ in both countries. Unemployment amounted to 400 workers to reach a stable equilibrium. Graphically, this translates into an inwards shifting of the production possibilities frontier as indicated in Figure 5.1. It shifts in proportionately with regard to both goods. The new equilibrium is described by C on the new production possibilities frontier which has to be located on the ray from the origin that fixes the share and thereby the relative price of both goods.

Figure 5.1: Factor mobility with rigid wages in a two sector model



Assuming labour to be the only mobile factor, opening up the borders would not change the equilibrium point A in home. However, the higher wage for workers in the capital abundant economy attracts foreign workers and causes immigration. In order to keep relative factor endowments constant, one domestic worker has to become unemployed for every immigrant. The new open economy equilibrium settles when relative factor endowments are equated - either by means of capital mobility or labour

migration. Accordingly, relative goods and factor prices must be identical as well. Contrary to the flexible wage scenario world market prices for goods and factors are now equated on home's autarky level. This implies that wages in foreign have increased to a higher level than they would have with flexible wages in home. The only reason why this could be achieved is by means of higher capital imports in order to increase the capital endowment per worker to home's autarky level. Concerning output, the story resembles again the previous one in Chapter 4. Unemployment must emerge as the remaining adjustment mechanism in order to keep wages at their high level. With less factors of production being employed at the same costs, total output must have fallen by the number of unemployed times the wage rate. From a welfare perspective, this is clearly inferior to both autarky and the open economy equilibrium with rigid wages.

Result 5.1: *In a model with two goods, factor mobility exhibits the same outcome as in a model with only one good. The levels of unemployment, output and factor movements do not alter.*

Finally, let us relax the assumption that both countries are of equal size. Only in that case, the capital abundant economy is capable of equalising the relative world factor endowment to its autarky level. A small open economy simply does not have enough workers that could become unemployed. Even with 100 percent unemployment, the relative world capital-labour ratio is lower than home's autarky ratio. We can conclude that the results of the simple model in Chapter 3 also hold in a two sector setting. There is unemployment to maintain high domestic wages, the same amount of excessive capital flight and an output loss relative to both a flexible wage scenario and autarky.

5.2 The pathological trade boom

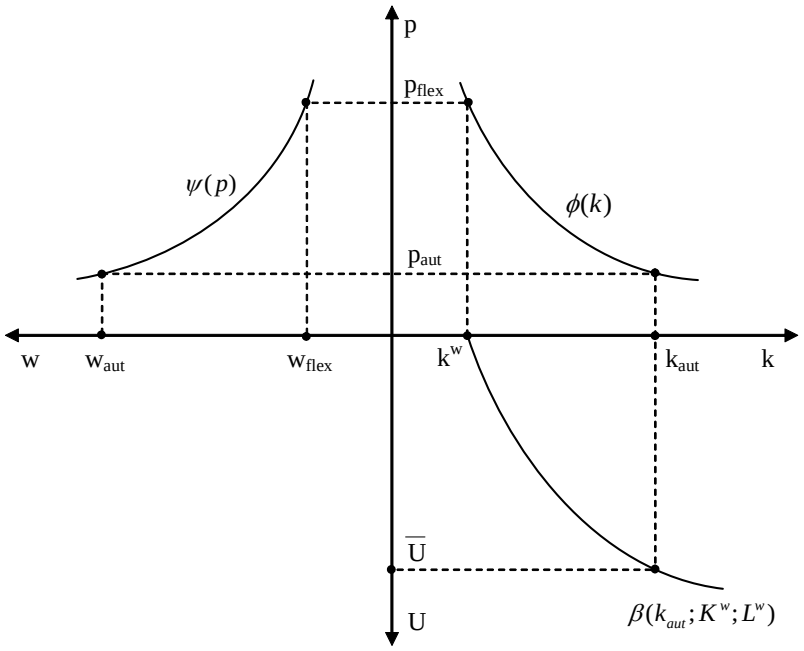
Let us now switch to the pure theory of international trade. The standard Heckscher-Ohlin model predicts that a capital abundant country will experience a decline in real wages and a rise in real capital returns if it starts trade relations with a labour abundant economy. This is due to a decrease in the relative price of the labour intensive commodity. The link between factor and goods prices is well-known as the Stolper-Samuelson theorem. This is the key to understand the mechanism of the model when rigid wages are introduced. Then, any change in relative prices necessarily implies a change in the remuneration of factors. As global trade can only decrease the relative price of the labour intensive good in home, this price change must be avoided in the first place. In other words, relative prices must be fixed to avoid the Stolper-Samuelson effect. This, in turn, can only be achieved by unemployment in home. Thereby, relative supply adjusts in the way that is in line with relative commodity prices in home in autarky. This makes clear that the specification of the minimum wage exercises no influence on the result. As neither prices nor factor remuneration changes, we can either fix the nominal or the real wage.

As mentioned before, Richard Brecher (1974a) was the first to lay out this mechanism. The aspect of excessive trade flows was first mentioned in a comment on Paul Krugman's (1995) paper by Srinivasan. Landmann and Pflüger (1998) also derive that result among others in their work. Later, Sinn (2005a, 2005b) brought the issue back into the German policy debate. The next part picks up on these insights, lays out the basic mechanism again and studies the impact for both a large and a small open economy. The latter has not been examined before.

5.2.1 Rigid wages in the Heckscher-Ohlin model

As a first step, we show how rigid wages work in a Heckscher-Ohlin framework. Figure 5.2 which is borrowed from Davis (1998) nicely illustrates the relationship between rigid wages and the level of unemployment.

Figure 5.2: Unemployment in the Heckscher-Ohlin model



The upper left quadrant reveals the Stolper-Samuelson theorem, that is wages w are a function of relative prices with $\psi'(p) < 0$. p reflects the relative price of the capital intensive good in units of the labour intensive one. If p rises, say from p_{aut} to p_{flex} due to international trade, the domestic wage rate will decline from its autarky level w_{aut} to w_{flex}. This is the effect if wages are flexible. The upper right quadrant depicts the relationship between relative prices and the capital-labour ratio k. The Heckscher-Ohlin theorem ensures that a country with a relatively high relative endowment can produce the capital intensive good x relatively cheaper. Thus, $\phi'(k) < 0$. k_{aut} denotes home's capital labour ratio in autarky whereas k^w is the aggregated ratio of both countries. Since we have assumed that $k^H > k^F$, $k^w < k_{aut}$. Finally, the lower right section of Figure 5.2 illustrates the relation between the level of unemployment and both the relative and the absolute endowment levels, which we explain in more detail below.

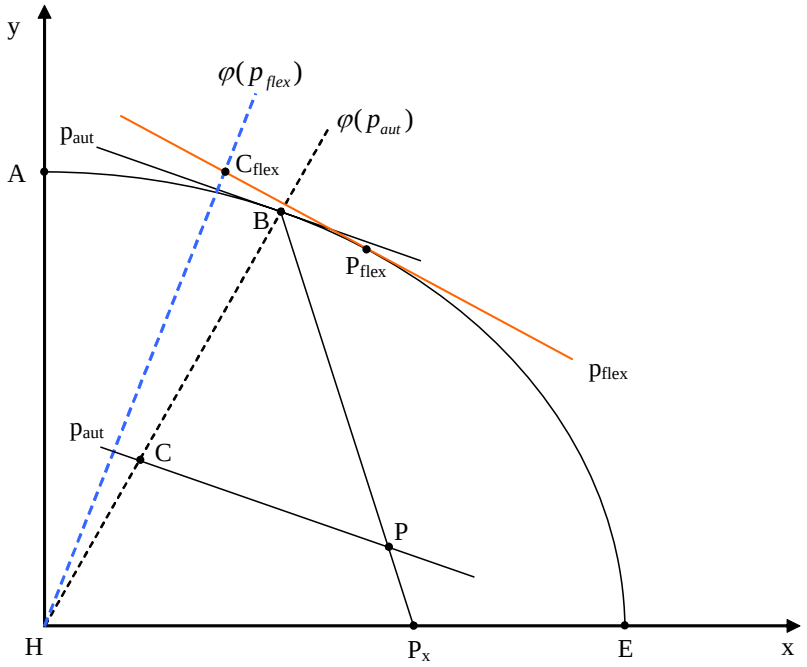
The mechanism works as follows. In the case of flexible wages, aggregated world endowments are fully employed. Thus k^w implies relative goods prices p_{flex} which are higher than for home in autarky, that is the labour intensive good will be cheaper. The higher goods price determines the wage w_{flex} which is lower than in autarky due to the Stolper-Samuelson effect. In the absence of transport costs, factor price equalisation guarantees that w_{flex} denotes the common global wage level. However, if wages are downwardly rigid in home relative prices must not change. This can only be realised if the aggregated relative supply of x and y is identical in autarky and in the free trade equilibrium. As the upper right quadrant shows, relative supply and thus relative prices are a function of relative endowments. Hence, only unemployment in home can keep the aggregated (employed) relative world endowment on the same level as the capital-labour ratio in autarky under full employment. Now it becomes clear how the level of unemployment depends on the relative endowment k_{aut}, the absolute size of the aggregated labour force and the aggregated capital stock, as shown in the lower right quadrant. Unemployment is higher the more different the two countries are in terms of relative and absolute endowments. The same numerical example from above applies again. As trade and factor mobility are perfect substitutes in constant returns to scale trade models, it is not surprising that the same equilibrium with the same amount of unemployment emerges in both cases. With factor mobility, relative price changes are caused by the change in relative endowments whereas the import and export of goods causes relative prices to change when trade is the only linkage between two countries.

As we have laid out the basic mechanism, we can now study the implications for both a large and a small open economy, respectively. The focus should be on the impact of rigid wages on structural change and trade flows compared to a flexible wage scenario.

5.2.2 The large open economy

Let us now compare the impact of rigid wages and thus, unemployment on the change in industry structure and the volume of trade to a scenario with flexible wages and full employment. In Figure 5.3, AE describes home's production possibilities frontier. In autarky, the pareto-efficient general equilibrium is denoted by B where full employment prevails. Relative goods prices are reflected by the price line p_{aut}. If the country opens up for trade, the labour intensive good will be available at a lower price because foreign can produce it at lower costs. On the other hand, foreign demands the capital intensive good from home, because it is cheaper to buy it than to produce it. Workers and capital in home would shift to the capital intensive industry, thus leading to a lower output of y and a higher output of x. Due to different technologies in the two sectors, that is different capital-labour ratios across industries at given relative factor prices, more labour is set free than would be employed by the other sector at given prices. Therefore, the wage rate declines. The opposite is true for capital.

Figure 5.3: Trade and rigid wages in a large open economy



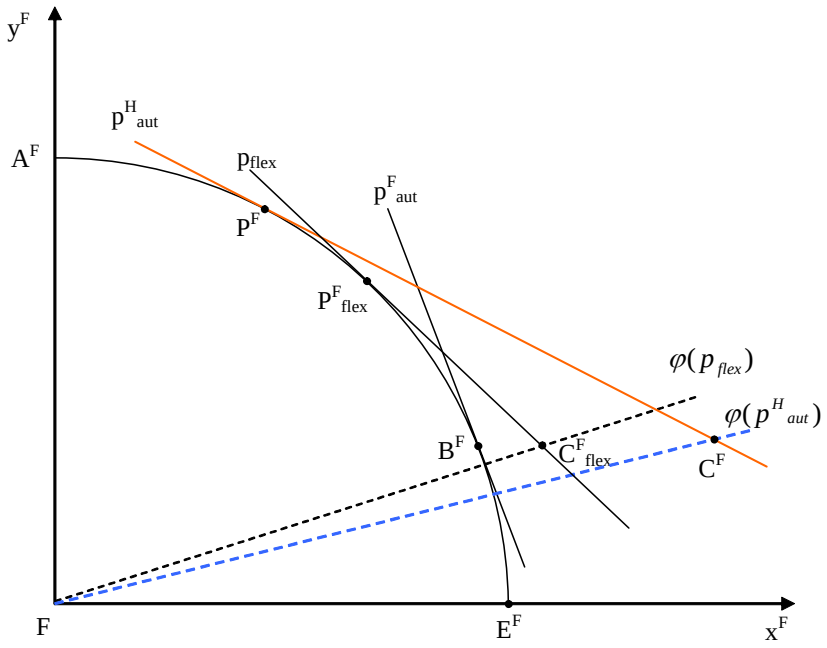
If wages cannot fall, one part of the workers in this sector becomes unemployed while another part moves to the expanding sector. This means that output of sector y shrinks while output of sector x increases. Contrary to the flexible wage case, though, this shift is now driven by unemployment and thus a change in relative (employed) endowments in home rather than via a change in relative prices. Due to unemployment, home's production possibilities frontier is no longer described by AE, but turns to ABP_xE where BP_x describes the Rybczynski line. This line is the locus of all efficient equilibria given the minimum wage. Unemployment reduces home's labour force that can be used in the production process and hence, shifts in the initial production possibilities frontier. BP_x characterises all tangency points of the price line p_{aut} with the respective production possibilities frontier for different levels of employment. While in B full employment prevails, unemployment rises along the Rybczynski line until P_x. Then the economy would completely specialise in producing the capital intensive good. This case will be considered in detail in the next section. In our example, home is driven down the Rybczynski line to the production locus P as the large country assumption ensures that neither country completely specialises. Due to homothetic preferences, consumers are willing to consume the two commodities in the same ratio independently of their level of income. This is reflected by the dashed line $\varphi(p_{aut})$. With C being the consumption point, the economy's trade vector is PC. This means that the capital intensive commodity is exported while the labour intensive one is imported. Autarky prices p_{aut} become world market prices.

Volume of trade

How does the trade volume with unemployment compare to the trade volume with full employment? With regard to Figure 5.3, we need to compare PC with $P_{flex}C_{flex}$. This, however, is a difficult task. Fortunately, the problem solves easily if we look at both trade equilibria from a different angle – the other country (foreign). The impact of rigid wages in home on foreign is shown in Figure 5.4 below. Due to a lower capital-labour ratio, general equilibrium in autarky is characterised by a relatively higher output - and thus a lower price - of the labour intensive commodity y. This

is reflected in the steeper relative price line in autarky p^F_{aut}. $A^F E^F$ denotes foreign's production possibilities frontier with B^F reflecting the pareto-efficient general equilibrium in autarky. Opening up for trade changes relative prices. This is shown by the shift of the relative price line p^F_{aut} to p_{flex} and p^H_{aut}, respectively. With flexible wages in home, world commodity prices are p_{flex}. This yields P^F_{flex} as foreign's efficient production locus and C^F_{flex} as foreign's consumption bundle. Again, the dashed line indicates homothetic preferences.

Figure 5.4: The volume of trade with rigid wages



If home maintains its high wage rate by defending its relative prices, then terms of trade would improve even more for foreign. If the world price of the labour intensive good remains on the high autarky level prevailing in home, then foreign will produce more of it than it would have for lower prices, of course. Thus, the relative price line for foreign rotates more than in the flexible wage scenario. In Figure 5.4, this is indicated by the line p_{aut}. Now we can easily see that the trade vector $P^F C^F$ must be larger than $P^F_{flex} C^F_{flex}$. While the terms of trade effect for home was entirely absorbed by means of domestic unemployment, the change in relative prices turns out to be larger

for foreign. Home's relative goods prices in autarky have become world market prices. As we have identified a new trade equilibrium, exports of home have to be identical to imports of foreign and vice versa. As foreign demands more of the capital intensive commodity from home, we know that home must export more than with flexible wages. Home pathologically exports too much if unemployment arises.

Structural change

From this analysis we can equivalently infer the change in industry structure. Home's wage rigidity induces a larger structural change in both home and foreign. With flexible wages, the production locus would have only shifted from B^F to P^F_{flex} abroad. With rigid wages in home, though, even more of the labour intensive commodity will be produced and less of the capital intensive one. Analogously, home "over-specialises" in the capital intensive good. The adjustment of relative prices that sets in if wages are flexible does not work as a braking force. Therefore, structural change through unemployment is pathologically stronger than the healthy process induced by a change in relative prices.

Welfare

As Brecher (1974a) has already shown, welfare gains from trade do not arise if wages are downwards rigid and trade equilibrium is characterised by incomplete specialisation of both economies. *"No trade"* is superior to *"trade"*. If this mechanism is at work, structural change and hence, trade volumes are pathologically too high. From a high trade volume and a strong decline of the labour intensive industry, we can no longer infer that the economy is benefiting from global markets. On the contrary, in this setting it clearly loses. If a country performs well in international trade, there are only welfare gains if no (further) unemployment emerges. Hence, rising exports are not by itself a sign of welfare gains. If trade causes unemployment, rising export figures should ring the alarm.

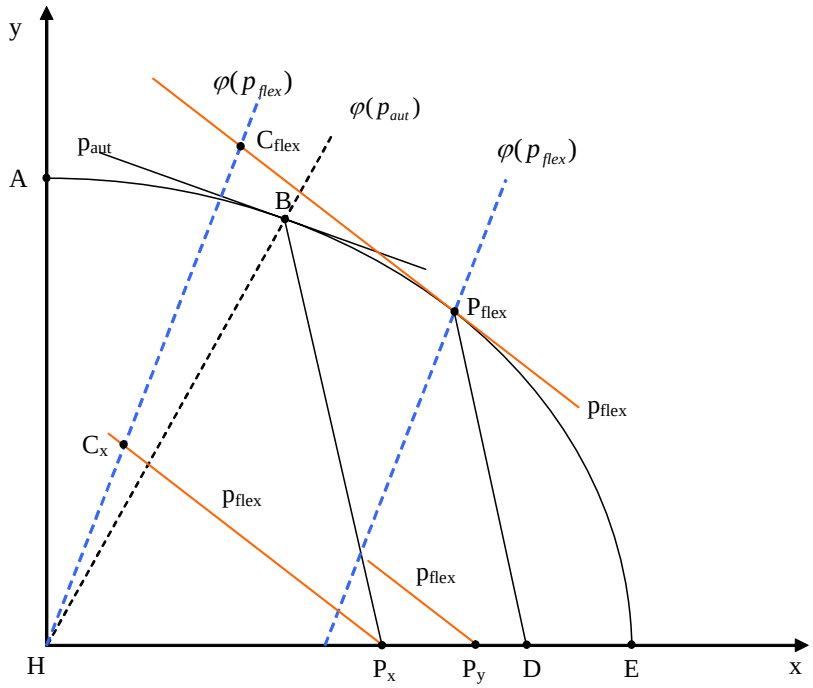
Result 5.2 *A large open economy that is relatively abundantly endowed with capital will face unemployment when it opens up for international trade and prevents wages from adjusting downwardly. While output and welfare decline, specialisation in the capital intensive industry becomes more pronounced than with flexible labour markets. Hence, also trade flows reach higher levels than without unemployment.*

5.2.3 The small open economy

We now turn to the small country. Contrary to many questions in international trade, the small open economy case turns out to be more complicated if wages are rigid. This is due to the fact that a small country has no influence on world market prices and maintaining domestic wage levels unavoidably leads to complete specialisation. This modification of relative prices has to be considered as an additional effect. Consequently, it matters a great deal how the minimum wage is specified – either in nominal terms or in real values as in units of good x or good y. To compare trade flows with rigid and flexible wages, it is crucial to identify the production structure of home. It will turn out that this depends on the definition of the minimum wage.

Figure 5.5 shows the same transformation curve of home as Figure 5.3 in the previous section. The only difference is that in this case, the rigid wage economy cannot defend its autarky prices on the world market. Rather relative prices in the rest of the world will become the relevant terms of trade in the small open economy. In other words, relative goods prices p_{flex} are exogenously given. Again, B denotes production and consumption in autarky with ABP_xE representing the transformation curve given the minimum wage. While the previous section discussed an interior solution where home ended up somewhere on the Rybczynski line, the economy is now driven to complete specialisation of the capital-intensive commodity. Production of the labour intensive good collapses entirely. Output of x now depends on the definition of the wage floor. If defined in terms of good x, P_x will be the production point. Unemployment remains on its maximum level. One can imagine that the economy is driven down the Rybczynski line at given autarky prices p_{aut}. With complete specialisation,

Figure 5.5: Trade and rigid wages in a small open economy



however, home can no longer defend the high price of the labour intensive commodity and hence, the relative price of x rises. In order to keep real wages constant in terms of good x, nominal wages have to increase by the same percentage as p_x. As x is the only good being produced in the economy using the entire capital stock, the capital return also rises by the relative increase of p_x. Marginal productivity of capital is unaffected because in P_x, the same capital-labour ratio is employed as both in autarky and along the Rybczynski line. But the marginal revenue product, which determines factor rewards, rises due to the price increase.

If one defines the real wage in terms of the labour intensive good y, firms could pay lower nominal wages and thus employ more workers. As the value of their output increases, the minimum wage constraint is thereby relaxed. The magnitude of new employment (relative to P_x) depends on the elasticity along the marginal revenue curve of labour. In Figure 5.5, P_y denotes output of x in this scenario. P_y must lie to the right of P_x, but to the left of D. This must be true because D belongs to the Rybczynski line starting from P_{flex} at world market prices. With flexible wages, we know that along

$P_{flex}D$ real wages have declined in terms of both goods due to the Stolper-Samuelson effect.

Finally, the minimum wage could be indexed to the inflation rate. With homothetic preferences, the price index would be $p_{index} = \alpha p_x + (1-\alpha)\, p_y$ where α denotes the constant income share spent on commodity x while $(1-\alpha)$ is the expenditure share for good y. Therefore, the wage floor would be w/p_{index}. Depending on α, the economy would produce x in the range of P_x and P_y. The higher α the less employment will be generated and vice versa. With flexible wages, of course, the change of relative prices from p_{aut} to p_{flex} would drive the economy along the transformation curve AE to P_{flex}. The change in industry structure depends on the elasticity along the transformation curve.

We now turn to consumption. As consumer prices change for households in home, the consumption mix in the new equilibrium will be different from autarky. The extent of consumption change depends on the price elasticity of demand. Due to homothetic preferences, consumption ratios can be expressed along a ray from the origin as long as relative prices do not change: $x/y = \varphi(p)$, where $\varphi' < 0$. With regard to the diagram, the question is how much will the ray describing the function $\varphi(p)$ change when p changes. Thus, we get C_{flex} as the consumption point with flexible wages and C_x with rigid wages where the minimum wage is defined in terms of the capital intensive good here.

This enables us to compare trade vectors with flexible and inflexible labour markets. It will turn out that both a lower and a higher volume of trade is possible relative to the flexible wage case. The volume of trade with flexible wages is described by the vector $P_{flex}C_{flex}$. Shifting the dashed line to the right until it crosses P_{flex}, it becomes clear that – for the situation depicted in Figure 5.5 – in equilibrium, the small open economy trades more than it would with flexible wages. The trade vector with unemployment is represented by P_xC_x, which is clearly larger than $P_{flex}C_{flex}$. If the wage floor was defined in terms of a consumption basket or in terms of the labour intensive good, there would also be a pathological trade boom. However, the result is not unique. One can

easily imagine a combination of elasticities that generates a smaller trade flow than in a flexible wage world. Say, the elasticity of demand is higher than depicted in Figure 5.5. Then $\varphi(p_{flex})$ would be steeper thus cutting the horizontal axis further to the right. If the elasticity is sufficiently higher, $P_x C_x$ would be smaller than $P_{flex} C_{flex}$. As a second possibility, one can imagine that the difference in relative endowments and thus in relative prices is larger between the small open economy and the rest of the world. Then, p_{flex} would be steeper, thus driving the economy further down the flexible wage transformation curve AE. Depending on how the minimum wage is fixed, it is possible that home would export fewer goods in the presence of unemployment. Hence, for a small open economy, it is not clear that rigid wages imply excessive trade flows. Nevertheless, the production of the capital intensive commodity always outweighs the output level with incomplete specialisation.

At least we can identify parameters that determine the volume of trade: On the supply side the elasticity along the flexible wage transformation curve and the elasticity along the marginal revenue curve of labour if the wage is either defined in terms of a basket or in terms of the labour intensive commodity. On the demand side, the price elasticity of demand turns out to be the crucial parameter. The higher the elasticity along the flexible wage transformation curve AE, the less likely is a pathological volume of trade ceteris paribus. Also, as stated before, the larger the difference between autarky and world market prices, the less likely are excessive trade flows. A high elasticity of the marginal revenue curve of labour in sector x, however, makes it more likely that the small rigid wage country's volume of trade is larger than with labour market clearance. On the demand side, a high price elasticity of demand ceteris paribus makes excessive trade flows less likely. Contrary to the large open economy, the volume of trade does not provide a measure of welfare loss if unemployment emerges simultaneously. Rather, starting from P_x more trade improves welfare because unemployment can be reduced and thereby production increased. Nevertheless, welfare is lower than in autarky given that a whole industry vanishes.

The ambiguity in the results vanishes, however, if we add factor mobility in addition

to trade. We have seen that complete specialisation does not equate factor prices across both countries which leaves an incentive for factors to relocate. The domestic wage rate exceeds the foreign labour remuneration, whereas the capital return is lower than abroad. The differences in factor prices can only be maintained if trade is the only linkage between both regions. With either capital or labour mobility, however, these differentials cannot be sustainable as there is an incentive for domestic capital to shift abroad and foreign labour to migrate to home, respectively. This enhances convergence of factor prices and generates further unemployment in home. Due to our small country assumption, however, home cannot equate relative factor endowments of the entire world to its autarky level. Hence, 100 percent of the domestic labour force will become unemployment again. Either foreign workers are employed jointly with domestic capital in home or the entire capital stock is driven out of the rigid wage region.

Although this is too harsh a result to be taken literally for policy debate, it impressively demonstrates the catastrophic effects of defending national wages against the forces of globalisation for a small open economy.

Result 5.3 *Rigid wages drive the small open economy into full specialisation of the capital intensive good. However, trade does not unambiguously generate excessive trade flows. The elasticities on both the demand and the supply side crucially influence the outcome. Contrary to a model with pure factor mobility, a small open economy that is only linked via commodity trade to the rest of the world, can theoretically prevent extinction by complete specialisation. The difference in factor prices vis-à-vis the rest of the world can only be sustained without factor mobility. Otherwise, the entire domestic labour force would be driven into unemployment again.*

5.3 A remedy for the pathology

This chapter has clearly stated that neither more complex models with more than one sector, nor the existence of trade or factor mobility change the result. The only difference turns out between a large and a small open economy. While the large open economy can equate relative global factor endowments to its autarky level, the small open economy's factor endowments will either be made extinct from employment, or it is driven into complete specialisation, as long as trade remains the only international linkage between two regions.

Therefore, we must conclude that distributional goals that try to be achieved by means of implementing labour market rigidities, come at very high cost - that is unemployment, and a decrease in both output and welfare. This delivers a strong argument for an alternative way. Certainly, protectionism would reduce the detrimental effects of rigid wages. However, potential gains from globalisation could not be realised, of course. Richard Brecher (1974b) analysed alternative policy measures in a second-best fashion. He found that wage subsidies would be able to reach the same equilibrium as without any distortions. This must be the starting point for any policy maker in a globally linked market economy when thinking about distributional policies. Paying wage subsidies rather than minimum wages would avoid unemployment as wages could adjust to their market clearing level. The subsidy can then be regarded as a supplement to lower real wages.

With regard to Germany, it is the design of the welfare state rather than explicit minimum wages that generates the distortion in the labour market. Paying wage replacement incomes that are only paid under the condition that someone is not working, create a reservation wage that might not be compatible with full employment. Therefore, policy makers should pick up on Brecher's (1974b) result that a wage subsidy can improve the situation. In fact, the US has installed the Earned Income Tax Credit, that builds upon this idea, already since 1975. For Germany, there are a few policy proposals on the table. Chapter 8 will come back to them in more detail.

Chapter 6

The short- and medium-run effects of trade with rigid wages

One of the central assumptions of the Heckscher-Ohlin model claims that factors of production can freely move between national industries. Thereby, firms are able to react to relative price changes by adjusting their factor employment and thus, output. However, this scenario might only be true in the long run as capital, for instance, causes changeover costs or workers need new training until they can be employed in other production processes. Hence, assuming (partial) immobilities of production factors seems plausible to describe the impact of trade in the short and medium run. The textbook model for this analysis is called the specific factors model. This chapter studies the implications of rigid wages in this setup and relates them to previously derived results.

The specific factors model has been revitalised by Jones (1971a) and Samuelson (1971). Mayer (1974), Neary (1978) and Mussa (1978) later integrated it as the short-run interpretation of the Heckscher-Ohlin model. However, not much focus has been laid upon the impact of downwardly rigid wages in such a framework. One example is Haberler (1950) who discusses different cases of factor immobilities in connection with labour market distortions such as wage differentials and minimum wages. He shows that trade can have detrimental effects on national welfare if factor markets

are inflexible. In most cases, however, wage differentials rather than minimum wages have been studied. Examples include Jones (1971b), Magee (1971), Bhagwati and Srinivasan (1971) or Matusz (1994). As in the previous chapters, this part follows the simplest possible approach in which workers are paid a minimum wage.[1] For the long-run perspective, Brecher (1974a) and more recently Davis (1998), Oslington (2002), Kreickemeier (2005) and Sinn (2005c) have followed this approach as well.[2]

This chapter distinguishes between the short and medium run by assuming different degrees of mobility. The short run is the period of time where both capital and labour are immobile between sectors, whereas the medium run builds on the classical specific factors model with intersectorally mobile labour and immobile real capital. Using Jones' (1971a) seminal "hat calculus" approach, we study the impact of minimum wages on welfare, unemployment, structural change, factor returns and trade flows in both scenarios. There are two countries, home and foreign, that produce two goods, x and y, with the inputs capital (K) and labour (L) under perfect competition and constant returns to scale. Sector x is capital intensive while sector y uses relatively more labour. Home is assumed to be relatively abundantly endowed with capital. Furthermore, both countries are of similar size in order to guarantee an interior solution, that is, both countries always produce both goods. The definition of the minimum wage is crucial because it can substantially influence the results. Here, the real wage is fixed in terms of both goods via a price index. Unemployed workers receive benefits that are financed in a lump-sum fashion. Thereby, we avoid explicit modelling of the welfare state.

One can think of two strands of contribution of this chapter. Firstly, it extends the specific factors literature by implementing downwardly rigid wages. Secondly, it complements the long-run Heckscher-Ohlin model results as it relates the market outcome in the short and medium run to the long-run effects. This provides a better understanding of the "adjustment process" caused by the opening up for trade and the

[1] Other ways to model unemployment include the search theoretic approach applied by Davidson et al. (1999) or Weiß (2001). Fair wages are used by Brecher (1992), Matusz (1994), Kreickemeier and Nelson (2006) and Kreickemeier and Schoenwald (2002).

[2] Sinn (2005d) interprets the minimum wage as replacement incomes paid by the welfare state.

change in relative prices.

We find that the detrimental long-run effects of the Heckscher-Ohlin framework with rigid wages turn out to be less severe in the presence of factor immobility. Unemployment and welfare losses are always lower in the specific factors model. Preferences determine the rate of unemployment. The more of their income consumers spend on the commodity, whose price rises, the more weight this price increase gains in the index. Thus, nominal wages have to rise more, or are not allowed to decrease as much, in order to keep real wages constant. In the short run, unemployment emerges only in the sector in which the price falls. Due to better allocation of labour in the medium run, unemployment will decline. However, the impact on welfare and the volume of trade is ambiguous both in the short and medium run. The positive terms of trade effect is counteracted by the negative unemployment effect.

The next section explains the specification of the minimum wage. Based on this, the following part studies the impact of rigid wages for both the short and the medium run. Section 6.3 links the results to the outcomes in the long run (see Chapter 5). The final part concludes and discusses policy implications.

6.1 The minimum wage

The definition of the minimum wage is crucial in the specific factors model. Contrary to the long-run Heckscher-Ohlin framework, results change substantially with different specifications. Recall that wages decline in terms of both goods if both captial and labour can migrate between sectors and the relative price of the capital intensive commodity rises. Hence, fixing the wage in nominal terms or in terms of either commodity does not change the result. Unemployment and welfare will reach the same level in every case. In the specific factors model, however, wages increase in terms of one good and fall in terms of the other depending on the direction of the relative price change. For a capital abundant economy, which we focus on in this analysis, workers would lose in terms of the capital intensive good and gain in terms of the labour intensive one.

Hence, fixing the real wage in terms of the latter would not yield any unemployment. The market clearing wage would always be equal to the minimum wage level. On the other hand, defining the wage floor in terms of the capital intensive commodity would clearly generate unemployment because nominal wages would have to increase more than market forces require.

As this appears rather arbitrary, we follow a different approach by defining the minimum wage in terms of a consumption basket. With homothetic preferences, we can use the income shares spent on each commodity as weights in the price index. The minimum wage is then defined as

$$\overline{w}_{\text{real}} \leq \frac{w_i}{\alpha p_x + (1-\alpha)\, p_y} \qquad i = x, y. \tag{6.1}$$

w_i denotes the nominal wage in sector x or y. p_x and p_y are the prices of the respective commodities. These prices are weighted by α which is the income share spent on good x and $(1-\alpha)$ for good y, respectively. Due to homothetic preferences, these shares remain constant independent of goods price or income changes. Eq. (6.1) implies that the nominal wage which firms have to pay must at least rise by the same percentage as the price index to prevent a decrease of real wages. This can be seen by totally differentating eq. (6.1) to get

$$\frac{dw_i}{w_i} = \widehat{w}_i \geq \widehat{p}_{index} = \frac{\alpha dp_x + (1-\alpha)\, dp_y}{\alpha p_x + (1-\alpha)\, p_y}. \tag{6.2}$$

It also becomes clear that the nominal wage has to increase more, the higher is the value of α, if p_x goes up. This, however, will be the case for a capital abundant country.[3] As long as $\alpha =]0;1[$ and home is relatively capital abundant, $\widehat{p}_x > \widehat{p}_{index} > \widehat{p}_y$. The implications of this wage floor in the short and medium run are examined in the following chapter.

[3]The proof is relegated to Appendix 6.A.

6.2 The model

The model describes two equally large countries, home and foreign, that produce two goods (x and y) with the inputs capital (K) and labour (L) under perfect competition. Home is assumed to be capital abundant whereas foreign possesses relatively more labour. x is the capital intensive good whereas y needs relatively more labour in the production process. We assume that factors differ in their mobility between sectors. In the short run, both capital and labour are specific to their industries whereas labour is allowed to be mobile in the medium run. International factor mobility is not considered. This approach follows the short-run interpretation of the Heckscher-Ohlin framework by Mayer (1974), Neary (1978) or Mussa (1978). Thereby, we get an idea about the development of unemployment, welfare, structural change and volume of trade over time without considering a dynamic model. The outcome with full intersectoral factor mobility is taken from the Heckscher-Ohlin literature.[4]

It is enough to explicitly study the equations for the capital intensive economy (home) alone. Foreign is only necessary to explain the direction and magnitude of change in relative prices. The more diverse both countries are in terms of both relative and absolute factor endowments, the more pronounced the change in relative prices has to be. The approach builds on the "hat calculus" model introduced by Jones (1971a). For simplicity reasons, we start from a long-run pareto-efficient equilibrium in autarky. This implies that factor prices are equal in both sectors and all factors are fully employed. Opening up for trade with the labour intensive country increases the relative price of the capital intensive good x, thereby creating an exogenous shock.

6.2.1 The short run

In the short run, both labour and capital are specific to their industries. However, they are not specific to the firms they are employed at. This assumption is necessary to ensure unique factor prices within sectors. With regard to capital, this assumption

[4] See Brecher (1974a) or Davis (1998) and Chapter 5 of this book.

is justifiable as machines require time for changeover to be productive in the other industry, but not within industries. With regard to workers, a similar mechanism can be assumed, for instance that workers need to acquire different skills to work in the other industry. However, we abstain from modelling this transformation explicitly. Sector specificity of both factors allows us to analyse the two sectors separately. With the same technological know-how in both jurisdictions, home produces the capital intensive commodity x relatively cheaper as it is relatively abundantly endowed with capital. Hence, integrating goods markets leads to an increase in p_x and a decline in p_y in home. Preferences are identical and homothetic. In a first step, we take a look at the capital intensive sector x.

The x-sector

The sector can be described by means of the following equations

$$a_{L_x} w_x + a_{K_x} r_x = p_x \tag{6.3}$$

$$a_{L_x} x + U = \overline{L}_x \tag{6.4}$$

$$a_{K_x} x = \overline{K}_x \tag{6.5}$$

where $a_{L_x} = \frac{L_x}{x}$ and $a_{K_x} = \frac{K_x}{x}$ are the unit inputs of labour L and capital K, respectively. x denotes output of the capital intensive commodity. Eq. (6.3) represents the zero profit condition where unit costs are equated to unit revenues. Eqs. (6.4) and (6.5) reflect the resource constraints in this sector where U describes unemployment in absolute terms. Clearly, with flexible factor markets, $U = 0$. With a binding minimum wage, however, U can take positive values. Totally differentiating eqs. (6.3) to (6.5) and expressing in terms of relative change yields[5]

[5]For derivation see Appendix 6.B.

$$\theta_{L_x}\widehat{w}_x + \theta_{K_x}\widehat{r}_x = \widehat{p}_x - (\theta_{L_x}\widehat{a}_{L_x} + \theta_{K_x}\widehat{a}_{K_x}) \tag{6.6}$$

$$\widehat{U}_x = \widehat{L}_x - \widehat{x} - \widehat{a}_{L_x} \tag{6.7}$$

$$\widehat{x} = \widehat{K}_x - \widehat{a}_{K_x}. \tag{6.8}$$

The "$\widehat{\ }$" over a variable illustrates relative changes, for example $\widehat{r} = \frac{dr}{r}$. The θs are factor income shares of capital and labour respectively, for example $\theta_{L_x} = \frac{a_{L_x} w}{p_x}$. Hence, $\theta_{L_x} + \theta_{K_x} = 1$. Now $\widehat{U}_x$ shows the unemployment rate in sector x, that is the number of workers relative to the labour force attached to the capital intensive industry, $\overline{L}_x$. In order to determine $\widehat{a}_{L_x}$ and $\widehat{a}_{K_x}$ we need two additional equations. They can be taken from the firms' unit cost minimisation

$$\min_{w_x, r_x} \; a_{L_x} w_x + a_{K_x} r_x \tag{6.9}$$

and from the definition of the elasticity of factor substitution, which is defined in the following way so as to be positive

$$\sigma_x = \frac{\widehat{a}_{K_x} - \widehat{a}_{L_x}}{\widehat{w}_x - \widehat{r}_x}. \tag{6.10}$$

By total differentiation of (6.9) we get

$$\theta_{L_x}\widehat{a}_{L_x} + \theta_{K_x}\widehat{a}_{K_x} = 0. \tag{6.11}$$

Solving and substituting in (6.10) yields

$$\widehat{a}_{K_x} = \theta_{L_x}\sigma_x\left(\widehat{w}_x - \widehat{r}_x\right) \tag{6.12}$$

$$\widehat{a}_{L_x} = -\theta_{K_x}\sigma_x\left(\widehat{w}_x - \widehat{r}_x\right). \tag{6.13}$$

With flexible wages, only w and r adjust to changes in the goods price. As can be seen from eq. (6.6) jointly with eq. (6.11), a one percent increase in p_x leads to a one

percent increase in both w and r. Wages, however, are not fully flexible, but bounded to the floor. By implementing eqs. (6.11), (6.12) and (6.13) into eqs. (6.6) to (6.8) we get three equations in three endogenous variables. Solving for $\widehat{U}_x$ yields

$$\widehat{U}_x = \frac{\sigma_x}{\theta_{K_x}} \left(\widehat{p}_{index} - \widehat{p}_x \right). \tag{6.14}$$

As we know from the previous section $\widehat{p}_x > \widehat{p}_{index}$. Hence, $\widehat{U}_x$ would be negative. However, unemployment can only be larger than or equal to zero by definition. Therefore, in this case $\widehat{U}_x = 0$, while $\widehat{x}$, $\widehat{r}_x$, and $\widehat{w}_x$ are endogenously determined.

Result 6.1 *In a capital abundant country, the capital intensive sector is not affected by the downwardly rigid real wage if both factors are sector specific. Hence, unemployment in this sector is zero.*

The intuition for this result is the following. From the analysis above we know that market wages rise by the same percentage as the price of the capital intensive commodity. This would be more than the rise in the price index and hence, implies an increase in real wages. Hence, the minimum wage constraint is not binding in sector x. Therefore, $\widehat{w}_x = \widehat{r}_x = \widehat{p}_x$, while $\widehat{U}_x$, $\widehat{x}$, $\widehat{a}_{L_x}$, $\widehat{a}_{K_x}$ are zero.

The y-sector

We can employ the same set of equations to analyse the impact on sector y. The only difference to the previous section is that the commodity price p_y declines. The equations of change are

$$\theta_{L_y} \widehat{w}_y + \theta_{K_y} \widehat{r}_y = \widehat{p}_y \tag{6.15}$$

$$\widehat{U}_y = \widehat{L}_y - \widehat{y} - \widehat{a}_{L_y} \tag{6.16}$$

$$\widehat{y} = \widehat{K}_y - \widehat{a}_{K_y}. \tag{6.17}$$

Solving eqs. (6.15) to (6.17) by using eqs. (6.10) and (6.11) for sector y, we get

$$\widehat{U}_y = \frac{\sigma_y}{\theta_{K_y}} \left(\widehat{p}_{index} - \widehat{p}_y \right). \tag{6.18}$$

As $\widehat{p}_y < \widehat{p}_{index}$, the minimum wage constraint becomes binding and unemployment emerges in this sector. Only if the minimum wage was defined in terms of the labour intensive good, that is $\widehat{p}_{index} = \widehat{p}_y$, this term would be zero and hence, full employment would be maintained. Maximum unemployment would arise, if the minimum wage was defined in terms of the capital intensive commodity x. Thus, from eqs. (6.2) and (6.18) we can infer that α has a positive influence on the unemployment rate.

Proposition 6.1 *In the short run, unemployment emerges in the labour intensive sector. It increases in α.*

Proof. $\frac{\partial \widehat{U}_y}{\partial \alpha} = \frac{\sigma_y}{\theta_{K_y}} \frac{\partial \widehat{p}_{index}}{\partial \alpha} > 0$, because $\frac{\partial \widehat{p}_{index}}{\partial \alpha} > 0$. See Appendix 6.A for details. ■

Intuitively, the higher the preference for the capital intensive good, the higher the weight of the price change in the price index and thus, the higher the difference between $\widehat{p}_{index}$ and $\widehat{p}_y$. The term $\frac{\sigma_y}{\theta_{K_y}}$ reflects the elasticity of the marginal product curve of labour.[6] The higher this elasticity, the more unemployment will be generated given the difference in price changes and given α.

The impact of the binding minimum wage on $\widehat{r}_y$ can be seen from eq. (6.15) directly. As $\widehat{w}_y$ decreases by less than market forces require for market clearance, $\widehat{r}_y$ has to decrease more than the price of y to fulfill this condition. Writing eq. (6.15) differently brings

$$\widehat{r}_y = \frac{1}{\theta_{K_y}} \widehat{p}_y - \frac{\theta_{L_y}}{\theta_{K_y}} \widehat{p}_{index} < \widehat{p}_y. \tag{6.19}$$

Result 6.2 *With rigid wages, the return to capital in sector y decreases more than with flexible wages.*

[6] The marginal physical product of labour is given by w_y/p_y. This increases as a_{L_x}/a_{K_x}, the input of labour relative to the fixed factor capital, declines. The elasticity of the marginal product curve is $\left(\widehat{a}_{K_y} - \widehat{a}_{L_y}\right) / \left(\widehat{w}_y - \widehat{p}_y\right)$. From eq. (6.15), $\widehat{w}_y - \widehat{p}_y$ is equivalent to $\theta_{K_y} \left(\widehat{w}_y - \widehat{r}_y\right)$. See Jones (1971a), footnote 5.

Intuitively, capital must bear a higher burden because there is a relative input effect in addition to the regular price effect. The latter effect would reduce r_y by the same percentage as the price decrease. Unemployment, however, increases the capital-labour ratio in this sector and hence, reduces the marginal productivity of capital. The combination of these two effects yields a lower return than in the flexible wage scenario. The same argument works in the opposite direction for labour. This second effect increases marginal productivity of labour thus allowing firms to pay wages above the market clearing level.

Finally, the effect on the third endogenous variable, output y, is revealed in the following equation

$$\widehat{y} = -\theta_{L_y} \frac{\sigma_y}{\theta_{K_y}} \left(\widehat{p}_{index} - \widehat{p}_y\right) < 0. \tag{6.20}$$

Of course, output recedes due to unemployment in sector y. Interestingly, the change in unemployment is higher than the change in output of y in absolute terms. This becomes clear from eqs. (6.18) and (6.20) because $\theta_{L_y} < 1$.

Welfare, trade and structural change

In order to close the model, we introduce the demand side. As both countries have homothetic preferences, relative demand is a function of relative prices only

$$\frac{x}{y} = \rho\left(\frac{p_x}{p_y}\right) \tag{6.21}$$

with $\rho' < 0$. Totally differentiating eq. (6.21) brings

$$\widehat{x} - \widehat{y} = -\sigma_D \left(\widehat{p}_x - \widehat{p}_y\right) \tag{6.22}$$

where σ_D represents the price elasticity of demand.[7] As ρ is a monotonically decreasing

[7] See Appendix 6.C for details of this calculation.

function, the inverse exists and we can rewrite eq. (6.22) as

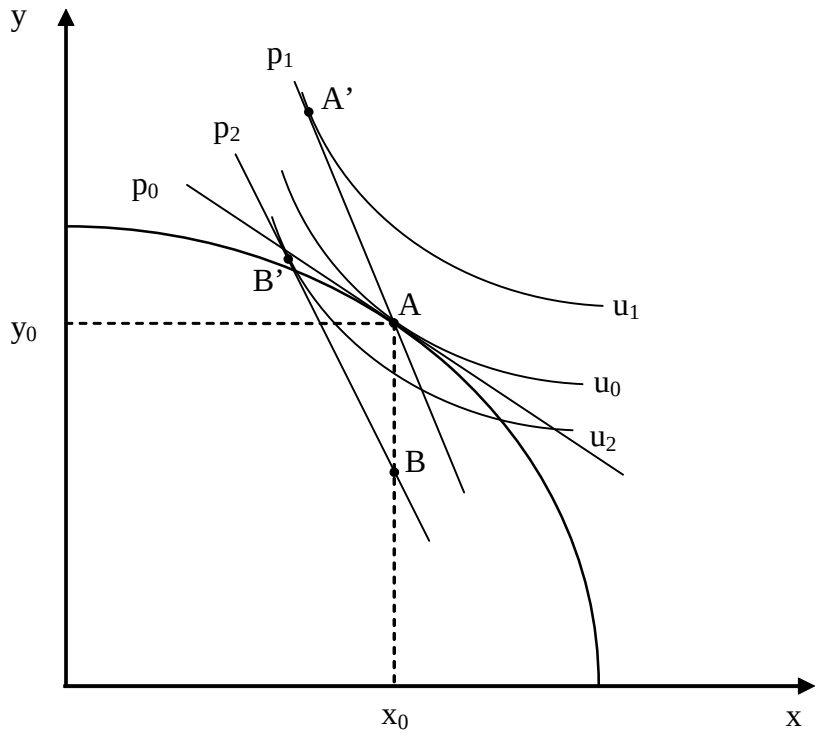
$$\widehat{p}_x - \widehat{p}_y = -\frac{1}{\sigma_D}\left(\widehat{x} - \widehat{y}\right). \tag{6.23}$$

With identical preferences in both jurisdictions and from the fact that $\frac{x}{y} = \gamma\left(\frac{K}{L}\right)$ with $\gamma' > 0$, we know that $\frac{x^H}{y^H} > \frac{x^F}{y^F}$ and hence, $\left(\frac{p_x}{p_y}\right)^H < \left(\frac{p_x}{p_y}\right)^F$ by eq. (6.21). Equivalently, $p_x^H < p_x^F$ and $p_y^H > p_y^F$. From home's perspective, $\widehat{x} - \widehat{y}$ is negative because foreign offers more y relative to x. By eq. (6.23), $\widehat{p}_x - \widehat{p}_y$ must therefore be positive. As relative supply is a function of relative endowments given preferences, we can infer that relative prices change more the more different relative endowments are in both countries and the larger the other country is in terms of absolute endowments. Thus, eq. (6.23) reflects the positive terms of trade effect which increases national welfare. Although production possibilities do not increase in the short run, consumption possibilities are extended as long as full employment prevails.

However, from the previous section it is known that a reduction in p_y generates unemployment in this sector. Thus, $\widehat{y}^H < 0$. With full employment in foreign and $\widehat{x}^F = \widehat{y}^F = 0$, the right side of eq. (6.23) becomes smaller and thus, relative prices change less. The output effect generated by unemployment in home counteracts the first order terms of trade effect and exercises a negative impact on welfare. As the second order effect cannot outweigh the first order effect, the terms of trade effect still remains positive. But there is an additional negative effect: unemployment reduces national income through less production in sector y and consumption possibilities are reduced. The overall effect of trade with rigid wages on home's welfare is therefore ambiguous. However, it is clearly lower than with full employment and free trade. Figure 6.1 illustrates these effects.

A denotes home's long-run autarky equilibrium. This means that factor prices are equated across sectors and the marginal rate of substitution resembles the marginal rate of transformation (MRS=MRT). p_0 indicates relative prices and u_0 social welfare in home. Trade changes relative prices according to the previous analysis and makes

Figure 6.1: Equilibrium in the short run



the relative price line rotate in A. Without unemployment, the economy still produces the same quantities, but international trade increases consumption possibilities along p_1. In this scenario, there are welfare gains from trade. However, gains from specialisation can only accrue in the medium and long run due to an efficient allocation of factors. The trade vector is represented by AA' implying that home exports the capital intensive commodity and imports the labour intensive one. With binding minimum wages output of sector y is reduced according to α and the differences in relative and absolute endowments. Figure 6.1 depicts a case where y is reduced by AB. While the economy produces in B, it consumes in B'. Relative to A both the second order terms of trade as well as the unemployment effect decrease home's welfare. The scenario in the figure depicts a negative net effect.

Finally, how does unemployment affect structural change and trade flows compared to free trade with flexible factor markets? As the minimum wage generates unemploy-

ment, sector y declines while output of sector x remains constant. With flexible labour markets, there would not be any change in the output structure in the short run. We have seen that the change in relative output worsens the terms of trade for home. Hence, the rigid wage country will consume less y for two reasons. Firstly, home's income shrinks and secondly, the price of good y becomes relatively more expensive. Vice versa, foreign benefits from improved terms of trade. Their export good, y, has become more valuable relative to the capital intensive commodity. Thus, they can import more for one unit of exports. The relative price change unambiguously increases the demand for commodity x, which has to be matched by export supply of home.

Result 6.3 *Unemployment in home artificially improves the terms of trade for foreign. This yields excessive import demand. While welfare has clearly declined relative to a flexible wage free trade equilibrium, it is ambiguous whether the net terms of trade effect outweighs the negative unemployment effect in home.*

6.2.2 The medium run

Now, we turn to the medium run and allow workers to be mobile between sectors. Contrary to the short run, a common labour market with a common wage rate emerges. Capital, however, can only be shifted to the other sector in the long run due to changeover costs. Home's economy is described by means of the following equations.

$$c_i\left(w, r_i\right) = a_{Li}w + a_{Ki}r = p_i \tag{6.24}$$

$$a_{Li} = c_w^i\left(w, r_i\right) \tag{6.25}$$

$$a_{Ki} = c_r^i\left(w, r_i\right) \tag{6.26}$$

$$a_{Lx}x + a_{Ly}y + U = \overline{L} \tag{6.27}$$

$$a_{Kx}x = \overline{K}_x \tag{6.28}$$

$$a_{Ky}y = \overline{K}_y \tag{6.29}$$

Eq. (6.24) describes the zero profit conditions for both sectors i, where $i \in \{x, y\}$. $c_i(\cdot)$ are the unit cost functions which have to be equal to the commodity price. Eqs. (6.25) and (6.26) represent the minimum cost inputs for L and K in each sector, where $a_{Lx} = L_x/x$. From Shepard's lemma we know that the cost minimising inputs per unit of output can be derived by differentiating the unit cost function with respect to the relevant input price. Eqs. (6.27), (6.28) and (6.29) reveal the resource constraints. As we allow for unemployment U, the labour market constraint, eq. (6.27), is extended by this variable. On the other hand, capital markets are always cleared. Totally differentiating this set of equations and expressing in rates of change yields

$$\theta_{Li}\widehat{w} + \theta_{Ki}\widehat{r_i} = \widehat{p_i} \tag{6.30}$$

$$\widehat{a}_{Li} = -\theta_{Ki}\sigma_i\left(\widehat{w} - \widehat{r}_i\right) \tag{6.31}$$

$$\widehat{a}_{Ki} = \theta_{Li}\sigma_i\left(\widehat{w} - \widehat{r}_i\right) \tag{6.32}$$

$$\lambda_{Lx}\widehat{x} + \lambda_{Ly}\widehat{y} = \widehat{L} - \widehat{U} - \left(\lambda_{Lx}\widehat{a}_{Lx} + \lambda_{Ly}\widehat{a}_{Ly}\right) \tag{6.33}$$

$$\widehat{x} = \widehat{K}_x - \widehat{a}_{Kx} \tag{6.34}$$

$$\widehat{y} = \widehat{K}_y - \widehat{a}_{Ky} \tag{6.35}$$

Again, the θs denote factor income shares. The λs describe the share of the labour force and the capital stock, respectively, which are absorbed in either sector. σ_i describes the elasticity of factor substitution in sector x and y, respectively. a_{K_i} and a_{L_i} represent factor inputs per unit of output. There are nine equations in nine endogenous variables: r_i, x, y, a_{L_i}, a_{K_i} and either w or U, depending on whether the minimum wage constraint is binding.

Unemployment

Solving for $\widehat{U}$ yields

$$\widehat{U} = \lambda_{L_y} \frac{\sigma_y}{\theta_{K_y}} \left(\widehat{p}_{index} - \widehat{p}_y\right) + \lambda_{L_x} \frac{\sigma_x}{\theta_{K_x}} \left(\widehat{p}_{index} - \widehat{p}_x\right). \tag{6.36}$$

As we have argued in the previous section, p_x rises and p_y falls so that $\widehat{p}_x > \widehat{p}_{index} > \widehat{p}_y$. Therefore, the first term on the right hand side is positive whereas the second term is clearly negative. The unemployment rate, however, can only take positive numbers, of course. Negative values imply that the minimum wage constraint is not binding and market wages settle above the minimum level. α plays a crucial role because the income share spent on the capital intensive good x determines how the price index reacts to price changes. As a thought experiment, take $\alpha = 1$; then $\widehat{p}_{index} = \widehat{p}_x$.[8] The second term in eq. (6.36) would cancel and the first, positive one remains. The difference between $\widehat{p}_{index} = \widehat{p}_x$ and $\widehat{p}_y$ is the maximum difference that is achievable in this setting. Hence, unemployment reaches a maximum if the minimum wage was defined in terms of the capital intensive good. On the other hand, with $\alpha = 0$, that is the minimum wage is defined in terms of the labour intensive commodity, $\widehat{p}_{index} = \widehat{p}_y$ and the first term would cancel. The second term remains. It is negative as $\widehat{p}_y$ is negative and $\widehat{p}_x$ positive. As we have argued before, $\widehat{U}$ cannot take negative values and hence, full employment is sustained. Hence, as $\widehat{p}_{index}$ is monotonically increasing in α, there must be an α^* for which eq. (6.36) becomes zero. Consequently, for all $\alpha \leq \alpha^*$ unemployment is zero.

Proposition 6.2 *If $\alpha \leq \alpha^*$, no unemployment arises in the medium run. For any $\alpha > 0$ unemployment will decline relative to the short run if intersectoral labour mobility is introduced.*

Proof. $\frac{\partial U}{\partial \alpha} = \left(\lambda_{L_y} \frac{\sigma_y}{\theta_{K_y}} + \lambda_{L_x} \frac{\sigma_x}{\theta_{K_x}}\right) \frac{\partial \widehat{p}_{index}}{\partial \alpha} > 0$ as $\frac{\partial \widehat{p}_{index}}{\partial \alpha} > 0$. See Appendix 6.A for details. ■

[8] This should just exemplify the case where the minimum wage is defined in terms of the capital intensive good. Taken literally, however, $\alpha = 1$ would imply that only the capital intensive commodity would be produced.

This result differs from the short run, where any $\alpha > 0$ generates unemployment in the y-sector. In any case, unemployment declines because labour migration from sector y to sector x allows for an efficient allocation given the minimum wage constraint. As the market wage in sector x used to be above the wage floor in the short run, this sector can absorb more employment. As long as the minimum wage remains binding, however, employment in sector y does not change. The additional employment in the capital intensive industry is taken from the pool of unemployed. Equilibrium settles if wages are equated.

Magnification effect

In the specific factors model, the magnification effect[9] is preserved with respect to the fixed factors, but not with respect to the mobile factor if wages are flexible:

$$\widehat{r}_x > \widehat{p}_x > \widehat{w} > \widehat{p}_y > \widehat{r}_y.$$

If unemployment emerges in the medium run, this magnification effect is modified quantitatively, however staying in place qualitatively. The minimum wage influences the demand for labour in both sectors thus yielding different capital-labour ratios and different marginal productivities. Less people will be employed both in the x- and the y-sector relative to a flexible wage scenario. Therefore, the return to capital falls less in the capital intensive industry and declines more in the labour intensive one. Solving the model for $\widehat{r}_x$ and $\widehat{r}_y$ we get

$$\begin{aligned} \widehat{r}_x &= \frac{1}{\Delta}\left\{\left(\lambda_{L_x}\frac{\sigma_x}{\theta_{K_x}} + \lambda_{L_y}\frac{\sigma_y}{\theta_{K_y}}\frac{1}{\theta_{K_x}}\right)\widehat{p}_x - \frac{\theta_{L_x}}{\theta_{K_x}}\lambda_{L_y}\frac{\sigma_y}{\theta_{K_y}}\widehat{p}_y\right\} \\ &\quad + \frac{1}{\Delta}\left\{\frac{\theta_{L_x}}{\theta_{K_x}}\left(\widehat{L} - \widehat{U} - \lambda_{L_x}\widehat{K}_x - \lambda_{L_y}\widehat{K}_y\right)\right\} \end{aligned} \tag{6.37}$$

[9]The terminology goes back to Jones (1965). It states that factor prices change more than goods prices such as $\widehat{r} > \widehat{p}_x > \widehat{p}_y > \widehat{w}$. In the Heckscher-Ohlin framework, the capital return increases in terms of both goods whereas wages decline in terms of both goods if x is the capital intensive good.

and

$$\begin{aligned}\widehat{r}_y &= \frac{1}{\Delta}\left\{\left(\lambda_{L_y}\frac{\sigma_y}{\theta_{K_y}}+\lambda_{L_x}\frac{\sigma_x}{\theta_{K_x}}\frac{1}{\theta_{K_y}}\right)\widehat{p}_y-\frac{\theta_{L_y}}{\theta_{K_y}}\lambda_{L_x}\frac{\sigma_x}{\theta_{K_x}}\widehat{p}_x\right\}\\ &\quad+\frac{1}{\Delta}\left\{\frac{\theta_{L_y}}{\theta_{K_y}}\left(\widehat{L}-\widehat{U}-\lambda_{L_x}\widehat{K}_x-\lambda_{L_y}\widehat{K}_y\right)\right\}, \qquad (6.38)\end{aligned}$$

where $\Delta = \lambda_{L_x}\frac{\sigma_x}{\theta_{K_x}} + \lambda_{L_y}\frac{\sigma_y}{\theta_{K_y}}$, a weighted average of the elasticities of the marginal product curves of labour. Eqs. (6.37) and (6.38) show that in addition to the regular influence of prices on capital returns (which is shown in the first curly bracket), the last term also exercises an influence on the interest rates as $\widehat{U} > 0$. With regard to $\widehat{r}_x$ unemployment reduces the relative change in the return to capital in sector x. In the other sector, capital has to bear a part of the burden generated by the minimum wage. $-\frac{\theta_{L_i}}{\theta_{K_i}}\widehat{U}$ is negative and further reduces the capital return in sector y, while it prevents a higher return to capital in sector x. Comparing both equations, it becomes obvious that unemployment has a stronger influence on $\widehat{r}_y$ than on $\widehat{r}_x$ because $\frac{\theta_{L_x}}{\theta_{K_x}} < \frac{\theta_{L_y}}{\theta_{K_y}}$ due to different input intensities.

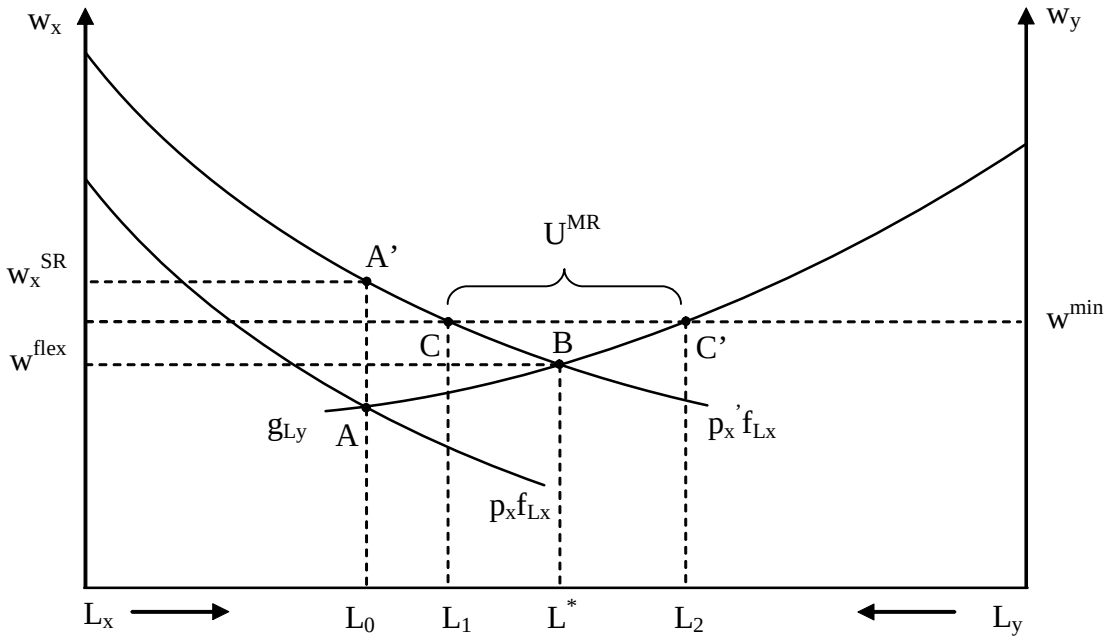
Result 6.4 *Unemployment modifies the magnification effect quantitatively:* $\widehat{r}_x^{flex} > \widehat{r}_x^{rigid}$, $\widehat{r}_y^{flex} < \widehat{r}_y^{rigid}$ *as* $\widehat{w} > \widehat{w}^{flex}$. *However, its qualitative statement remains valid.*

Intuitively, a wage rate above the market clearing level implies a lower demand for labour in both sectors. Hence, with capital being immobile in the medium run, the capital-labour ratio is lower in both the capital and the labour intensive industry. Therefore, marginal value products of capital must be lower relative to a flexible wage scenario.

Figure 6.2 illustrates some of the previous results. The labour force of home is denoted on the horizontal axis, where labour input in sector x is plotted from the left and labour input in sector y from the right hand side. Thereby, the width of the box represents the size of home's labour force. The wage rate, which has to be equal to the marginal value product of labour, can be read from the vertical axes. $p_x f_{L_x}$ and g_{L_y} show the marginal product curves of labour where p_x denotes the relative price of

commodity x in terms of commodity y, whose price is set to unity for this purpose. Autarky is described by the intersection of both curves in A with L_xL_0 units of labour being employed in sector x and L_yL_0 in sector y. Assume that minimum wages are equal to market clearing wages and full employment prevails. Trade changes relative prices so that p_x increases, say by 10 percent. Hence, $p_x f_{L_x}$ shifts up by 10 percent to $p'_x f_{L_x}$.

Figure 6.2: Equilibrium in the medium run



Without labour mobility *(short run)* factor prices would also rise by 10 percent in sector x to fulfill zero profit conditions. This would yield a market wage in sector x of w_x^{SR}. In the short run, equilibrium would be A' and A indicating different marginal value products and hence, different wages. This scenario implies flexible wages. However, a constant real wage matches the nominal wage level $w^{\min}$. As this level has to be equal to g_{L_y} unemployment emerges in the amount L_0L_2. The wage differential between the two sectors is thereby reduced, but remains positive in this case.

If labour mobility is introduced *(medium run)*, workers in sector y are poached by firms in the capital intensive industry. Thereby, the prevailing wage rate in this sector

declines to the wage floor as the capital-labour ratio falls. Due to a more efficient allocation of labour, unemployment is reduced by L_0L_1. Wages converge to $w^{\min}$. Relative inputs are kept on the same level in sector y as emigrating workers are substituted by unemployed workers one by one. Alternatively, the additional employment in sector x is recruited from the pool of unemployed. In any case, unemployment is lower in the medium run.

Structural change

Figure 6.2 also illustrates, how the structure of the economy is influenced through wage rigidity. As described in the previous section, the binding minimum wage prevents a higher demand for labour. Only by employing less workers can their marginal productivity be kept on a high level. Thus, the capital intensive industry will expand by a lower percentage, whereas the labour intensive industry will decline by a higher percentage relative to full employment. This can be seen by solving for the change in output

$$\widehat{x} = \theta_{L_x}\sigma_x\left(\widehat{r}_x - \widehat{w}\right) > 0 \tag{6.39}$$

and

$$\widehat{y} = \theta_{L_y}\sigma_y\left(\widehat{r}_y - \widehat{w}\right) < 0. \tag{6.40}$$

Nothing differs with respect to the direction of change. However, from the modification of the magnification effect we know that $\widehat{r}_x$ is now lower and $\widehat{w}$ higher leading to a lower, although still positive value of $\widehat{x}$. By the same argument, $\widehat{y}$ declines more because $\widehat{r}_y$ becomes more negative and a higher value of $\widehat{w}$ is subtracted from it.

Proposition 6.3 *A binding minimum wage constraint brakes the expansion of the capital intensive industry and leads to a larger decline of the labour intensive sector in the medium run.*

Proof. $\widehat{x}^{flex} > \widehat{x}^{rigid}$, as $\widehat{r}_x^{flex} > \widehat{r}_x^{rigid}$ and $\widehat{w}^{\min} > \widehat{w}^{flex}$ and $\left|\widehat{y}^{flex}\right| < \left|\widehat{y}^{rigid}\right|$, as $\left|\widehat{r}_y^{flex}\right| < \left|\widehat{r}_y^{rigid}\right|$ and $\widehat{w}^{\min} > \widehat{w}^{flex}$. ■

Terms of trade, volume of trade and welfare

In order to be able to say something about terms of trade and trade flows, the change in relative supply is crucial. Subtracting eq. (6.40) from eq. (6.39) and substituting for $\widehat{r}_x$, $\widehat{r}_y$ and $\widehat{w}$ yields

$$\widehat{x} - \widehat{y} = \frac{\lambda_{L_x}\theta_{L_y} + \lambda_{L_y}\theta_{L_x}}{\Delta}\frac{\sigma_x}{\theta_{K_x}}\frac{\sigma_y}{\theta_{K_y}}\left(\widehat{p}_x - \widehat{p}_y\right) - \frac{1}{\Delta}\left(\theta_{L_x}\frac{\sigma_x}{\theta_{K_x}} - \theta_{L_y}\frac{\sigma_y}{\theta_{K_y}}\right)\widehat{U}, \qquad (6.41)$$

where $\widehat{K}_x$, $\widehat{K}_y$ and $\widehat{L}_y$ are set to zero. The coefficient of $(\widehat{p}_x - \widehat{p}_y)$ denotes the elasticity of substitution of the production possibilities frontier indicating the change in relative supply to a change in relative prices. This would be the only effect with flexible factor markets and no international factor movements. With a binding minimum wage, though, an additional unemployment effect sets in. $\widehat{U}$ can be handled in the same way as emigration, that is, a reduction of the labour stock available for the domestic market. Whether unemployment generates a positive or negative effect on relative supply, is ambiguous depending on elasticities. Ignoring the first effect in eq. (6.41), which is always positive for home, relative supply of x will decrease if $\theta_{L_x}\frac{\sigma_x}{\theta_{K_x}} > \theta_{L_y}\frac{\sigma_y}{\theta_{K_y}}$. The θs denote the labour income shares in the two sectors with $\theta_{L_x} < \theta_{L_y}$. The elasticity of the marginal product curve of labour, however, is unknown. With a sufficiently high $\frac{\sigma_x}{\theta_{K_x}}$, more labour needs to leave sector x relative to sector y in order to keep marginal revenue values and thus, the wage rate constant. Hence, output of x will decline more than output of y relative to a flexible wage world.

Returning to the demand side the impact of unemployment on relative supply influences relative prices and thus generates a second order terms of trade effect. As eq. (6.41) reflects, this terms of trade effect is ambiguous. Therefore, the first order terms of trade effect can be further increased or reduced. The unemployment effect, however, is always clearly negative and reduces both production possibilities and welfare. As the terms of trade effect is ambiguous, the change in trade flows relative to a flexible wage scenario is uncertain as well. If the terms of trade improve, home exports less x and imports more y and vice versa.

Result 6.4 *A pathological export boom, which occurs in the long-run Heckscher-Ohlin framework, will not necessarily occur in the medium run. Home only exports too much from a welfare perspective if the elasticity of the marginal product curve of labour is sufficiently low in sector x and relative supply of the capital intensive commodity is reduced via unemployment.*

With regard to welfare, there are two counteracting effects again: the terms of trade effect, which influences welfare in a positive way, and the negative unemployment effect. Again, nothing can be said about which one dominates. Thus, it is unclear whether autarky would be preferable from a welfare perspective. Trivially, though, unemployment decreases welfare relative to free trade with flexible wages.

6.3 Transition to the long run

Finally, we relate this chapter's results to the long-run outcome as is well known from Brecher (1974a), Davis (1998) and Sinn (2005a, 2005b, 2006). As a first step, we compare the short-run results to the case with perfect intersectoral factor mobility.

From the short run to the long run

Recall that $w_x > w_y$ and $r_x > r_y$. Consequently, both labour and capital will move to the high return sector. The wage differential prevails as long as $\alpha > 0$. Unemployment only drives an additional wedge between the capital returns. The incentive for capital owners to shift this factor to the x-sector will therefore be increased and more factors will pathologically be employed in the capital intensive industry.[10]

In the long run, unemployment ensures that world prices will be equal to autarky prices in home. Thus, there is no beneficial terms of trade effect, but a negative unemployment effect only. Starting from short-run equilibrium, both capital and labour will move to sector x. However, due to different factor intensities capital demand rises, whereas labour demand falls. The Stolper-Samuelson effect sets in and can

[10] This terminology goes back to Sinn (2005).

only be prevented by bringing relative goods prices back to the autarky level through unemployment. Hence, unemployment must unambiguously be higher than in the short run. There is clearly a welfare loss and trade flows will be excessive because foreign's terms of trade improve further. While unemployment depends on the income share spent on the capital intensive commodity in the short run, the long-run outcome is independent of how the price index changes.

From the medium run to the long run

A similar line of argumentation holds for the transition from the medium to the long run. With or without unemployment in the medium run, capital employed in sector y has an incentive to shift to the high return capital intensive sector. Again, due to different factor intensities the Stolper-Samuelson effect would be unavoidable if relative goods prices were not brought back to the autarky level. Hence, more unemployment must arise to eliminate the previously positive terms of trade effect and thus, increasing the negative unemployment effect. This causes the transformation curve to shift in.

Result 6.6 *In the long run, unemployment is higher and welfare lower than both in the short and medium run. Thus, capital immobility cushions pressure from global competition when wages are downwardly rigid.*

6.4 Conclusions

This chapter has examined the impact of trade on employment, factor returns, structural change, trade flows and welfare in the presence of rigid wages and (partial) factor immobility. We have distinguished between the short run, where both factors of production, capital and labour, are immobile intersectorally and the medium run, where only labour can move between sectors. The main lesson from this analysis is that factor immobility in a pure trade model cushions the pressure from international competition on national labour markets. The unambiguously detrimental effects of trade with rigid wages that occur in the long run will be less severe in the short and medium run.

We have seen that, in the short run, unemployment only arises in the sector where the commodity price falls. In order to pay higher wages, capital has to bear a part of the burden through lower returns. As real wages are fixed via a price index, preferences determine the rate of unemployment. The higher the income share spent on the capital intensive good, the higher unemployment. A lower level of employment increases relative world supply of the capital intensive good and thereby worsens home's terms of trade. This yields excessive exports. In the medium run, labour mobility guarantees a more efficient allocation of labour and hence, higher marginal productivities. This allows firms to employ more workers and to reduce the national unemployment rate. The change in trade flows in the presence of unemployment crucially depends on the elasticities of the marginal product curves of labour. The terms of trade effect can either be improved or worsened. Hence, no clear statement can be made about the volume of trade. In both the short and the medium run, the impact on welfare is ambiguous as a positive terms of trade effect (which is zero in the long run) is counteracted by a welfare decreasing unemployment effect.

With regard to policy implications, a politically induced slow down of capital mobility could reduce the detrimental long-run effects. However, both intersectoral and international capital flows must be included to retard structural change and still, welfare would be lower than with flexible labour markets. Therefore, labour market reforms to increase wage flexibility should be implemented to reap the benefits of globalisation. Rather than just cutting down or abolishing the minimum wage, smarter reforms could avoid a reduction of real income. Wage supplement schemes have already been mentioned in preceding chapters. Thereby, an efficient labour market outcome can be combined with a socially acceptable net income of workers.[11] As a consequence, the economy as a whole would clearly benefit from global markets.

[11] A more detailed discussion is relegated to Chapter 8.

Appendix

6.A The impact of α on the price index

$$\frac{\partial \widehat{p}_{index}}{\partial \alpha} = \frac{(dp_x - dp_y)(\alpha p_x + (1-\alpha)p_y) - (\alpha dp_x + (1-\alpha)dp_y)(p_x - p_y)}{(\alpha p_x + (1-\alpha)p_y)^2}$$

This expression is larger than zero if

$$(dp_x - dp_y)(\alpha p_x + (1-\alpha)p_y) > (\alpha dp_x + (1-\alpha)dp_y)(p_x - p_y)$$

$$\begin{aligned} \Leftrightarrow \quad & \alpha p_x dp_x - \alpha p_x dp_y + (1-\alpha)p_y dp_x - (1-\alpha)p_y dp_y > \alpha p_x dp_x - \alpha p_x dp_y \\ & + (1-\alpha)p_x dp_y - (1-\alpha)p_y dp_y \end{aligned}$$

$$\Leftrightarrow \; p_y dp_x > p_x dp_y$$

$$\Leftrightarrow \frac{dp_x}{p_x} > \frac{dp_y}{p_y}$$

This condition is fulfilled by assuming that home possesses relatively more capital. Therefore, p_x will rise and p_y will fall in this economy.

6.B Derivation of equations of change

Totally differentiating the zero profit condition for sector x, eq. (6.1), yields

$$w_x da_{L_x} + a_{L_x} dw_x + r_x da_{K_x} + a_{K_x} dr_x = dp_x$$

$$\widehat{a}_{L_x}\frac{a_{L_x}w_x}{p_x} + \widehat{w}_x\frac{a_{L_x}w_x}{p_x} + \widehat{a}_{K_x}\frac{a_{K_x}r_x}{p_x} + \widehat{r}_x\frac{a_{K_x}r_x}{p_x} = \widehat{p}_x$$

$$\theta_{L_x}\widehat{w}_x + \theta_{K_x}\widehat{r}_x = \widehat{p}_x - (\theta_{L_x}\widehat{a}_{L_x} + \theta_{K_x}\widehat{a}_{K_x})$$

Total differentiation of the labour market constraint, eq. (6.2), brings

$$x da_{L_x} + a_{L_x} dx + dU = dL_x$$

$$\widehat{a}_{L_x} \frac{a_{L_x} x}{L_x} + \widehat{x} \frac{a_{L_x} x}{L_x} + \widehat{U}_x = \widehat{L}_x$$

$$\widehat{U}_x = \widehat{L}_x - \widehat{x} - \widehat{a}_{L_x}$$

as $\frac{a_{L_x} x}{L_x} = 1$.

With respect to the capital market constraint, eq. (6.3), we get

$$x da_{K_x} + a_{K_x} dx = dK_x$$

$$\widehat{a}_{L_x} \frac{a_{K_x} x}{K_x} + \widehat{x} \frac{a_{K_x} x}{K_x} = \widehat{K}_x$$

$$\widehat{x} = \widehat{K}_x - \widehat{a}_{L_x},$$

as $\frac{a_{K_x} x}{K_x} = 1$. The same procedure yields the analogous results for sector y and also the equations of change for the medium run.

6.C Derivation of elasticity of substitution

Total differentiation of eq. (6.21) brings

$$\frac{x}{y} (\widehat{x} - \widehat{y}) = \rho' \frac{p_x}{p_y} (\widehat{p}_x - \widehat{p}_y) .$$

Using the definition of the elasticity of substitution between x and y on the demand side

$$\sigma_D = - \frac{\frac{d(x/y)}{x/y}}{\frac{d(p_x/p_y)}{p_x/p_y}} = \rho' \frac{y}{x} \frac{p_x}{p_y}$$

yields

$$\widehat{x} - \widehat{y} = -\sigma_D (\widehat{p}_x - \widehat{p}_y) .$$

Chapter 7

Agglomeration and imperfect labour markets*

This chapter leaves the grounds of pure constant returns to scale framworks and introduces a monopolistic competition sector. Although constant returns to scale models provide answers to a large set of economic questions, they cannot describe the geographical distribution of economic activity. With constant returns to scale, one should observe an equal geographic distribution. This, however, is not the case. The economy rather looks like a "lumpy place".[1] For instance, agglomeration is mirrored in the existence of large metropolitan areas, while the periphery shows less economic activity. As a consequence of this observation, the seminal papers by Krugman (1991), Krugman and Venables (1995), and Venables (1996) have started off a sizable literature on the "new economic geography",determining the agglomeration forces in general equilibrium with trade and international factor mobility. One major interest in this line of research is the analysis of the role of transport costs for the agglomeration of economic activity in the presence of firm-level economies of scale. The conceptual framework for this is also referred to as the core-periphery model (CPM). Forslid (1999) has developed an analytically solvable CPM that has been applied later by Andersson and Forslid (1999), Baldwin and Krugman (2000), and others. Pflüger (2004) provides a

*This chapter is based on Egger and Seidel (2006).

[1] Baldwin et al. (2003), p. 9.

further simplified variant of this model that is based on the assumption of quasi-linear consumer preferences with Dixit and Stiglitz (1977) type differentiated manufactures and a homogeneous agricultural good.

This chapter implements the assumption of rigid labour markets into a core-periphery agglomeration model. The purpose is to study the implications of unemployment for the location decision of firms and thus, the agglomeration pattern in the long run. We model labour market imperfection by means of a fair wage contraint following the seminal paper by Akerlof and Yellen (1990). This approach has gained popularity in the recent trade literature as in Kreickemeier (2004), Kreickemeier and Nelson (2006) and Egger and Kreickemeier (2006) to mention a few examples. By fair wages we mean that workers have preferences for being fairly paid, that is income dispersion should not increase too much. More specifically, workers attribute some weight to the capital owners' remuneration which we assume to be always higher.[2] The reason for this approach is its simplicity. It allows us to determine factor prices and the level of unemployment endogenously in equilibrium without considering a more complex bargaining model.

Despite this justification, we can also find evidence for fair wages. This evidence is based on surveys among managers and workers, on firm-level studies analysing the nexus between wages and employment spell lengths, and on experimental evidence (see Howitt, 2002, and Bewley, 2005, for reviews of the literature). Beyond that, continental European labour markets are characterised by a much more stable dispersion of earnings than the US or the UK over the last 25 years (see OECD, 2004c).[3] The reason for this may be seen in a preference in continental Europe to limit the gap in the wages of high-skilled and low-skilled workers, which comes at the expense of higher unemployment there. The fair wage constraint can also be interpreted in a different way. Alternatively, one might think about the government influencing wage compression by fixing minimum wages relative to capital earnings. One could then talk about fair minimum wages that yield the same outcome if the wage floor is determined in the

[2] Capital may be interpreted either as physical or human capital (skilled labour).

[3] The level of the US and the UK earnings dispersion was already higher than in continental Europe 25 years ago, and it even increased since then.

same way. However, this chapter sticks to the former interpretation.

Fair wage preferences affect relative capital rentals and unemployment rates in the short run, and the agglomeration pattern in the long run. In a first step, we only consider initially symmetric countries. Capital mobility, however, might lead to asymmetries in the long run, of course. We show that a symmetric increase in the fair wage constraint unambiguously decreases both domestic and foreign capital returns. This works via unemployment that reduces demand for both domestic and foreign manufactures. In the long run with two symmetric countries, a full dispersion equilibrium becomes unstable already at a higher level of trade costs than with perfect labour markets. With asymmetric fair wage constraints, workers in one region possess a higher preference for equal remuneration than workers in the other. Then, capital tends to flee the more constrained labour market at intermediate trade costs.

In the next section, we present the model and the fair wage constraint. Section 7.3 describes the short-run equilibrium where both capital and labour are assumed to be internationally immobile. In Section 7.4, we treat capital as mobile and analyse the long-run equilibrium. Section 7.5 concludes with a summary of the most important findings and a brief policy discussion.

7.1 The model

7.1.1 An analytically tractable core-periphery model

The model builds on a variant of the core-periphery agglomeration model. Household utility is characterised by a quasi-linear upper-tier utility function as in Pflüger (2004). There are two sectors, a homogeneous agricultural and a differentiated industrial sector. Consumers are characterised by a love of variety as in Dixit and Stiglitz (1977). Furthermore, there are two countries i and j where two factors are supplied, labour L and capital K, respectively. L is used in the production of both homogeneous and differentiated goods and immobile across borders. K is only used for firm set-up (see

Flam and Helpman, 1987; Pflüger, 2004) and mobile across borders in the long run. L's supply is bound by a fair wage constraint.

There are $L_i + K_i$ households in country i. Labour (capital) owners supply one unit of labour (capital) each. Household preferences in country i are determined by

$$O_i = \alpha \ln C_{Xi} + C_{Yi}, \quad C_{Xi} = \left(\sum_{i=1}^{n_i} x_{ii}^{\frac{\sigma-1}{\sigma}} + \sum_{j=1}^{n_j} x_{ji}^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}, \quad \alpha > 0, \quad \sigma > 1, \quad (7.1)$$

where C_Y is aggregate demand for the agricultural good and C_X is aggregate demand for industrial goods. x_{ii} is demand for a single variety that is locally supplied and x_{ji} denotes demand for a single foreign manufacture. There are n_i (n_j) firms operating in the industrial sector in country i (j). Each firm supplies a single variety. The varieties are substitutable at a constant elasticity σ. Iceberg trade costs impede cross-border transactions of differentiated goods. In particular, producers have to send τ units so that one unit arrives. In equilibrium, the mill price is identical for differentiated goods that are supplied locally and ones that are exported. Accordingly, the consumer price differs between locally sold varieties (the corresponding consumer price in j is p_j) and exported varieties (the price of the same variety for consumers in country i is $p_j\tau$). To simplify the notation, we account already for the fact that all firms producing and supplying at the same market set identical mill prices in equilibrium due to their access to identical technologies and the assumption of symmetric utility (hence, the mill price p_i is identical across all firms producing in i).

Income in country i is determined by

$$E_i = P_i C_{Xi} + C_{Yi}, \quad P_i = \left[n_i p_i^{1-\sigma} + n_j \phi p_j^{1-\sigma} \right]^{\frac{1}{1-\sigma}}, \quad 0 \leq \phi \equiv \tau^{1-\sigma} \leq 1, \quad (7.2)$$

where P_i reflects the CES price index for consumers in country i. Utility maximisation

determines demand and indirect utility, V_i:

$$\begin{aligned} C_{Xi} &= \frac{\alpha}{P_i}, \quad C_{Yi} = E_i - \alpha, \\ x_{ii} &= \alpha p_i^{-\sigma} P_i^{\sigma-1}, \quad x_{ij} = \alpha(\tau p_i)^{-\sigma} P_j^{\sigma-1} \qquad (7.3) \\ V_i &= -\alpha \ln P_i + E_i + \alpha(\ln \alpha - 1). \qquad (7.4) \end{aligned}$$

We adopt the common assumptions that there is perfect competition in sector Y and trade of Y is not subject to any barriers. Production of one unit of the agricultural good requires a single unit of labour such that $Y_i = L_{Yi}$. Choosing the price of the agricultural good as the numéraire then guarantees that wages are $w_i = w_j = 1$ as long as diversification prevails. Market clearing for domestic varieties of the manufacture implies that aggregate supply at the firm level X_i equals aggregate demand of a single variety: X_i.

The production of one unit of the manufacturing good requires c units of labour such that $X_i = L_{Xi}/c$, with $c > 0$. Accordingly, parameter c reflects the marginal costs of producing one unit of manufactures. The production of manufactures is characterised by economies of scale. By assumption, each firm operating in the X-sector of country i has to incur fixed costs r_i associated with the use of a single unit of capital K in firm set-up. Profits of firms are then determined by

$$\pi_i = (p_i - c)X_i - r_i. \qquad (7.5)$$

In equilibrium, mill prices are set so that their relation to variable costs corresponds to a fixed mark-up

$$p_i = c\frac{\sigma}{\sigma - 1}. \qquad (7.6)$$

Equilibrium profits are zero due to free entry which yields equilibrium firm size as[4]

$$\pi_i = \frac{c}{\sigma - 1}X_i - r_i = 0 \quad \Rightarrow X_i = r_i\frac{\sigma - 1}{c}. \qquad (7.7)$$

[4]By applying the zero-profit condition, we neglect the integer problem and treat firm numbers as continuous (see Baldwin, 1988).

7.1.2 The fair wage constraint

In contrast to previous research, supply of labour is elastic in this framework. As indicated before, workers' remuneration is bound by a fair wage constraint. By fair wage we mean that workers attribute some weight to capital's remuneration. Since we focus on the case where the capital rental is higher than the wage rate,[5] the perceived fair wage always exceeds its market clearing counterpart. If employees in country i are paid less than their fair wage, they reduce effort according to the following effort function

$$e_i = \min\left(\frac{w_i}{w_i^*}, 1\right),$$

where w_i is the market wage in country i and w_i^* denotes the fair wage. Normal effort is set to unity. The functional form implies that workers reduce their effort proportionately if the market wage falls short of the fair wage. Hence, effective labour costs cannot be influenced by firms. Firms choose to pay the fair wage if doing so does not diminish their profits. w_i^* is determined by

$$w_i^* = \beta r_i + (1-\beta)(1-U_i)\, w_i. \tag{7.8}$$

The preference for an equal income distribution rises with β, a preference parameter workers attribute to the return to capital.[6] The second component, $(1-U_i)\, w_i$, describes the expected wage of workers outside their firm (where U_i denotes the unemployment rate) and is weighted by $1-\beta$. It is straightforward to show that in equilibrium, the fair wage exceeds the market clearing wage, thus producing unemployment as long as $\beta > 0$. A similar relationship as eq. (7.8) exists for capital owners. However, as their market income always exceeds market clearing wages by assumption, the fair capital return will always be lower than its market clearing counterpart and thus be non-binding. Consequently, capital is always fully employed.[7] Using the equi-

[5] Recall that capital may be associated with skilled labour.

[6] For now, we assume that domestic and foreign workers are identical with respect to their fair wage preferences. This condition will be relaxed in an extension of the model, below.

[7] Again, associating capital with skilled labour, this is consistent with the stylised fact that the risk of becoming unemployed is predominantly important for unskilled labour.

librium outcome and the assumption that workers are always paid their fair wage, we can derive the fair wage constraint as

$$\frac{w_i}{r_i} = \frac{\beta}{\beta + (1-\beta)\,U_i}. \tag{7.9}$$

As long as $\beta > 0$, unemployment arises in equilibrium and exerts a dampening effect on the relative wage-capital-return ratio w_i/r_i. Under diversification, $w_i = 1$ so that the unemployment rate in country i is determined by

$$U_i = \frac{\beta}{1-\beta}\,(r_i - 1)$$

which implies $r_i \in [1, \beta^{-1}]$.

According to our assumptions, the factor constraints in country i are

$$\begin{aligned} K_i &= n_i \\ L_i &= U_i L_i + (1-U_i) L_i \\ &= U_i L_i + \underbrace{a_{Xi} n_i x_i}_{L_{Xi}} + \underbrace{Y_i}_{L_{Yi}}, \end{aligned}$$

where a_{Xi} describes the labour input coefficient for the manufacturing good, that is cL/x_i. For the employed workers, we then obtain[8]

$$(1-U_i)\,L_i = \frac{1-\beta r_i}{1-\beta} L_i. \tag{7.10}$$

In the sequel, we assume countries to be symmetric not only with respect to β, but also with respect to $L_i = L_j \equiv L$. We focus on differences in the allocation of capital $(K_i,\, K_j)$ across economies.

[8] As there is no unemployment benefit in the model, aggregate demand for a single variety is determined by $X_i = ((1-U_i)L_i + K_i)x_{ii} + ((1-U_j)L_j + K_j)\tau x_{ij}$.

7.2 Short-run equilibrium

In the short run, both capital and labour are immobile across borders, but goods can be traded internationally. By using eqs. (7.2), (7.3), (7.5), (7.6) and the condition for employed workers (7.10), zero profits imply that the capital return in country i reads

$$r_i = \frac{\kappa_i}{\sigma\kappa_i + \alpha\widetilde{\beta}L}\left(\frac{\alpha\left(\frac{L}{1-\beta}+K_i\right)}{\kappa_i} + \frac{\phi\alpha\left(\frac{L}{1-\beta}(1-\beta r_j)+K_j\right)}{\kappa_j}\right),$$

where $\widetilde{\beta} = \beta/(1-\beta)$, $\kappa_i = K_i + \phi K_j$ and $\kappa_j = K_j + \phi K_i$. If the fair wage parameter β equals zero, the zero profit condition for the short run boils down to the one in Pflüger (2004) who assumes labour markets to be perfectly flexible.

In the short run, we are interested in the impact of the fair wage constraint on the equilibrium capital rental for a given allocation of capital among countries. We summarise the corresponding findings in the following proposition.

Proposition 7.1 *An increase in β exhibits an unambiguously negative impact on the capital return r_i. There is both a negative direct effect on r_i from an increase in the domestic fair wage parameter and a negative indirect effect from a simultaneous increase abroad.*

Proof. See Appendix 7.A. ■

The intuition is the following. A higher β attributes a higher weight of the capital return to the determination of the fair wage. As the firms always pay the fair wage and we set this wage to unity, a higher fair wage necessarily implies a lower capital return. The reduction in r_i can be inferred from the zero profit condition in eq. (7.5). With $w = 1$, prices are constant and hence, the reduction in r_i causes a decline in demand, partly triggered by unemployment – that is, partly due to fewer workers that are able to purchase varieties of the differentiated good. As firms are faced with both domestic and foreign demand for their product, the decline in demand of one country's households reduces both the domestic and the foreign capital return. The following proposition

states the impact of the fair wage parameter on the domestic unemployment rate and thus sheds further light on this mechanism.

Proposition 7.2 *An increase in β raises world-wide unemployment. While the direct effect of an increase in the domestic fair wage constraint unambiguously increases U_i, the indirect effect lowers domestic unemployment.*

Proof. See Appendix 7.B. ■

The latter effect stems from the fact that a reduction of foreign demand for national varieties can be compensated by more national demand through higher employment. However, the direct impact of an increase in β on domestic unemployment can be eventually overturned by the indirect one from rising fair wage preferences abroad. The direct effect is more likely overturned, the more the foreign capital rental exceeds the domestic one. If $K_i = K_j$, the direct effect always dominates, that is, an increase in β necessarily leads to higher unemployment in two symmetric countries (see Appendix 7.B for further details). However, what matters here is that the effect on world-wide unemployment is positive so that the demand for varieties declines in β as stated before.

So far, capital was assumed to be immobile across borders. In the following long-run perspective, this will be relaxed and our focus is then on the impact of a marginal increase in the fair wage parameter on the pattern of agglomeration.

7.3 Long-run equilibrium

In the long run, we consider a given allocation of capital as being unstable if capital owners would be better off after relocating their firm to the other country. We assume that they will prefer to do so as long as their indirect utility would be higher abroad. Notice that a necessary condition for a long-run equilibrium is that the difference between the indirect utility for capital owners residing in i and the ones in j is zero:

$$V_{Ki} - V_{Kj} = \alpha \ln(P_j/P_i) + (r_i - r_j) = 0.$$

Furthermore, we may rewrite the price indices for countries i and j

$$P_i = \left(\frac{c\sigma}{\sigma-1}\right)(K_i + \phi K_j)^{\frac{1}{1-\sigma}}\,; \qquad \frac{P_j}{P_i} = \left(\frac{\phi K_i + K_j}{K_i + \phi K_j}\right)^{\frac{1}{1-\sigma}}.$$

Using the definition $\lambda \equiv K_i/(K_i + K_j)$, we determine

$$\alpha \ln(P_j/P_i) = \frac{\alpha}{1-\sigma} \ln\left(\frac{\phi\lambda + 1 - \lambda}{\lambda + \phi(1-\lambda)}\right)$$

and define $\rho \equiv L/(K_i + K_j)$ to obtain

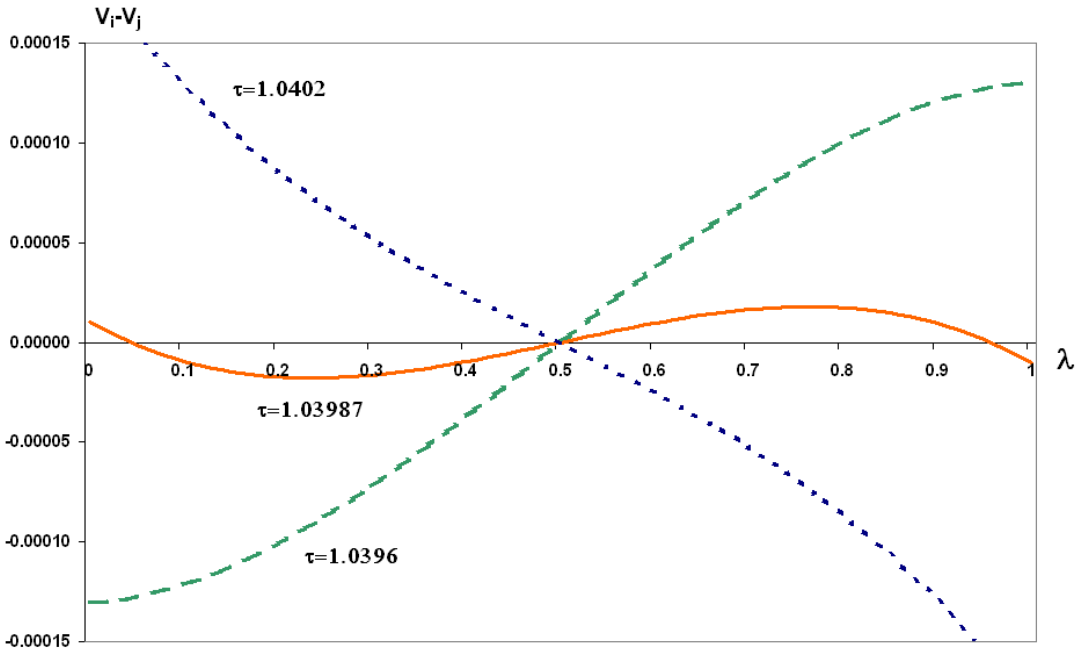
$$\begin{aligned} V_{Ki} - V_{Kj} \;=\; & \frac{\alpha}{1-\sigma} \ln\left(\frac{\phi\lambda + 1 - \lambda}{\lambda + \phi(1-\lambda)}\right) \\ & + \alpha \frac{\sigma(1-\phi)\left[\frac{\rho}{1-\beta}\left[(1-2\lambda)(1-\phi)\right] + \phi(2\lambda - 1)\right]}{\left\{\sigma[\lambda + \phi(1-\lambda)] + \alpha\widetilde{\beta}\rho\right\}\left\{\sigma[\phi\lambda + (1-\lambda)] + \alpha\widetilde{\beta}\rho\right\} - \alpha^2\phi^2\widetilde{\beta}^2\rho^2} \\ & + \alpha \frac{\left(1-\phi^2\right)\alpha\widetilde{\beta}\rho\,(2\lambda - 1)}{\left\{\sigma[\lambda + \phi(1-\lambda)] + \alpha\widetilde{\beta}\rho\right\}\left\{\sigma[\phi\lambda + (1-\lambda)] + \alpha\widetilde{\beta}\rho\right\} - \alpha^2\phi^2\widetilde{\beta}^2\rho^2}. \end{aligned} \tag{7.11}$$

The CPM contains two agglomeration forces and one dispersion force which appear in this setup as well. The first term in eq. (7.11) captures the *price index effect* (or *cost-of-living effect*), which always works in favour of agglomeration. There, an increase in λ is associated with a higher share of firms being active in market i. This lowers the price index because fewer varieties have to be imported. This by itself increases the real capital return, generating a capital inflow and hence, an influx of firms. This price index effect represents the first of the two agglomeration forces in the model.

The second term in eq. (7.11), namely $r_i - r_j$, captures the impact of a change in the allocation of firms λ on the nominal capital return differential. This term is the sum of two effects: the *market access effect* as the second agglomerative force, and the *market crowding effect* as the dispersion force. The market access effect suggests that firms earn higher profits in the larger market. Therefore, a deviation from the symmetric equilibrium with $\lambda = 0.5$ stimulates a further capital outflow to the larger region. The market crowding effect indicates that the agglomeration of firms in one

region implies tougher competition and thus lower capital rentals there. Accordingly, the net effect of the two is ambiguously related to λ, depending on the level of ϕ.

Figure 7.1: Indirect utility differentials for different trade costs, $\beta_i = \beta_j = 0.1$



We need to determine under which circumstances a symmetric equilibrium at $\lambda = 0.5$ (also referred to as *full dispersion*) is stable. Stability of such an equilibrium is achieved if the $V_{Ki} - V_{Kj}$-locus intersects with the abscissa and it is negatively sloped at $\lambda = 0.5$. Then, capital owners in country i do not have an incentive to move one further firm abroad, because they would encounter lower real capital rentals there. However, foreign capital owners would not want to locate one further unit of capital in market i either, because they would then face lower real capital rentals abroad. The stability of the dispersion equilibrium depends on the level of trade costs. This is illustrated in Figure 7.1, where we use similar parameter values as Pflüger (2004), namely $\alpha = 0.3$ and $\sigma = 6$. However, we have to employ a sufficiently high share of labour relative to capital ($\rho = 11$) to ensure that $r_i, r_j \geq 1$. Otherwise, the fair wage constraint would not be binding. Countries are identical in all respects except λ.

According to Figure 7.1, full dispersion is a stable equilibrium at a sufficiently high level of τ, for example, at $\tau = 1.0402$. If trade costs are sufficiently low, the agglomeration forces outweigh the dispersion force and equilibria at $\lambda \neq 0.5$ become stable in the long run. A deviation from the symmetric allocation renders capital owners in the target country better off, thus generating incentives for other firms to follow the initial mover. At very low trade costs full agglomeration becomes stable (at $\lambda = 0$ and $\lambda = 1$). At intermediate trade costs, there are two interior stable equilibria (referred to as partial agglomeration).

By using the condition $\partial \left(V_{Ki} - V_{Kj} \right) / \partial \lambda = 0$, it is possible to determine analytically the highest possible level of trade costs (that is the lowest possible ϕ) which is consistent with a long-run equilibrium $\lambda = 0.5$:

$$\phi^* = \frac{2\left(\sigma - 1\right)\left(\frac{\rho(\sigma - \alpha\beta)}{1-\beta}\right) - \sigma^2 - 4\alpha\widetilde{\beta}\rho\left(\sigma + \alpha\widetilde{\beta}\rho\right)}{2\left(\sigma - 1\right)\left(\sigma + \frac{\rho(\sigma + \alpha\beta)}{1-\beta}\right) + \sigma^2 - 4\alpha^2\widetilde{\beta}^2\rho^2}. \tag{7.12}$$

If we increase ϕ (lower trade costs) any further when starting at ϕ^*, the full dispersion equilibrium is not tenable any more in the long run. Although the determination of ϕ^* is crucial to know whether and where full dispersion is possible in the long run, we do not know yet whether the fair-wage-constrained CPM is still characterised by a supercritical pitchfork bifurcation (hence, whether $\lambda = 0.5$ is a unique long-run equilibrium at ϕ^*). The following proposition provides an answer on this question.

Proposition 7.3 *A supercritical pitchfork bifurcation requires that* $\partial^2 \left(V_{Ki} - V_{Kj} \right) / \partial \lambda^2 \big|_{\phi=\phi^*, \lambda=0.5} = 0$ *and* $\partial^3 \left(V_{Ki} - V_{Kj} \right) / \partial \lambda^3 \big|_{\phi=\phi^*, \lambda=0.5} < 0$. *Whereas* $\partial^2 \left(V_{Ki} - V_{Kj} \right) / \partial \lambda^2 \big|_{\phi=\phi^*, \lambda=0.5} = 0$ *is generally fulfilled in the fair-wage-constrained CPM,* $\partial^3 \left(V_{Ki} - V_{Kj} \right) / \partial \lambda^3 \big|_{\phi=\phi^*, \lambda=0.5} < 0$ *is not. Only the unconstrained model (where* $\beta = 0$*) is necessarily of the supercritical pitchfork bifurcation type. Such a bifurcation arises in the constrained model only if* $\sigma^2 \left(\sigma - 1\right)\left(1 - \phi^2\right)\left(1 + \phi\right)^2 \left(\sigma + \frac{2\alpha\beta\rho}{1-\beta}\right) < \sigma^2 \left(\sigma - 1\right)\left(1 - \phi\right)^4 \left(\sigma + \frac{2\rho\sigma}{1-\beta}\right) + 4\left(1 - \phi\right)^2 \left[\left\{\frac{\sigma}{2}\left(1 + \phi\right) + \alpha\widetilde{\beta}\rho\right\}^2 - \alpha^2\phi^2\widetilde{\beta}^2\rho^2\right]^2$.

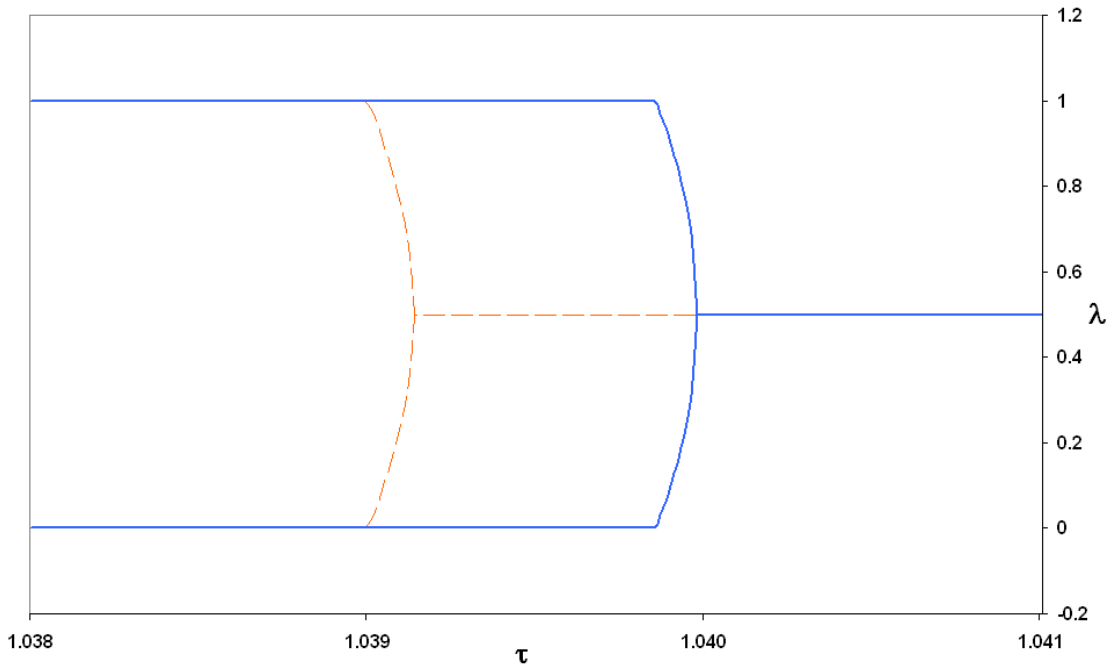
Proof. See Appendix 7.C. ■

Most importantly, we are interested in how the fair wage preference parameter β influences ϕ^*. Hence, we need to determine whether a marginal increase in β fosters agglomeration versus dispersion. We have seen that the corresponding effect on the capital rental in the short run is unambiguously negative. The following proposition sheds light on the relationship between β and ϕ^*.

Proposition 7.4 *The break-point for the full dispersion equilibrium (ϕ^*) is ambiguously related to β in general. However, a marginal increase in the fair wage parameter in an unconstrained initial equilibrium with $\beta = 0$ leads to an unambiguous decline in ϕ^*. Then, a marginal increase in β renders full dispersion at the original level of ϕ^* untenable. In turn, a full dispersion equilibrium can then only be maintained at higher trade costs in the long run.*

Proof. See Appendix 7.D. ■

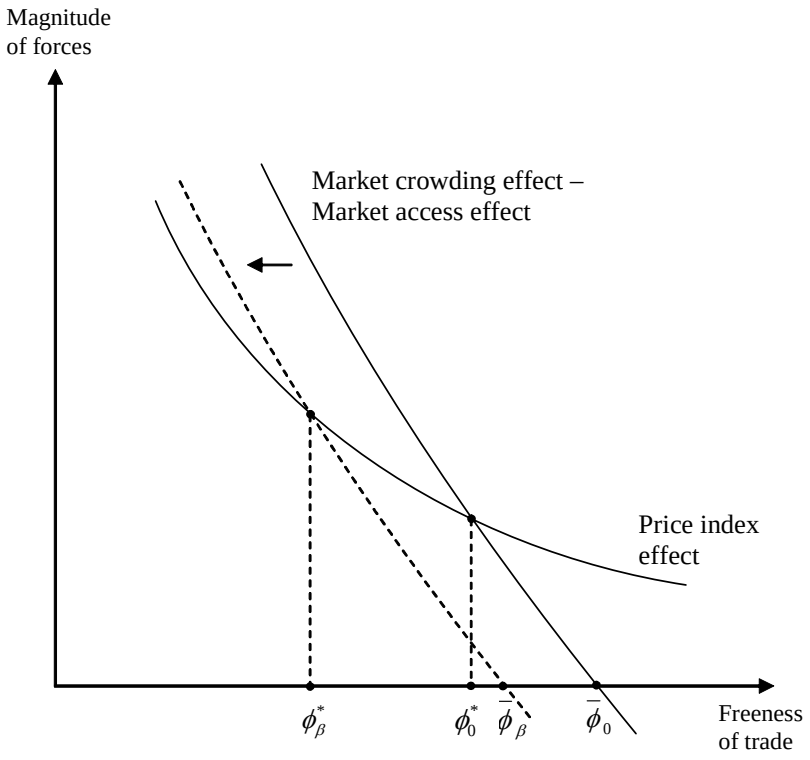
Figure 7.2: Bifurcation diagram for $\beta = 0$ (dashed) and $\beta = 0.1$ (solid)



By extending the exercise of Figure 7.1 in order to cover the entire range of trade costs, one arrives at the bifurcation diagram which depicts all stable long-run equilibria in relation to τ. Figure 7.2 shows simulation results for the identical set of parameters as above whereas the constrained scenario with $\beta = 0.1$ – described by the solid line – is compared to the unconstrained case – described by the dashed line. The diagram clearly illustrates the pitchfork bifurcation for these parameters and shows that the break point shifts towards a higher level of τ as β increases.

The intuition behind this result is the following. Recall that the price index effect works in favour of agglomeration as λ rises. However, an increase in β at $\beta = 0$ will increase $r_i - r_j$ and lead to a reduction of the sensitivity of the capital rental differential with respect to λ. Therefore, the agglomeration forces will dominate the dispersion forces already at higher trade costs. Figure 7.3 sheds further light on their interaction.

Figure 7.3: Agglomeration and dispersion forces in relation to freeness of trade

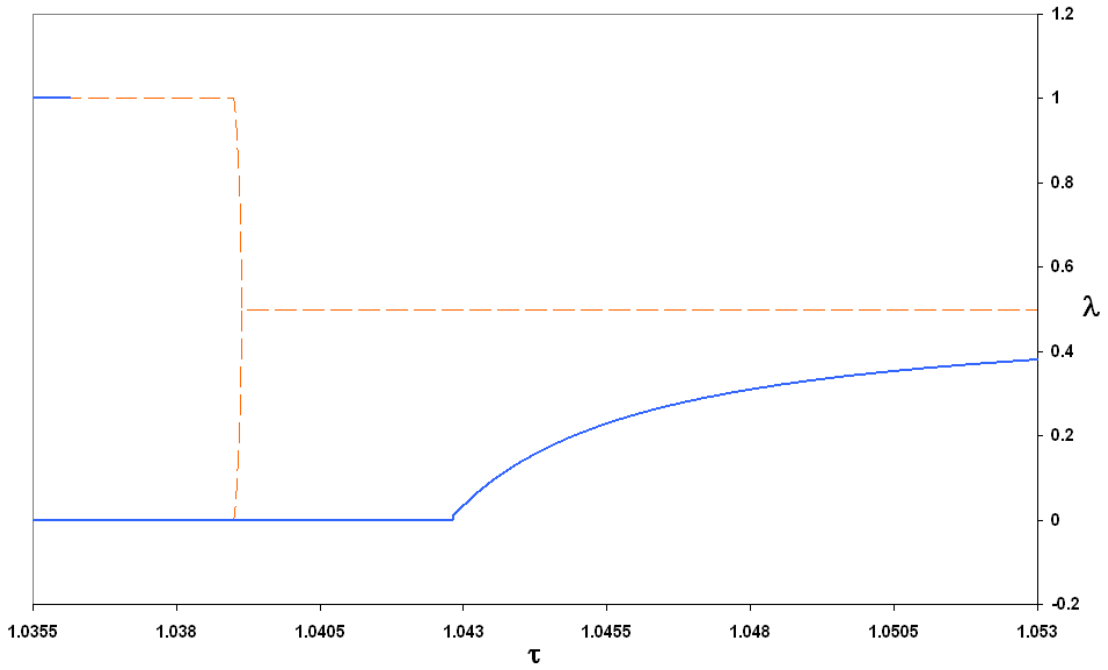


Both agglomeration and dispersion forces decline in ϕ. While the dispersion force generally dominates at a low freeness of trade, there is one well-defined ϕ at which agglomeration forces outweigh the market crowding effect. According to this model, Figure 7.3 illustrates the price index effect (as one agglomeration force) and the sum of market crowding and market access effects (henceforth referred to as the net dispersion force) as two separate loci. With perfect labour markets, ϕ_0^* reflects the break point at which full dispersion is no longer a stable equilibrium. There, the net dispersion force exactly offsets the price index effect. For all $\phi < \phi_0^*$, $\lambda = 0.5$ is stable. The net dispersion force becomes zero at $\overline{\phi}_0$. There, market crowding and market access effects offset each other and the corresponding locus in Figure 7.3 crosses the abscissa. At $\phi = 1$ the magnitude of all forces becomes zero because trade costs do not impede trade any longer. Then, the location of production has no influence on real capital rentals.

Let us now introduce a symmetric fair wage constraint – captured by $\beta > 0$ – starting from an initial equilibrium with $\beta = 0$. This rotates the net dispersion force locus counter-clockwise with its origin remaining at $\phi = 1$. While the price effect does not depend on β, the market crowding effect loses strength relative to the market access effect. This is caused by the compression of capital rentals. Such a marginal increase in β leads to $\phi_\beta^* < \phi_0^*$ where the agglomeration forces exactly offset the dispersion force, and it also leads to $\overline{\phi}_\beta < \overline{\phi}_0$ (see Appendix 7.E for a proof of the latter result).

As a further exercise it is interesting to look at the asymmetric case where one region possesses a stricter fair wage constraint than the other. Although the non-linearities in the model prevent an analytical discussion in this case, we can provide tentative insights by means of numerical simulations. For the above parameters and $\beta_i = 0.1$, $\beta_j = 0$, Figure 7.4 presents the results. Comparing the asymmetric fair wage scenario - again described by the solid lines - to the unconstrained one with $\beta_i = \beta_j = 0$, we find that the fair wage constraint tends to drive capital to the unconstrained country at intermediate trade costs.

Figure 7.4: Bifurcation diagram for $\beta_i = \beta_j = 0$ (dashed) and $\beta_i = 0.1$ and $\beta_j = 0$ (solid)



The intuition behind this outcome is the following. Note that $r_i < r_j$ at $\beta_i > \beta_j = 0$, because a higher fair wage constraint generates more unemployment in this country. This by itself generates an incentive for capital owners to reside in the unconstrained country j. Lower trade costs and, hence, more integrated commodity markets lead to an increasing share of firms locating in country j. Then, only partial or even full agglomeration in j is stable in the long run. The direction of capital mobility is then unambiguous at moderate trade costs and the bifurcation breaks down. Full agglomeration prevails at an even higher level of trade costs than in the symmetric case. Only at extremely low trade costs may full agglomeration prevail even in the fair-wage-constrained country. There, it is not very important where to locate production as trade impediments are negligible. Both agglomerative and dispersive forces settle on a lower level and, thus, the disadvantage of having a fair-wage-constrained labour market loses its severeness.

7.4 Conclusions

This chapter has demonstrated that labour market imperfection as modelled by a fair wage constraint depresses relative capital returns by generating unemployment. With respect to the long-run agglomeration pattern, the depression of capital rentals fosters agglomeration forces. For symmetric countries with equally constrained labour markets, the full dispersion equilibrium becomes unstable already at a higher level of unemployment. More interestingly, if one country has a more constrained labour market, capital will unambiguously be driven towards the less constrained region. This must hold true as a stricter constraint implies lower capital returns due to higher unemployment. Therefore, it is no longer indeterminate where firms agglomerate in the long run.

How can we evaluate these results? What do new economic geography models tell us about the implications of rigid labour markets when globalisation forces operate? For symmetrically endowed countries that possess equally constrained labour markets, the results only change quantitatively (relative to flexible wages). Apart from the fact that the breakpoint will be shifted towards a higher level of trade costs, the pattern of agglomeration does not change. The only difference is that higher unemployment increases relative wages. When it comes to asymmetries with regard to the labour market constraint, though, the picture is less promising. The ambiguity of where firms locate in the long run vanishes. The country with the more constrained labour market will by no means form the core. Hence, it has to pay higher prices for manufacturing goods as they have to be imported from abroad and clearly experiences a deterioration of income. Comparing this result to the message of constant returns to scale models in previous chapters, it turns out that there is no fundamental difference. In both frameworks, a more rigid labour market causes (more) capital to flee the country, thereby causing a deterioration in real income.

Appendix

7.A Proof of Proposition 7.1

Appendix 7.A lays out the proof of Proposition 7.1.

$$\frac{\partial r_i}{\partial \beta} = \frac{\left(\alpha L \sigma \kappa_j + \alpha^2 \widetilde{\beta} L^2\right)\left(1-\phi^2\right)\frac{1-r_i}{(1-\beta)^2} + \phi\alpha L\sigma\kappa_i \frac{1-r_j}{(1-\beta)^2}}{\left(\sigma\kappa_i + \alpha\widetilde{\beta}L\right)\left(\sigma\kappa_j + \alpha\widetilde{\beta}L\right) - \phi^2\alpha^2\widetilde{\beta}^2 L^2} < 0$$

$\partial r_i/\partial\beta$ is unambiguously negative as both r_i and r_j must be larger than one by assumption. This result stems from the fact that both the direct domestic and the indirect foreign effect point in the same direction:

$$\frac{\partial r_i}{\partial \beta_i} = \frac{1-r_i}{(1-\beta_i)^2} \frac{\alpha L\sigma\kappa_j + \alpha^2\widetilde{\beta}_j L^2\left(1-\phi^2\right)}{\left(\sigma\kappa_i + \alpha\widetilde{\beta}_i L\right)\left(\sigma\kappa_j + \alpha\widetilde{\beta}_j L\right) - \phi^2\alpha^2\widetilde{\beta}_i\widetilde{\beta}_j L^2} < 0$$

and

$$\frac{\partial r_i}{\partial \beta_j} = \frac{1-r_j}{\left(1-\beta_j\right)^2} \frac{\phi\alpha L\sigma\kappa_i}{\left(\sigma\kappa_i + \alpha\widetilde{\beta}_i L\right)\left(\sigma\kappa_j + \alpha\widetilde{\beta}_j L\right) - \phi^2\alpha^2\widetilde{\beta}_i\widetilde{\beta}_j L^2} \leq 0.$$

The indirect effect from an increase in the foreign fair wage parameter only exhibits a negative impact on r_i if trade costs are not prohibitively high, that is $\phi > 0$.■

7.B Proof of Proposition 7.2

In Appendix 7.B, we determine the impact of fair wage preferences on the unemployment rate U_i.

$$\frac{\partial U_i}{\partial \beta} = \frac{\left(\sigma^2\kappa_i\kappa_j + \alpha\widetilde{\beta}L\sigma\kappa_i\right)\frac{r_i-1}{(1-\beta)^2} - \phi\alpha\widetilde{\beta}L\sigma\kappa_i\frac{r_j-1}{(1-\beta)^2}}{\left(\sigma\kappa_i + \alpha\widetilde{\beta}L\right)\left(\sigma\kappa_j + \alpha\widetilde{\beta}L\right) - \phi^2\alpha^2\widetilde{\beta}^2 L^2} \lesseqgtr 0$$

The impact of a simultaneous rise in both β_i and β_j on home's unemployment rate is

positive iff

$$\left(\sigma^2\kappa_i\kappa_j + \alpha\widetilde{\beta}L\sigma\kappa_i\right)(r_i - 1) - \phi\alpha\widetilde{\beta}L\sigma\kappa_i\,(r_j - 1) > 0,$$

that is if the positive direct effect

$$\begin{aligned}\frac{\partial U_i}{\partial \beta_i} &= \frac{r_i - 1}{(1-\beta_i)^2} + \widetilde{\beta}_i\frac{\partial r_i}{\partial \beta_i} \\ &= \frac{r_i - 1}{(1-\beta_i)^2}\frac{\sigma^2\kappa_i\kappa_j + \alpha\widetilde{\beta}_j L\sigma\kappa_i}{\left(\sigma\kappa_i + \alpha\widetilde{\beta}_i L\right)\left(\sigma\kappa_j + \alpha\widetilde{\beta}_j L\right) - \phi^2\alpha^2\widetilde{\beta}_i\widetilde{\beta}_j L^2} > 0\end{aligned}$$

outweighs the indirect effect

$$\begin{aligned}\frac{\partial U_i}{\partial \beta_j} &= \widetilde{\beta}_i\frac{\partial r_i}{\partial \beta_j} \\ &= -\frac{r_j - 1}{\left(1-\beta_j\right)^2}\frac{\phi\alpha\widetilde{\beta}_i L\sigma\kappa_i}{\left(\sigma\kappa_i + \alpha\widetilde{\beta}_i L\right)\left(\sigma\kappa_j + \alpha\widetilde{\beta}_j L\right) - \phi^2\alpha^2\widetilde{\beta}_i\widetilde{\beta}_j L^2} \leq 0.\end{aligned}$$

■

7.C Proof of Proposition 7.3

In Appendix 7.C, we derive the second and third derivatives of the country i-based capital owners' indirect utility differential with respect to λ. For the subsequent derivations, it will be useful to define

$$
\begin{aligned}
T_{1i} &\equiv \alpha \ln(P_j/P_i) = \frac{\alpha}{1-\sigma} \ln\left(\frac{\phi\lambda + 1 - \lambda}{\lambda + \phi(1-\lambda)}\right) \\
T_{2i} &\equiv \frac{\alpha}{\left\{\sigma[\lambda + \phi(1-\lambda)] + \alpha\widetilde{\beta}\rho\right\}\left\{\sigma[\phi\lambda + 1 - \lambda] + \alpha\widetilde{\beta}\rho\right\} - \alpha^2\phi^2\widetilde{\beta}^2\rho^2} \\
T_{3i} &\equiv \left(\frac{\rho}{1-\beta} + \lambda\right)\left(\sigma\left[\phi\lambda + 1 - \lambda\right] + \left(1-\phi^2\right)\alpha\widetilde{\beta}\rho\right) \\
&\quad + \left(\frac{\rho}{1-\beta} + 1 - \lambda\right)\phi\sigma\left[\lambda + \phi(1-\lambda)\right] \\
T_{3j} &\equiv \left(\frac{\rho}{1-\beta} + 1 - \lambda\right)\left(\sigma\left[\lambda + \phi(1-\lambda)\right] + \left(1-\phi^2\right)\alpha\widetilde{\beta}\rho\right) \\
&\quad + \left(\frac{\rho}{1-\beta} + \lambda\right)\phi\sigma\left[\phi\lambda + (1-\lambda)\right]
\end{aligned}
$$

Note that

$$
\frac{\partial^2\left(V_{Ki} - V_{Kj}\right)}{\partial\lambda^2} = \frac{\partial^2 T_{1i}}{\partial\lambda^2} + \frac{\partial^2 T_{2i}}{\partial\lambda^2}\left(T_{3i} - T_{3j}\right) + 2\frac{\partial T_{2i}}{\partial\lambda}\frac{\partial\left(T_{3i} - T_{3j}\right)}{\partial\lambda} + T_{2i}\frac{\partial^2\left(T_{3i} - T_{3j}\right)}{\partial\lambda^2}
$$

Furthermore, we have

$$
\begin{aligned}
\frac{\partial^2 T_{1i}}{\partial\lambda^2} &= -\frac{\alpha}{1-\sigma}\frac{\left(1-\phi\right)^4\left(1-2\lambda\right)}{\left\{\left[\lambda + \phi\left(1-\lambda\right)\right]\left[\phi\lambda + 1 - \lambda\right]\right\}^2} \Longrightarrow \\
\left.\frac{\partial^2 T_{1i}}{\partial\lambda^2}\right|_{\lambda=0.5} &> 0 \\
\left.T_{3i}\right|_{\lambda=0.5} &= \left.T_{3j}\right|_{\lambda=0.5} \Longrightarrow \\
\left.\frac{\partial^2 T_{2i}}{\partial\lambda^2}\left(T_{3i} - T_{3j}\right)\right|_{\lambda=0.5} &= 0
\end{aligned}
$$

$$
\frac{\partial T_{2i}}{\partial\lambda}\frac{\partial\left(T_{3i} - T_{3j}\right)}{\partial\lambda} = -\frac{\alpha\sigma^2\left(1-\phi\right)^2\left[1-2\lambda\right]\left[\left(1-\phi^2\right)\left[\sigma + 2\alpha\widetilde{\beta}\rho\right] - \left(1-\phi\right)^2\left(\frac{2\rho\sigma}{1-\beta} + \sigma\right)\right]}{\left[\left\{\sigma[\lambda + \phi(1-\lambda)] + \alpha\widetilde{\beta}\rho\right\}\left\{\sigma[\phi\lambda + 1 - \lambda] + \alpha\widetilde{\beta}\rho\right\} - \alpha^2\phi^2\widetilde{\beta}^2\rho^2\right]^2}
$$

$$
\Longrightarrow 2\frac{\partial T_{2i}}{\partial\lambda}\left.\frac{\partial\left(T_{3i} - T_{3j}\right)}{\partial\lambda}\right|_{\lambda=0.5} = 0
$$

$$
T_{2i}\frac{\partial^2\left(T_{3i} - T_{3j}\right)}{\partial\lambda^2} = 0
$$

Hence, $\left.\partial^2\left(V_{Ki} - V_{Kj}\right)/\partial\lambda^2\right|_{\lambda=0.5} = 0$.

Analogously, we can determine

$$\left.\frac{\partial^3\left(V_{Ki}-V_{Kj}\right)}{\partial\lambda^3}\right|_{\lambda=0.5} = \frac{\alpha}{1-\sigma}\frac{8\left(1-\phi\right)^4}{\left(1+\phi\right)^2} + \frac{2\alpha\sigma^2\left(1-\phi\right)^2\left[\left(1-\phi^2\right)\left(\sigma+2\alpha\widetilde{\beta}\rho\right)-\left(1-\phi\right)^2\left(\frac{2\rho\sigma}{1-\beta}+\sigma\right)\right]}{\left[\left\{\frac{\sigma}{2}\left(1+\phi\right)+\alpha\widetilde{\beta}\rho\right\}^2-\alpha^2\phi^2\widetilde{\beta}^2\rho^2\right]^2}$$

$$\left.\frac{\partial^3\left(V_{Ki}-V_{Kj}\right)}{\partial\lambda^3}\right|_{\lambda=0.5} < 0 \Longleftrightarrow$$

$$\frac{\sigma^2\left(\sigma-1\right)\left(1-\phi^2\right)\left(\sigma+\frac{2a\beta\rho}{1-\beta}\right)}{\left[\left\{\frac{\sigma}{2}\left(1+\phi\right)+\alpha\widetilde{\beta}\rho\right\}^2-\alpha^2\phi^2\widetilde{\beta}^2\rho^2\right]^2} < \frac{\sigma^2\left(\sigma-1\right)\left(1-\phi\right)^2\left(\sigma+\frac{2\rho\sigma}{1-\beta}\right)}{\left[\left\{\frac{\sigma}{2}\left(1+\phi\right)+\alpha\widetilde{\beta}\rho\right\}^2-\alpha^2\phi^2\widetilde{\beta}^2\rho^2\right]^2} + \frac{4\left(1-\phi\right)^2}{\left(1+\phi\right)^2}$$

$$\begin{aligned} & \sigma^2\left(\sigma-1\right)\left(1-\phi^2\right)\left(1+\phi\right)^2\left(\sigma+\frac{2a\beta\rho}{1-\beta}\right) \\ < \; & \sigma^2\left(\sigma-1\right)\left(1-\phi\right)^4\left(\sigma+\frac{2\rho\sigma}{1-\beta}\right) \\ & +4\left(1-\phi\right)^2\left[\left\{\frac{\sigma}{2}\left(1+\phi\right)+\alpha\widetilde{\beta}\rho\right\}^2-\alpha^2\phi^2\widetilde{\beta}^2\rho^2\right]^2 \end{aligned}$$

For $\beta = 0$, we obtain

$$\left.\frac{\partial^3\left(V_{Ki}-V_{Kj}\right)}{\partial\lambda^3}\right|_{\lambda=0.5,\beta=0} = \frac{1}{1-\sigma}\frac{8\left(1-\phi\right)^4}{\left(1+\phi\right)^2} + \frac{8\sigma^2\left(1-\phi\right)^2\left[\left(1-\phi^2\right)\sigma-\left(1-\phi\right)^2\sigma\left(2\rho+1\right)\right]}{\sigma^2\left(1+\phi\right)^4}$$

There, $\partial^3\left(V_{Ki}-V_{Kj}\right)/\partial\lambda^3 < 0$ requires

$$\begin{aligned} \sigma\left(\sigma-1\right)\left(1+\phi\right) & < \left(1-\phi\right)\sigma\left(\sigma-1\right)\left(2\rho+1\right)+\left(1-\phi\right)\left(1+\phi\right)^2 \\ & \Longrightarrow \; -2\sigma\left(\sigma-1\right)\left[\phi\left(1+\rho\right)-\rho\right] < \left(1-\phi\right)\left(1+\phi\right)^2 \end{aligned}$$

Inserting ϕ^* at $\beta = 0$, we derive

$$-\frac{\sigma\left(2\rho+1\right)}{2\left(\sigma-1\right)\left(1+\rho\right)+\sigma} < \left(1-\phi\right)\left(1+\phi\right)^2$$

which is generally fulfilled. Hence, the unconstrained CPM is characterised by a supercritical pitchfork bifurcation, but the fair-wage-constrained one is not in general. Hence, the fair wage constrained CPM exhibits a supercritical pitchfork bifurcation pattern only in the neighbourhood of $\beta = 0$. At high levels of β both full dispersion and full agglomeration may be an equilibrium at a given level of ϕ^* (hence, there may be three stable equilibria at this and higher levels of trade costs).■

7.D Proof of Proposition 7.4

In Appendix 7.D, we derive the sign of $\partial\phi^*/\partial\beta$:

$$\frac{\partial\phi^*}{\partial\beta} = \frac{\frac{2(\sigma-1)\rho(\sigma-\alpha)-4\sigma\alpha\rho-8\alpha^2\widetilde{\beta}\rho^2}{(1-\beta)^2}\left[2\left(\sigma-1\right)\left(\sigma+\frac{\rho(\sigma+\alpha\beta)}{1-\beta}\right)+\sigma^2-4\alpha^2\widetilde{\beta}^2\rho^2\right]}{\left[2\left(\sigma-1\right)\left(\sigma+\frac{\rho(\sigma+\alpha\beta)}{1-\beta}\right)+\sigma^2-4\alpha^2\widetilde{\beta}^2\rho^2\right]^2} - \frac{\frac{2(\sigma-1)\rho(\sigma+\alpha)-8\alpha^2\widetilde{\beta}\rho^2}{(1-\beta)^2}\left[2\left(\sigma-1\right)\left(\frac{\rho(\sigma-\alpha\beta)}{1-\beta}\right)-\sigma^2-4\alpha\widetilde{\beta}\rho\left(\sigma+\alpha\widetilde{\beta}\rho\right)\right]}{\left[2\left(\sigma-1\right)\left(\sigma+\frac{\rho(\sigma+\alpha\beta)}{1-\beta}\right)+\sigma^2-4\alpha^2\widetilde{\beta}^2\rho^2\right]^2}$$

In general, $\partial\phi^*/\partial\beta$ is ambiguous. However, it is useful to evaluate $\partial\phi^*/\partial\beta$ at $\beta = 0$ to derive

$$\left.\frac{\partial\phi^*}{\partial\beta}\right|_{\beta=0} = \frac{\left[2\left(\sigma-1\right)\sigma\left(\rho+1\right)+\sigma^2\right]\left[2\left(\sigma-1\right)\rho\left(\sigma-\alpha\right)-4\alpha\sigma\rho\right]}{\left[2\left(\sigma-1\right)\sigma\left(\rho+1\right)+\sigma^2\right]^2} - \frac{\left[2\left(\sigma-1\right)\sigma\rho-\sigma^2\right]\left[2\left(\sigma-1\right)\rho\left(\sigma+\alpha\right)\right]}{\left[2\left(\sigma-1\right)\sigma\left(\rho+1\right)+\sigma^2\right]^2}.$$

Still, the sign of $\partial\phi^*/\partial\beta|_{\beta=0}$ is not obvious. However, it can be determined after taking into account the following three conditions.

First, diversification of production in equilibrium requires

$$\begin{aligned} \frac{\rho}{(\sigma-1)} &> r = \frac{\alpha(2\rho+1)}{\sigma} \Longrightarrow \\ \alpha &< \frac{\rho\sigma}{(\sigma-1)(2\rho+1)}. \end{aligned}$$

Second, r must be at least as high as unity for the fair wage approach to be meaningful:

$$\begin{aligned} r &= \frac{\alpha(2\rho+1)}{\sigma} > 1 \Longrightarrow \\ \alpha &> \frac{\sigma}{2\rho+1}. \end{aligned}$$

Hence, for α we know that

$$\frac{\sigma}{2\rho+1} < \alpha < \frac{\rho\sigma}{(\sigma-1)(2\rho+1)}.$$

Whereas $\phi^* \leq 1$ is an unbinding constraint, a third condition emerges from $0 \leq \phi^*$, which yields

$$\rho \geq \frac{\sigma}{2(\sigma-1)}.$$

Note that $\partial\phi^*/\partial\beta|_{\beta=0} < 0$ requires

$$[2(\sigma-1)(\rho+1)+\sigma][(\sigma-1)(\sigma-\alpha)-2\alpha\sigma] < [2(\sigma-1)\rho-\sigma][(\sigma-1)(\sigma+\alpha)].$$

Subtracting $2(\sigma-1)\rho(\sigma-1)\sigma$ from both sides yields

$$\begin{aligned} & 2(\sigma-1)^2\sigma - 2(\sigma-1)^2(\rho+1)\alpha \\ & +\sigma(\sigma-1)(\sigma-\alpha) - 4\alpha\sigma(\sigma-1)(\rho+1) - 2\alpha\sigma^2 \\ < \; & 2(\sigma-1)^2\alpha\rho - \sigma(\sigma-1)(\sigma+\alpha). \end{aligned}$$

By rearranging and collecting all α-terms, we derive

$$\begin{aligned} & 2(\sigma-1)^2\sigma + 2(\sigma-1)\sigma^2 \\ < \; & \alpha\left[2(\sigma-1)^2(\rho+1) + 4\sigma(\sigma-1)(\rho+1) + 2\sigma^2 + 2(\sigma-1)^2\rho\right]. \end{aligned}$$

Hence,

$$\alpha > \frac{(\sigma-1)^2\sigma + (\sigma-1)\sigma^2}{(\sigma-1)^2(\rho+1) + 2\sigma(\sigma-1)(\rho+1) + \sigma^2 + (\sigma-1)^2\rho}.$$

The second condition ($r > 1$) must hold, so that it is sufficient to show that

$$\frac{(\sigma-1)^2\sigma + (\sigma-1)\sigma^2}{(\sigma-1)^2(\rho+1) + 2\sigma(\sigma-1)(\rho+1) + \sigma^2 + (\sigma-1)^2\rho} < \frac{\sigma}{2\rho+1}$$

which holds if

$$\begin{aligned} & \left[(\sigma-1)^2 + (\sigma-1)\sigma\right](2\rho+1) \\ < \; & (\sigma-1)^2(2\rho+1) + 2\sigma(\sigma-1)(\rho+1) + \sigma^2 \end{aligned}$$

$$\Leftrightarrow (\sigma-1)\sigma(2\rho+1) - 2\sigma(\sigma-1)(\rho+1) - \sigma^2 < 0$$

$$\Leftrightarrow -\sigma(\sigma-1) - \sigma^2 < 0.$$

Hence, a marginal increase of β in an initial equilibrium with $\beta = 0$ generally shifts the break-point towards higher levels of trade costs, that is $\partial\phi^*/\partial\beta|_{\beta=0} < 0$.■

7.E Proof of $\partial\overline{\phi}/\partial\beta < 0$

In Appendix 7.E, we derive $\overline{\phi}$ (the value of ϕ where the market crowding effect exactly offsets the market access effect in $r_i - r_j$) and the sign of $\partial\overline{\phi}/\partial\beta$. Note that

$$\frac{\partial(r_i - r_j)}{\partial\lambda} = \alpha\frac{\left(1-\phi^2\right)\left(\sigma + 2\alpha\widetilde{\beta}\rho\right) - \left(\frac{2\rho}{1-\beta}+1\right)\sigma(1-\phi)^2}{\left[\frac{\sigma}{2}(1+\phi) + \alpha\widetilde{\beta}\rho\right]^2 - \alpha^2\phi^2\widetilde{\beta}^2\rho^2} = 0$$

at

$$\overline{\phi} = \rho\frac{\sigma - \alpha\beta}{\sigma(1-\beta+\rho) + \alpha\beta\rho}$$

Then,

$$\begin{aligned}\frac{\partial\overline{\phi}}{\partial\beta} &= -\rho\frac{\alpha\left[\sigma\left(1-\beta+\rho\right)+\alpha\beta\rho\right]+\left(\sigma-\alpha\beta\right)\left(\alpha\rho-\sigma\right)}{\left[\sigma\left(1-\beta+\rho\right)+\alpha\beta\rho\right]^{2}} \\ &= -\rho\sigma\frac{\left(2\rho+1\right)\alpha-\sigma}{\left[\sigma\left(1-\beta+\rho\right)+\alpha\beta\rho\right]^{2}}.\end{aligned}$$

Note that $\partial\overline{\phi}/\partial\beta < 0$ requires that $\alpha > \sigma/\left(2\rho+1\right)$ which holds generally whenever $r_i, r_j > 1$ at $\beta = 0$.■

Chapter 8

Conclusions and policy implications

The preceding analysis has generated one overarching result: rigid labour markets do not only prevent efficiency gains from globalisation, but they also deteriorate a country's performance relative to autarky. The reason is that structural change, which is required by global market forces, does not take place efficiently if the labour market cannot absorb this shock, that is, if the wage pattern cannot adjust to maintain current employment levels. Instead, unemployment emerges as the residual adjustment mechanism. Only a functioning labour market can assure gains from globalisation because workers have to be shifted to the internationally more competitive sector. For a capital abundant economy, for instance, this would be the capital intensive export industry. If, however, rigidities prevent such an efficient re-allocation, the economic pattern of the economy becomes distorted and welfare gains cannot be realised. An efficient structural change ensuring full employment all the time, constitutes the root for these gains. Following this logic, it is not surprising that a rigid wage country cannot benefit if this root is cut.

It turned out that this basic result holds in various theoretical frameworks. With respect to constant returns to scale models, both trade and factor mobility generally exhibit factor price convergence in a frictionless world. As long as a rigid wage economy is not too small relative to the rest of the world, factor prices still equate. Then, however, wages and interest rates are equated at the autarky price level of the rigid

wage economy. Of course, this can only be ensured by sufficiently high unemployment levels.

By means of a simple one sector model with factor mobility, Chapter 4 has shown that both capital and labour movements become pathologically too high if wages are prevented from adjustment. Either too much capital is driven out of the rigid wage country compared to a flexible wage scenario, or the incentive for immigration is kept upright due to a higher domestic real wage, thus generating excess immigration. One must call these excessive factor flows pathological because the emerging unemployment leads to a marginal reduction in output. Ironically, workers who should be protected by the rigid wage legislation have to bear this loss themselves. To make the picture even darker, distorting taxes might drive the entire capital out of this country if labour refuses to bear a part of the tax burden through lower disposable income. It is alarming that simple models which are widely used to argue in favour of globalisation's beneficial effects, produce such extreme results.

These pronounced findings hold in more complex setups as well. Chapter 5 extended the analysis to a two sector model that allowed the analysis of both factor mobility and trade. It turned out that factor mobility yields exactly the same outcome as in Chapter 4 with just one sector. With regard to commodity trade, we illustrated that trade flows are inflated artifically by rigid wages as long as factor price equalisation prevails. This outcome may not be too surprising as trade and factor mobility can be regarded as perfect substitutes. However, the rigid wage country must be large enough to avoid full specialisation despite high unemployment rates. For small open economies, defending high wages unambiguously leads to full specialisation and a significantly lower output level relative to large countries. Then, however, factor prices would diverge between countries exerting some protection. Nevertheless, this protection vanishes if one allows for factor mobility in addition. The end of the story resembles the one with factor mobility alone. The entire domestic labour force will be driven into unemployment. That implies that either the entire capital stock is driven out of the country or foreign workers have crowded out domestic ones to be employed jointly with home's capital

stock. Of course, we do not claim that these results serve as an appropriate description of reality. Nevertheless, the simple models nicely show the detrimental impact of rigid wages in an open economy.

A central criticism of the Heckscher-Ohlin model states that inter-industry factor mobility within countries might only be fulfilled in the long run. In the short run, however, factors might be mobile to different degrees. In other words, factors might be sector-specific in the short or medium run. To get an idea about the effects of rigid wages in the shorter time perspective, Chapter 6 implemented minimum wages into a specific factors model. By assuming capital to be less mobile than labour between sectors in the medium run, it turned out that the detrimental long-run outcomes are less severe.

Chapter 7 left the ground of a pure, constant returns to scale framework by studying the effect of imperfect labour markets in a new economic geography setup. These models usually describe a perfectly competitive agricultural next to a monopolistic competition manufacturing sector with increasing returns to scale. The labour market imperfection was modelled by means of a fair wage constraint. This means that workers have a preference for being paid a fair wage that is determined relative to the remuneration of capital. The higher their preference for fair wages, the higher the relative wage will be. Of course, this comes at the cost of unemployment. Concerning symmetric fair wage constraints and identical countries, the model revealed that agglomerative forces become dominant already at a higher level of trade costs. In other words, rigid labour markets foster capital agglomeration. With asymmetric labour market imperfections, simulations have shown that capital is driven out of the more constrained region already at intermediate transport costs. Hence, the country with the more constrained labour market unambiguously loses its capital stock and thus, large parts of its income. Although the mechanism differs from the previous approach with constant returns to scale, the qualitative argument remains valid. A more constrained labour market unambiguously drives capital out of the country and leads to a deterioration of national income.

The overarching result of all chapters states that every attempt to defend high domestic wages against the forces of globalisation exhibits detrimental effects. It would even be better not to open borders for international transactions given the labour market rigidity. The ironic part of the story says that workers who should have been protected by rigid wages must bear the burden themselves. Interfering with the free play of market forces only causes unemployment and makes the situation worse rather than better.

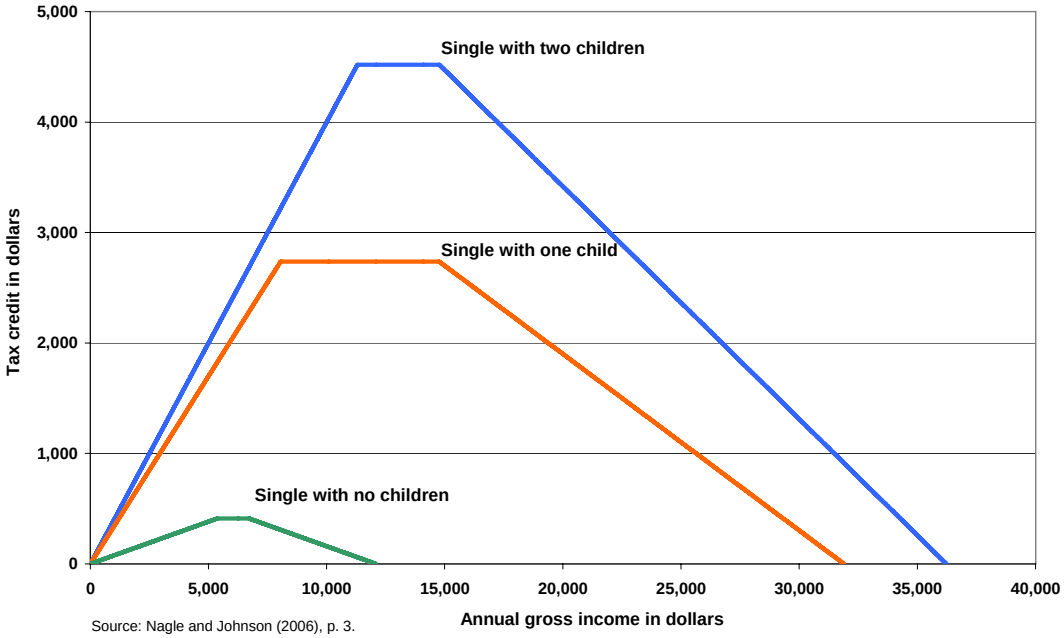
Therefore, the crucial task is to find more promising alternatives than simply fixing prevailing wage levels. The key is to protect (low-skilled) wage income without causing the described detrimental effects. What would such a policy look like? The preceding chapters have indicated that a wage supplement system promises a solution. Here, we want to go into more detail as to how such a system could be designed. The idea comprises two steps. Firstly, labour market rigidities need to be abolished to determine market clearing wages and achieve an efficient outcome. Secondly, the resulting divergence in relative earnings (as low-skilled wages are forced down by international competition) could be attenuated by wage supplements that are only granted under the condition that someone is working. It is crucial not to distort the labour supply decision in the sense that it pays off not to work and live on welfare payments instead.

This basic trade-off between efficiency and distribution on the labour market is not a new phenomenon. Several countries have already installed such welfare-to-work programmes. The EEAG Report on the European Economy 2002 provides a good overview of various programmes. Rather than re-inventing the wheel, we want to study existing programmes and concepts more closely. The US is a precursor in this respect as it implemented the so-called Earned Income Tax Credit (EITC) already 30 years ago. It turned out that this policy functioned as a role model for other welfare-to-work programmes. Hence, we describe in detail how the EITC is designed and what effect it had on the US labour market. Thereafter, we shift to the German policy debate and present two major concepts, the *Aktivierende Sozialhilfe* and the *Magdeburger Alternative*.

The Earned Income Tax Credit (EITC)

The US is one of the first countries that set up a welfare-to-work programme targeted to the working poor. Enacted by Congress in 1975, the *Earned Income Tax Credit* was expanded in 1986, 1990 and 1993 and has emerged to become the largest federal aid programme designed for low income workers. In 2003, about 22 million households were entitled to $39.1 billion - that is an average of $1,782 per household or $2,100 for a family with children.[1]

Figure 8.1: The Earned Income Tax Credit for unmarried singles, 2006



The EITC provides a refundable tax credit granted to people with low income, but especially to families with children. It is conceded indefinitely while its amount depends on gross earnings. The idea is to offset the EITC against the tax liability. Refundability implies that a person receives public money if the credit outweighs the tax liability. This means that for low income the EITC functions like a wage supplement. Figure 8.1 illustrates the three intervals for unmarried singles. A single mother with two or more children, for instance, receives a tax credit of 40 cents per dollar earned in the

[1] Furman (2006).

range of \$1 to \$11,300 in tax year 2006 (see Nagle and Johnson 2006). Up to an income of \$14,760 the absolute amount of the credit remains constant, whereas thereafter it is reduced by 21.06 cents for every marginal dollar up to \$36,222. This makes a maximum tax credit of \$4,520. A single with one child is only eligible for a maximum amount of \$2,737, that means 34 cents for every dollar up to a threshold of \$8,050. This grant remains constant up to \$14,760 whereas it shrinks by about 21 cents with every dollar thereafter. Singles without children only receive comparably tiny tax credits for income below \$12,080. The maximum in 2006 did not exceed \$411. For married couples filing jointly, the second and third range increase by \$2,000 while the phase-out rates remain constant.

A numerical example might further illustrate the effect of the US welfare-to-work programme. A family with one child where one adult works full time for the minimum wage would receive \$9,881 as after-tax income - that is \$2,949 below the poverty line.[2] The Earned Income Tax Credit lifts the family's income to \$13,362.

There is a remarkable amount of research on employment effects of the EITC. Meyer and Rosenbaum (2000 and 2001) find that the EITC expansions in the 1980s and 1990s were responsible for about 50 percent in the increase in employment of single mothers. Meyer (2002) argues that tax incentives played an important role for employment decisions. For instance, the employment of single mothers without a high-school degree rose by 60 percent between 1986 and 1990, while the increase was lower for women with a better education. On the other hand, single mothers without children showed constant or even declining employment rates for different education levels. Dickert, Hauser and Scholz (1995) estimate that half a million families moved from welfare to work due to expansions of the EITC between 1993 and 1996. Eissa and Liebman (1996), Ellwood (2000), Grogger (2003) and Hotz et al. (2005) provide further evidence for positive employment effects of the EITC.

Another aspect comprises the amount of poverty reduction. In 2003, the EITC lifted 4.4 million people above the poverty line, thereof 2.4 million children.[3] In fact, about

[2] Figures for 2005. See Nagle and Johnson (2006).
[3] Greenstein (2005).

one fourth out of 12.6 million children considered poor was brought above the poverty line. Furthermore, the Earned Income Tax Credit makes it possible for a minimum wage earner to provide his or her family a sufficient income above the subsistence level.

Aktivierende Sozialhilfe

In 2002, the German Ifo Institute for Economic Research presented a concept that is based on the American Earned Income Tax Credit.[4] The goal is to allow for a less compressed earnings dispersion to reduce high German unemployment levels, while compensating employees in the lower part of the wage distribution by supplement payments. Thereby, low-wage workers can only improve their net income through work, as low market wages plus wage supplements might add up to a more attractive income. This, however, is not guaranteed. In that case, workers have the option to take jobs provided by the public sector, which ensure the previous welfare payment. In other words, the implicit wage floor generated by welfare payments vanishes and wage flexibility rises. The new feature to the old system is that higher welfare payments are conditioned on employment. The proposal stands on three pillars that have to be implemented simultaneously:

- Currently prevailing welfare benefits should be cut down to increase the incentive even to accept low-paid jobs
- Up to a certain income level, the government grants wage supplements
- The public sector must provide jobs for everyone who does not find a job in the first labour market. Thereby, the currently prevailing welfare payments can be earned.

In concrete figures, the concept proposes that basic welfare benefits are cut from currently 624 € to only 293 € for singles. However, as this would clearly be below the subsistence level, the state must provide a safe opportunity for everyone to obtain the previous welfare benefit level. This should be ensured by the third point: publicly

[4] Sinn et al. (2002).

managed employment service centers that are able to find an appropriate employment for every unemployed individual. At any time, though, the incentive to enter the first labour market should dominate. This is ensured by the design of the wage supplements scheme that makes up the core of the concept. It is important to avoid high phase-out rates that make more employment at certain thresholds unattractive. In other words, a higher gross income should always translate into higher net earnings.

Comparable to the US Earned Income Tax Credit, the *Aktivierende Sozialhilfe* suggests three ranges. On the first level up to a monthly income of 200 €, the employee receives a tax credit of 20 cents for each euro earned. Also, employees' social security contributions are paid by the state. Employers, however, have to pay their contributions themselves. According to Sinn et al. (2002), the marginal tax of value added amounts to 14.3 percent in this range if one includes value added taxes. The second range leaves the absolute amount of the tax credit untouched, that means the phase-out rate is zero. However, between 200 € and 400 € full social security contributions must be paid. This implies that marginal value added is taxed at 43 percent including all social security contributions plus value added tax. Phasing-out of the wage supplements starts from the 401st €. With every additional euro the tax credit shrinks by 50 cents thus taxing marginal gross income with 70 percent. Marginal value added is even taxed at 80 percent if employers' contributions and value added taxes are incorporated. With two or more employable persons living in one household, the phase-in and phase-out rates do not change. Only the income thresholds for the respective ranges rise by 80 percent. Thus, monthly household income up to 360 € is effectively subsidised with 20 percent. The tax credit remains unaffected between 360 € and 720 € while phasing out starts at monthly earnings above this level.

Another important aspect to be considered is the entitlement of child benefits. The prevailing social system allows higher benefits with every additional child living in the household. Hence, more children unavoidably increase the household's reservation wage and make employment unattractive as phase-out rates are roughly 100 percent. Therefore, child benefits should be granted independently of income in order not to

distort participation in the labour market. However, maximum benefits cannot be the reference as they would be granted to all households, thus implying huge fiscal costs. Leaving room for higher payments, the proposal suggests basic child benefits of 154 € as are currently paid. However, children in households entitled to social aid should not increase welfare benefit entitlements.

The common critique when it comes to wage subsidies are windfall gains through wage dumping and high fiscal costs. Concerning the latter point, it should be possible to design the system in such a way to limit additional costs. There are basically two counteracting effects: On the one hand, wage supplements cause additional fiscal costs, but on the other hand, unemployed individuals to a large extent find new jobs in the first labour market, thus relieving public budgets. It is a calculation exercise, which crucially depends on the level of basic welfare benefits, the amount of subsidising and the corresponding income thresholds as well as a reliable number on how many unemployed can be placed.

The first argument also pops up commonly, but reveals a clear misunderstanding of the causes of unemployment and promising remedies. It is the intent of the *Aktivierende Sozialhilfe* to set off a wage dumping process and not a side effect that must be avoided. This is exactly how a market economy functions. Only if wage costs decrease, labour demand rises and new job opportunities emerge to cure the severe unemployment problem. Hence, not only must wages fall for unemployed workers in the low-wage sector, but for all employed workers in that sector, too. The Ifo Institute estimates that more than 4 million employees would be affected by wage cuts and could be entitled to tax credits. Wages are expected to decrease by one third and 2.3 million new jobs should durably emerge in the long run.

Yet another critique has a political-economic flavour. The argument states that wage cuts of one third - especially in the low wage sector - are impossible to achieve for political economy reasons. Nevertheless, if the unemployment disease should be cured, wage cuts are unavoidable. This is the stage where welfare-to-work programmes step in by increasing household income despite the reduction of market wages. They generally

provide an economically promising way to combine efficiency with distributional issues.

The next proposal we want to briefly discuss starts from the political-economic critique.

Magdeburger Alternative

Ronnie Schöb and Joachim Weimann, two German professors from the University of Magdeburg, basically agree with the diagnosis of the German unemployment problem, but doubt that the *Aktivierende Sozialhilfe* is politically implementable. The experience of the US since 1975 has taught that it takes many years for market wages to fall and hence, that new jobs emerge. Also, a flexible labour market is necessary, so that wages are not prevented from downward adjustment. This, however, could be the case if trade unions oppose this policy. While this condition is fulfilled in the US, the authors doubt this for Germany.

Therefore, the *Magdeburger Alternative* suggests not to pay wage subsidies to employees, but rather subsidise non-wage labour costs.[5] Thereby, labour costs instantly fall by the amount of the subsidy and labour demand rises. Basically, Schöb and Weimann suggest a four point programme:

- The government subsidises firms who create new jobs in the lowest wage group by exempting the new positions from all social security contributions. Thereby, labour costs decline by 35 percent.

- In order to prevent windfall gains, subsidies are only paid for additional low wage jobs in a specific company. However, new companies benefit entirely from this new legislation because subsidies are granted for all employees. In order to prevent artifical closures of companies and new formations with the same task to maximise subsidies, existing firms are entitled to additional subsidies. For every new position that is created, the firm receives additional subsidies for one existing job in the lowest wage group.

[5] See Schöb and Weimann (2003 and 2004).

- Those who refuse to accept offered jobs, but are basically able to work, lose their entitlement for welfare payments. This step ensures that unemployed workers are motivated to accept new jobs if offered by firms due to lower labour costs.
- Finally, subsidies have to be granted indefinitely as the problem on the labour market is not a temporary phenomenon.

The authors expect that about 1.8 million new jobs in the lowest wage group emerge over time and that the public sector is even relieved by 4 billion euros. The latter effect is due to more employment and thus, less welfare payments. It is a trade-off between more subsidies and less welfare payments that can well lead to a net relief of public expenditure.

The advantage of this concept is without doubt the higher probability of implementation. The opposition can be expected to be lower than with a transparent wage cut of up to one third. Moreover, the reduction in labour costs takes place from the first day of implementation. Nevertheless, there are arguments against the Magdeburger Alternative. Sinn et al. (2006) put forward that all low-wage jobs must be subject to the subsidy - independent of the entire income situation of the household. In addition, booming sectors benefit more from the subsidy as more employment emerges in any case and is further subsidised whereas declining sectors face a relative disadvantage. Efficient allocation affords adjustment of market prices which does not take place here. A third criticism points out that social partners also play a crucial role in this framework. The existence of a subsidy system creates incentives to negotiate higher wages for which the government has to pay a large burden - the social security contributions.

A final note

Of course, one can discuss extensively about the pros and cons of these exemplary concepts. What is clear, though, and the basis in all suggestions: only the reduction of labour costs can increase the demand for low-skilled labour. Although the preceding discussion has solely focussed on wage inflexibility, other labour market rigidities can be incorporated in this line of argumentation, too. In fact, dismissal rules impose

additional costs on employers and hence, a reduction thereof can decrease effective labour costs as well. The crucial essence of the analysis is that market integration can only boost output if the necessary structural change functions appropriately. Therefore, it must be possible to set up new firms quickly, redirect employment into booming sectors of the economy and pay market clearing wages.

However, protection of workers and the existence of the welfare state may generally exhibit welfare gains as well. More job security increases workers' motivation and effort for training and thus, productivity. By the end of the day, it remains a political decision how large the welfare state should be. However, as the previous reform proposals have demonstrated, it is not only a matter of money, but also a matter of design. Guaranteeing a social safety net with the least distortion of work incentives turns out to be the appealing solution. Politicians who think about defending high domestic wages against international competitors are certainly on the wrong track.

Bibliography

[1] Akbari, A.H. and D.J. Devoretz (1992): The Substitutability of Foreign-Born Labour in Canadian Production: Circa 1980, *Canadian Journal of Economics*, 25 (3), 604-14.

[2] Akerlof, G.A. and J.L. Yellen (1990): The Fair-Wage Effort Hypothesis and Unemployment, *Quarterly Journal of Economics*, 105 (2), 255-83.

[3] Andersson, F. and R. Forslid (1999): Tax Competition and Economic Geography, *CEPR Discussion Paper 2220.*

[4] Bairoch, P. (1989): European Trade Policy, 1815-1914, in: P. Mathias and S. Pollard (eds.): The Cambridge Economic History of Europe, Vol. VIII, Cambridge: Cambridge University Press.

[5] Bairoch, P. (1993): Economics and World History: Myths and Paradoxes. New York: Harvester.

[6] Baldwin, R.E. (1988), Hysteresis in Import Prices: The Beachead Effect, *American Economic Review* 78, 773-85.

[7] Baldwin, R.E. (2000): Agglomeration and Endogenous Capital, *European Economic Review*, 43, 253-80.

[8] Baldwin, R.E., R. Forslid, P. Martin, G. Ottaviano and F. Robert-Nicoud (2003): Economic Geography and Public Policy, Princeton University Press: Princeton and Oxford.

[9] Baldwin, R.E. and P. Krugman (2000): Agglomeration, Integration and Tax Harmonization, *CEPR Discussion Paper 2630*.

[10] Baldwin, R.E. and P. Martin (1999): Two Waves of Globalization, in: H. Siebert (ed.): Globalization and Labor, Mohr-Siebeck: Tübingen, 3-58.

[11] Barro, R.J. and X. Sala-i-Martin (1991): Convergence Across States and Regions, *Brookings Papers on Economic Activity*, 1991 (1), 107-82.

[12] Barro, R.J. and X. Sala-i-Martin (1992): Convergence, *Journal of Political Economy*, 100 (2), 223-51.

[13] Bauer, T. and K. Zimmermann (1999): Assessment of Possible Migration Pressure and its Labour Market Impact following EU Enlargement to Central and Eastern Europe, *IZA Research Report No. 3*, Bonn.

[14] Becker, S.O., K. Ekholm, R. Jäckle and M.-A. Muendler (2004): Location Choice and Employment Decisions: A Comparison of German and Swedish Multinationals, *CESifo Working Paper No. 1374*.

[15] Belke, A. and M. Hebler (2002): EU-Osterweiterung, Euro und Arbeitsmärkte, Oldenbourg: Wien, München.

[16] Bewley, T. (2005): Fairness, Reciprocity, and Wage Rigidity, in Gintis, H., Bowles, S., Boyd, R., Fehr, E. (eds.): *Moral Sentiments and Material Interests: The Foundations of Cooperation in Economic Life*, MIT Press: Cambridge/MA, 303-38.

[17] Bhagwati, J. and T. N. Srinivasan (1971): The Theory of Wage Differentials: Production Response and Factor Price Equalization, *Journal of International Economics*, 1, 19-35.

[18] Biffl, G. (2001): Migration Policy and Western Europe and EU-Enlargement, in: OECD (2001): Migration Policies and EU-Enlargement. The Case of Central and Eastern Europe, Paris, 155-72.

[19] Blanchflower, D.G. and R.B. Freeman (1993): Did the Thatcher Reforms Change British Labour Market Performance?, *CEP Discussion Paper No. 168.*

[20] Blau, F.D. and L.M. Kahn (1999): Institutions and Laws in the Labor Market, in: Ashenfelter, O. and D. Card (eds.): Handbook of Labor Economics, Volume 3A, 1399-1461.

[21] Borjas, G.J. (1994): The Economics of Immigration, *Journal of Economic Literature*, 32 (4), 1667-1717.

[22] Borjas, G.J., R. Freeman and L.F. Katz (1992): On the Labor Market Effects of Immigration and Trade, in: Borjas, G.J. and R. Freeman (eds.): Immigration and the Workfare, Chicago: University of Chicago Press.

[23] Borjas, G.J., R. Freeman and L.F. Katz (1997): How Much Do Trade and Immigration Affect Labor Market Outcomes?, *Brookings Papers on Economic Activity*, 1997 (1), 1-90.

[24] Brandt, N., J.-M. Burniaux and R. Duval (2005): Assing the OECD Jobs Strategy: Past Developments and Reforms, *OECD Economics Department Working Papers No. 429.*

[25] Brecher, R.A. (1971): Minimum Wages and the Pure Theory of International Trade, Cambridge, MA.

[26] Brecher, R.A. (1974a): Minimum Wage Rates and the Pure Theory of International Trade, *Quarterly Journal of Economics*, 88 (1), 98-116.

[27] Brecher, R.A. (1974b): Optimal Commercial Policy for a Minimum Wage Economy, *Journal of International Economics*, 4 (2), 139-49.

[28] Brecher, R.A. (1992): An Efficiency Wage Model with Explicit Monitoring: Unemployment and Welfare in an Open Economy, *Journal of International Economics*, 32, 179-91.

[29] Brown, C., C. Gilroy and A. Kohen (1982): The Effect of the Minimum Wage on Employment and Unemployment, *Journal of Economic Literature*, 20, 487-528.

[30] Brown, C. (1999): Minimum Wages, Employment, and the Distribution of Income, in: Ashenfelter, O. and D. Card (eds.): Handbook of Labor Economics, Volume 3B, Elsevier: Amsterdam.

[31] Brown, W., S. Deakin, D. Nash and S. Oxenbridge (2000): The Employment Contract: From Collective Procedures to Individual Rights, *British Journal of Industrial Relations*, 38,4, 611-29.

[32] Brücker, H., P. Trübswetter and C. Weise (2000): EU-Osterweiterung: Keine massive Zuwanderung zu erwarten, *Wochenbericht des DIW Berlin 21/00*.

[33] Brücker, H., P. Alvarez-Plata and B. Siliverstovs (2003): Potential Migration from Central and Eastern Europe into the EU15 – An Update, Report on behalf of the Directorate General Employment and Social Affairs of the European Commission, Berlin, 2003.

[34] Brücker, H, H. Trabold, P. Trübswetter and C. Weise (2003): Migration: Potential und Effekte für den deutschen Arbeitsmarkt, Nomos: Baden-Baden.

[35] Card, D. (1990): The Impact of the Mariel Boatlift on the Miami Labor Market, *Inustrial and Labor Relations Review*, 43, 245-57.

[36] Card, D. and A.B. Krueger (1995): Myth and Measurement. The New Economics of the Minimum Wage, Princeton University Press: Princeton.

[37] Chiswick, B.R. and T.J. Hatton (2003): International Migration and the Integration of Labour Markets, in: M.D. Bordo, A.M. Taylor and J.G. Williamson (eds.): Globalization in Historical Perspective, University of Chicago Press/NBER.

[38] Davidson, C., L. Martin and S. Matusz (1999): Trade and Search Generated Unemployment, *Journal of International Economics*, 48, 271-99.

[39] Davis, J. (1992): Cross-Country Patterns of Change in Relative Wages, *NBER Working Paper No. 4085.*

[40] Davis, D.R. (1998): Does European Unemployment Prop Up American Wages? National Labor Markets and Global Trade, *American Economic Review*, 88 (3), 478-94.

[41] De New, J.P. and K.F. Zimmermann (1994): Native Wage Impacts of Foreign Labor: A Random Effects Panel Analysis, *Journal of Population Economics*, 7, 177-92.

[42] Deutsche Bundesbank (2005): Kapitalverflechtungen mit dem Ausland, April 2005, Statistische Sonderveröffentlichung 10, Frankfurt/ Main.

[43] Deutscher Gewerkschaftsbund (2004):

[44] Deutscher Industrie- und Handelskammertag DIHK (2003): Produktionsverlagerung als Element der Globalisierungsstrategie von Unternehmen. Ergebnisse einer Unternehmensbefragung, Mai 2003, Berlin.

[45] Deutscher Industrie- und Handelskammertag DIHK (2006): Investitionen im Ausland, Ergebnisse einer DIHK-Umfrage bei den Industrie- und Handelskammern, Mai 2006, Berlin.

[46] Dickert, S., S. Hauser and J.K. Scholz (1995): The Earned Income Tax Credit and Transfer Programs: A Study of Labor Market and Program Participation, in: Poterba, J.M. (ed.): Tax Policy and the Economy, Vol. 9, MIT Press: Cambridge, 1-50.

[47] Dixit, A.K. and J.E. Stiglitz (1977): Monopolistic Competition and Optimal Product Diversity, *American Economic Review*, 67 (3), 297-308.

[48] Dolado, J., F. Kramarz, S. Machin, A. Manning, D. Margolis and C. Teulings (1996): The Economic Impact of Minimum Wages in Europe, *Economic Policy*, 23, 319-72.

[49] Ebbinghaus, B. and J. Visser (2000): The Societies of Europe. Trade Unions in Western Europe since 1945, Macmillan: London.

[50] EEAG (2002): Report on the European Economy 2002, European Economic Advisory Group at CESifo, Munich.

[51] EEAG (2004): Report on the European Economy 2004, European Economic Advisory Group at CESifo, Munich.

[52] EEAG (2006): Report on the European Economy 2006, European Economic Advisory Group at CESifo, Munich.

[53] Egger, H. and U. Kreickemeier (2006): Firm Heterogeneity and the Labour Market Effects of Trade Liberalisation, *mimeo*, University of Zurich.

[54] Egger, P. and T. Seidel (2006): Agglomeration and Fair Wages, *mimeo*, University of Munich.

[55] EIRO (2002): Industrial Relations in the EU Member States and Candidate Countries, European Industrial Relations Observatory on-line, European Foundation for the Improvement of Living and Working Conditions, http://www.eiro.eurofound.eu.int/2002/07/feature/tn0207104f.html.

[56] EIRO (2003): Arbeitsbeziehungen in den Mitgliedstaaten der Europäischen Union und den beitrittswilligen Ländern, European Industrial Relations Observatory on-line, European Foundation for the Improvement of Living and Working Conditions, http://www.eiro.eurofound.eu.int/2002/07/feature/tn0207107f.html.

[57] EIRO (2004a): Trade Union Membership 1993-2003, European Industrial Relations Observatory on-line, European Foundation for the Improvement of Living and Working Conditions, http://www.eiro.eurofound.eu.int/2004/03/update/tn0403105u.html.

[58] EIRO (2004b): Working Time Developments – 2003, European Industrial Relations Observatory on-line, European Foundation for the Improvement of Living and Working Conditions, http://www.eiro.eurofound.eu.int/2004/03/update/tn0403104u.html.

[59] Eissa, N. and J.B. Liebman (1996): Labour Supply Response to the Earned Income Tax Credit, *Quarterly Journal of Economics*, 111 (2), 605-637.

[60] Ellwood, D.T. (2000): The Impact of the Earned Income Tax Credit and Social Policy Reforms on Work, Marriage, and Living Arrangements, *National Tax Journal*, 53 (4), 1063-1105.

[61] European Commission (2002): Industrial Relations in Europe, Brussels.

[62] European Commission (2003a): Employment in Europe - Recent Trends and Prospects, Brussels.

[63] European Commission (2003b): Employment and Labour Market in Central European Countries, Brussels.

[64] European Commission (2003c): Free Movement of Workers To and From the New Member States – How Will It Work in Practice?; http://europa.eu.int/comm/employment_social/free_movement/en2-pr-pdf.pdf.

[65] European Conference of Ministers of Transport (2002): Trends in the Transport Sector, 1970-2000, Paris.

[66] European Integration Consortium: DIW, CEPR, FIEF, IAS, IGIER (2000): The Impact of Eastern Enlargement on Employment and Labour Markets in the EU Member States, Report on behalf of the Employment and Social Affairs Directorate General of the European Commission, Berlin and Milano.

[67] European Trade Union Confederation (2002): Third Annual Report on the Coordination of Collective Bargaining in Europe, Brussels.

[68] EUROSTAT (1998): Minimum Wages 1997 - A Comparative Study, Luxembourg.

[69] EUROSTAT (2003): Außen- und Intrahandel der Europäischen Union, Statistisches Jahrbuch, Daten 1958-2002, Luxembourg.

[70] EUROSTAT (2004): Minimum Wages - EU Member States, Candidate Countries and the US 2004, Statistics in Focus, 10/ 2004.

[71] Feenstra, R. and G. Hanson (1996): Globalization, Outsourcing, and Wage Inequality, *American Economic Review*, 86 (2), 240-45.

[72] Findlay, R. and K.H. O'Rourke (2003): Commodity Market Integration, 1500-2000, in: M.D. Bordo, A.M. Taylor and J.G. Williamson (eds.): Globalization in Historical Perspective, University of Chicago Press/NBER.

[73] Flam, H. and E. Helpman (1987): Industrial Policy under Monopolistic Competition, *Journal of International Economics*, 22, 79-102.

[74] Forslid, R. (1999): Agglomeration with Human and Physical Capital: An Analytically Solvable Case, *CEPR Discussion Paper 2102*.

[75] Forslid, R. and G.I.P. Ottaviano (2003): An Analytically Solvable Core-Periphery Model, *Journal of Economic Geography*, 3, 229-40.

[76] Foster, D. and P. Scott (eds.) (2003): Trade Unions in Europe - Meeting the Challenge, Lang: Brussels.

[77] Franz, W. (1999): Arbeitslosigkeit in Deutschland und Möglichkeiten ihrer Überwindung: Eine Bestandsaufnahme und Analyse aus der Sicht der wirtschaftspolitischen Beratung, *Empirica*, 26, 151-67.

[78] Franz, W. and H. Koenig (1986): The Nature and Causes of Unemployment in the Federal Republic of Germany since the 1970s: An Empirical Investigation, *Economica*, 53, 219-44.

[79] Friedberg, R.M. and J. Hunt (1995): The Impact of Immigrants on Host Country's Wages, Employment and Growth, *Journal of Economic Perspectives*, 9 (2), 23-44.

[80] Funk, L. and H. Lesch (2004): Arbeitsbeziehungen in Mittel- und Osteuropa, *iw-Trends 1/2004*, Institut der deutschen Wirtschaft, Cologne.

[81] Furman, J. (2006): Tax Reform and Poverty, Center on Budget and Policy Priorities, Washington D.C.

[82] Greenstein, R. (2005): The Earned Income Tax Credit: Boosting Employment, Aiding the Working Poor, Center on Budget and Policy Priorities, Washington D.C.

[83] Grogger, J. (2003): The Effects of Time Limits, the EITC, and other Policy Changes on Welfare Use, Work, and Income among Female-Headed Families, *Review of Economics and Statistics*, 85 (2), 394-408.

[84] Guild, E. (2001): Immigration Law in the European Community, Kluwer Law International: The Hague.

[85] Haberler, G. (1950): Some Problems in the Pure Theory of International Trade, *Economic Journal*, 60, 223-40.

[86] Harley, C.K. (1980): Transportation, the World Wheat Trade, and the Kuznets Cycle, 1850-1913, *Explorations in Economic History*, 17, 218-50.

[87] Harley, C.K. (1988): Ocean Freight Rates and Productivity, 1740-1913: The Primacy of Mechanical Invention Reaffirmed, *Journal of Economic History*, 48, 851-76.

[88] Harley, C.K. (1989): Coal Exports and British Shipping, 1850-1913, *Explorations in Economic History*, 26, 311-38.

[89] Holzner, Ch. (2006): Hartz IV fördert Minijobs und krankt an der ungenügenden Durchsetzbarkeit der Zumutbarkeitsregeln, *ifo Dresden berichtet* 13 (02), 5-9.

[90] Hotz, V.J., C.H. Mullin and J.K. Scholz (2005): The Earned Income Tax Credit and the Labor Market Participation of Families on Welfare, *mimeo*, University of California, Los Angeles.

[91] Howitt, P. (2002): Looking Inside the Labor Market: A Review Article, *Journal of Economic Literature*, 40, 125-138.

[92] Hummels, D. (1999): Have International Transportation Costs Declined?, *mimeo*, Chicago.

[93] Hunt, J. (1992): The Impact of the 1962 Repatriates from Algeria on the French Labor Market, *Industrial and Labor Relations Review*, 45, 556-72.

[94] International Institute for Management Development IMD (2005): IMD World Competitiveness Yearbook 2005, Lausanne.

[95] Institut für Arbeitsmarkt- und Berufsforschung (2002): Die Entwicklung der Flächentarifbindung 1995-2001, http://doku.iab.de.

[96] Institute for the German Economy (2002): Wettbewerbsfähigkeit und Internationalisierungsstrategien, *IW-Trends, Dokumentation 4-2002*, Cologne.

[97] Institute for the German Economy (2006): Deutschland in Zahlen, Ausgabe 2005, Cologne.

[98] Jaeger, D.A. (1996): Skill Differences and the Effect of Immigrants on the Wages of Natives, *US Bureau of Labor Statistics Working Paper No. 273.*

[99] Johnson, H.G. (1965): Optimal Trade Intervention in the Presence of Domestic Distortions, in: R.E. Baldwin et al. (eds.): Trade, Growth, and the Balance of Payments: Essays in Honor of Gottfried Haberler, Amsterdam: North-Holland.

[100] Johnson, G. and R. Layard (1986): The Natural Rate of Unemployment: Explanation and Policy, in: Ashenfelter, O. and R. Layard (eds.): Handbook of Labor Economics, North-Holland: Amsterdam.

[101] Jones, R.W. (1965): The Structure of Simple General Equilibrium, *Journal of Political Economy*, 73, 557-72.

[102] Jones, R.W. (1971a): A Three-Factor Model in Theory, Trade, and History, in: Bhagwati, J. et al. (eds.): Trade, Balance of Payments, and Growth: Essays in Honor of C.P. Kindleberger, Amsterdam: North-Holland.

[103] Jones, R.W. (1971b): Distortions in Factor Markets and the General Equilibrium Model of Production, *Journal of Political Economy*, 79 (3), 437-59.

[104] Katz, L.M and K.M. Murphy (1992): Changes in Relative Wages, 1963-87: Supply and Demand Factors, *Quarterly Journal of Economics*, 107 (1), 35-78.

[105] Kemp, M.C. (1969): The Pure Theory of International Trade and Investment, Englewood Cliffs: Prentice-Hall.

[106] Kohl, H. and W. Platzer (2003): Arbeitsbeziehungen in Mittelosteuropa. Transformation und Integration – Die acht EU-Beitrittsländer im Vergleich, Nomos: Baden-Baden.

[107] Kreikemeier, U. and S. Schoenwald (2002): A General Model of Fair Wages in an Open Economy, *Research Paper 34/2002*, University of Nottingham.

[108] Kreickemeier, U. (2004): Fair Wages and Human Capital Accumulation in a Global Economy, *GEP Research Paper 2004/09*.

[109] Kreikemeier, U. (2005): Unemployment and the Welfare Effects of Trade Policy, *Canadian Journal of Economics*, 38 (1), 194-210.

[110] Kreikemeier, U. and D. Nelson (2006): Fair Wages, Unemployment and Technological Change in a Global Economy, *Journal of International Economics*, forthcoming.

[111] Krugman, P. (1991): Increasing Returns and Economic Geography, *Journal of Political Economy*, 99, 483-99.

[112] Krugman, P. (1995): Growing World Trade - Causes and Consequences, *Brookings Papers on Economic Activity*, 1995 (1), 327-77.

[113] Krugman, P. and R.Z. Lawrence (1994): Trade, Jobs and Wages, *Scientific American*, 270 (4), 44-9.

[114] Krugman, P. and A.J. Venables (1995): Globalization and the Inequality of Nations, *Quarterly Journal of Economics*, 60, 857-80.

[115] LaLonde, R.J. and R.H. Topel (1991): Immigrants in the American Labor Market - Quality, Assimilation, and Distributional Effects, American Economic Review, 81 (2), Papers and Proceedings of the Hundred and Third Annual Meeting of the American Economic Association, 297-302.

[116] Layard, R. (1988): 'Discussion', following M. Burda: Unemployment, *Economic Policy*, 7, 416-19.

[117] Layard, R., O. Blanchard, R. Dornbusch and P. Krugman (1992): East-West Migration: The Alternatives. Cambridge (MA), London: MIT Press.

[118] Lazear, E.P. (1990): Job Security Provisions and Employment, *Quarterly Journal of Economics*, 105 (3), 699-726.

[119] Leamer, E. (1994): Trade, Wages and Revolving Door Ideas, *NBER Working Paper No. 4716.*

[120] Leamer, E. (1998): In Search of Stolper-Samuelson Linkages between International Trade and Lower Wages, in: S. Collins (ed.): Imports, Exports and the American Worker, 141-202.

[121] Lindbeck, A. (1973): The National State in an Internationalized World Economy, *IIES Seminar Paper No. 26*, Stockholm.

[122] MacDougall, G.D.A. (1960): The Benefits and Costs of Private Investment from Abroad, *Economic Record*, 22 (3), 189-211.

[123] Madsen, P.K. (1999): Denmark: Flexibility, Security and Labour Market Success, *Employment and Training Papers No. 53*, International Labour Office Geneva.

[124] Magee, S.P. (1971): Factor Market Distortions, Production, Distribution, and the Pure Theory of International Trade, *Quarterly Journal of Economics*, 85 (4), 624-43.

[125] Manning, A. (2003a): The Real Thin Theory: Monopsony in Modern Labour Markets, *Labour Economics*, 10 (2), 105-31.

[126] Manning, A. (2003b): Monopsony in Motion: Imperfect Competition in Labour Markets, Princeton University Press: Princeton and Oxford.

[127] Matusz, S. (1994): International Trade Policy in a Model of Unemployment and Wage Differentials, *Candian Journal of Economics*, 27, 939-49.

[128] Mayer, W. (1974): Short-Run and Long-Run Equilibrium for a Small Open Economy, *Journal of Political Economy*, 82 (5), 955-67.

[129] McDonald, J. and R. Shlomowitz (1990): Mortality on Immigrant Voyages to Australia, *Explorations in Economic History*, 27 (1), 84-113.

[130] McDonald, J. and R. Shlomowitz (1991): Passenger Fares on Sailing Vessels to Australia in the Nineteenth Century, *Explorations in Economic History*, 28 (2), 192-208.

[131] Meyer, B.D. (2002): Labor Supply at the Extensive and Intensive Margins: The EITC, Welfare, and Hours Worked, American Economic Review, 92 (5), 373-379.

[132] Meyer, B.D. and D.T. Rosenbaum (2000): Making Single Mothers Work: Recent Changes in Tax and Welfare Policy and Their Effects, *National Tax Journal*, 53 (4), 1027-62.

[133] Meyer, B.D. and D.T. Rosenbaum (2001): Welfare, the Earned Income Tax Credit, and the Labor Supply of Single Mothers, *Quarterly Journal of Economics*, 116 (3), 1063-1114.

[134] Mussa, M. (1978): Dynamic Adjustment in the Heckscher-Ohlin-Samuelson Model, *Journal of Political Economy*, 86 (5), 775-91.

[135] Mussa, M. and M. Goldstein (1993): The Integration of World Capital Markets, *IMF Working Paper WP/93/95*, Washington D.C.

[136] Nagle, A. and N. Johnson (2006): How State Earned Income Tax Credits Help Families Escape Poverty in 2006, Center on Budget and Policy Priorities, Washington D.C.

[137] Neary, P. (1978): Short-Run Capital Specificity and the Pure Theory of International Trade, *Economic Journal*, 88, 488-510.

[138] Newell, A. and J. Symons (1989): Stylised Facts and the Labour Demand Curve, *Labor*, 3, 3-21.

[139] Nickell, S. and B. Bell (1995): The Collapse in the Demand for the Unskilled and Unemployment across the OECD, *Oxford Review of Economic Policy*, 11, 40-62.

[140] Nickell, S. (1997): Unemployment and Labour Market Rigidities: Europe versus North America, *Journal of Economic Perspectives*, 11 (3), 55-74.

[141] Nickell, S. and R. Layard (1999): Labor Market Institutions and Economic Performance, in: Ashenfelter, O. and D. Card (eds.): Handbook of Labor Economics, North-Holland: Amsterdam.

[142] Nickell, S. and J. Symons (1990): The Real Wage-Employment Relationship in the United States, *Journal of Labor Economics*, 8, 1-15.

[143] North, D.C. (1958): Ocean Freight Rates and Economic Development 1750-1913, *Journal of Economic History*, 18, 538-55.

[144] Obstfeld, M. (1994): International Capital Mobility in the 1990s, *International Finance Discussion Papers No. 472*, Board of Governors of the Federal Reserve System, Washington, D.C.

[145] Obstfeld, M, (1998): The Global Capital Market - Benefactor of Menace?, *Journal of Economic Perspectives*, 12 (4), 9-30.

[146] Obstfeld, M. and A.M. Taylor (1996): International Capital Market Integration in the Long Run: The Great Depression as a Watershed, University of California at Berkeley.

[147] Obstfeld, M. and A.M. Taylor (2003): Globalization and Capital Markets, in: M.D. Bordo, A.M. Taylor and J.G. Williamson (eds.): Globalization in Historical Perspective, University of Chicago Press/ NBER.

[148] Ochel, W. (2000): Mittel- und osteuropäische Einwohner in Westeuropa, *ifo Schnelldienst*, 19-20/2000.

[149] Ochel, W. (2001): Collective Bargaining Coverage in the OECD from the 1960s to the 1990s, *CESifo Forum 4/2001*, 62-5.

[150] OECD (1994a): The OECD Jobs Study. Evidence and Explanations. Part I – Labour Market Trends and Underlying Forces of Change, Paris.

[151] OECD (1994b): The OECD Jobs Study. Evidence and Explanations. Part II – The Adjustment Potential of the Labour Market, Paris.

[152] OECD (1996): Employment Outlook 1996, Paris.

[153] OECD (1998): Employment Outlook 1998, Paris.

[154] OECD (1999a): Employment Outlook. Protection and Employment Performance, Paris.

[155] OECD (1999b): Benefit Systems and Work Incentives, Paris.

[156] OECD (2001a): Employment Outlook 2001, Paris.

[157] OECD (2001b): Migration Policies and EU Enlargement - The Case of Central and Eastern Europe, Paris.

[158] OECD (2002a): Benefits and Wages. OECD Indicators, Paris.

[159] OECD (2002b): Employment Outlook, Paris.

[160] OECD (2003a): Education at a Glance. OECD Indicators, Paris.

[161] OECD (2003b): Trends in International Migration, SOPEMI 2002, Paris.

[162] OECD (2004a): Main Economic Indicators, July 2004, Paris.

[163] OECD (2004b): Trends in International Migration, SOPEMI 2003, Paris.

[164] OECD (2004c): Employment Outlook, Paris.

[165] OECD (2004d): Benefits and Wages. OECD Indicators, Paris.

[166] Oslington, P. (2002): Factor Market Linkages in a Global Economy, *Economics Letters*, 76, 85-93.

[167] Pflüger, M. (2004): A Simple, Analytically Solvable, Chamberlinian Agglomeration Model, *Journal of Regional Science and Urban Economics*, 34, 565-73.

[168] Riboud, M., C. Sánchez-Páramo and C. Silva-Jáuregui (2002): Does Eurosclerosis Matter? Institutional Reform and Labor Market Performance in Central and Eastern European Countries in the 1990s, *Social Protection Discussion Paper Series No. 202*, World Bank.

[169] Sachs, J. and A. Warner (1995): Economic Reform and the Process of Global Integration, *Brookings Papers on Economic Activity*, 1995 (1), 1-118.

[170] Samuelson, P.A. (1971): Ohlin was Right, *Swedish Journal of Economics*, 73 (4), 365-84.

[171] Schöb, R. and J. Weimann (2003): Kombilohn - Die Magdeburger Alternative, *Perspektiven der Wirtschaftspolitik*, 4 (1), 1-16.

[172] Schöb, R. and J. Weimann (2004): Arbeit ist machbar - Die neue Beschäftigungsformel, Janos Stekovics: Dössel.w

[173] Seidel, T. (2005): Welfare Effects of Capital Mobility with Rigid Wages, *Applied Economics Quarterly*, 56, 61-75.

[174] Siebert, H. (1997): Labor Market Rigidities: At the Root of European Unemployment, *Journal of Economic Perspectives*, 11 (3), 37-54.

[175] Sinn, H.-W., G. Flaig, M. Werding, S. Munz, N. Düll and H. Hofmann (2001): EU-Erweiterung und Arbeitskräftemigration. Wege zu einer schrittweisen Annäherung der Arbeitsmärkte, ifo Beiträge zur Wirtschaftsforschung, München.

[176] Sinn, H.-W., Ch. Holzner, W. Meister, W. Ochel, M. Werding (2002): Aktivierende Sozialhilfe - Ein Weg zu mehr Beschäftigung und Wachstum, *ifo-Schnelldienst 9/2002*.

[177] Sinn, H.-W. (2004): Ist Deutschland noch zu retten?, Econ: Berlin.

[178] Sinn, H.-W. (2005a): Die Basar-Ökonomie. Deutschland: Exportweltmeister oder Schlusslicht?, Econ: Berlin.

[179] Sinn, H.-W. (2005b): Basarökonomie Deutschland: Exportweltmeister oder Schlusslicht?, *Special issue ifo Schnelldienst 6/2005*.

[180] Sinn, H.-W. (2005c): Migration and Social Replacement Incomes. How to Protect Low-income Workers in the Industrialized Countries against the Forces of Globalization and Market Integration, *International Tax and Public Finance*, 12, 375-93.

[181] Sinn, H.-W. (2006): The Pathological Export Boom and the Bazaar Effect. How to Solve the German Puzzle, *CESifo Working Paper No. 1708*, Munich.

[182] Sinn, H.-W., Ch. Holzner, W. Meister, W. Ochel, M. Werding (2006): Aktivierende Sozialhilfe 2006 - Das Kombilohnmodell des ifo Instituts, *ifo-Schnelldienst 2/2006*.

[183] Sinn, H.-W. and. T. Seidel (2006): The Pathological Trade Boom, *mimeo*, University of Munich.

[184] Stalker, P. (1994): The Work of Strangers: A Survey of International Labour Migration, ILO, Geneva.

[185] Statistisches Bundesamt (2002): Deutschlands Handelspartner in Mittel- und Osteuropa. Ein Beitrag der deutschen Außenhandelsstatistik, Wiesbaden.

[186] Svejnar, J. (1999): Labor Markets in the Transnational Central and Eastern European Economies, in: Ashenfelter, O. and D. Card (eds.): Handbook of Labor Economics, Volume 3B, Elsevier: Amsterdam, 2809-57.

[187] Svejnar, J. (2002): Labor Market Flexibility in Central and Eastern Europe, *William Davidson Institute Working Paper 496*.

[188] Taylor, A. (1996): International Capital Mobility in History. The Savings-Investment Relationship, *NBER Working Paper 5743*.

[189] Tille, C. and K.-M. Yi (2001): Curbing Unemployment in Europe: Are there Lessons from Ireland and the Netherlands?, Federal Reserve Bank of New York, *Current Issues in Economics and Finance*, 7 (5), 1-6.

[190] UNCTAD (1997): World Investment Report 1997, Geneva.

[191] UNCTAD (2000): World Investment Report 2000, Geneva.

[192] UNCTAD (2003): World Investment Report 2003, Geneva.

[193] United Nations (1996a): Trends in Total Migrant Stock, Revision 4, Database maintained by the Population Division, Department of Economic and Social Affairs, POP/IB/DB/96/1/Rev.4.

[194] United Nations (1996): World Population Prospects - The 1996 Revision, New York.

[195] United Nations (2005): World Population Prospects - The 2004 Revision, New York.

[196] Vecerník, J. (1995): Changing Earnings Distribution in the Czech Republic: Survey Evidence from 1988-1994, *Economics in Transition*, 3, 355-71.

[197] Venables, A.J. (1996): Equilibrium Location of Vertically Linked Industries, *International Economic Review*, 37, 341-59.

[198] Weiß, P. (2001): Unemployment in Open Economies: A Search Theoretic Analysis, Heidelberg: Springer.

[199] Williamson, J.G. (1974): Late Nineteenth Century American Development: A General Equilibrium History, Cambridge University Press: Cambridge.

[200] Winter-Ebmer, R. and K.F. Zimmermann (1998): East-West Trade and Migration - The Austro-German Case, *IZA Discussion Paper No. 2*.

[201] Wolf, E.N. (1991): Capital Formation and Productivity Convergence over the Long Run, *American Economic Review*, 81 (3), 565-79.

[202] Wood, A. (1994): North-South Trade, Employment and Inequality. Changing Fortunes in a Skill-Driven World, Claredon Press: Oxford.

[203] Wood, A. (1995): How Trade Hurt Unskilled Workers, *Journal of Economic Perspectives*, 9 (3), 57-80.

[204] World Bank (2000): Global Development Finance 2000, Washington D.C.

[205] World Bank (2001): Global Development Finance 2001, Washington D.C.

[206] WTO (2003): World Trade Report 2003, Geneva.

[207] WTO (2005): International Trade Statistics 2005, Geneva.

[208] Zevin, R. (1992): Are World Financial Markets More Open?, in: T. Banuri and J. Schor (eds.): Financial Openness and National Autonomy, Oxford: Oxford University Press.

[209] Zlotnik, H. (1999): Trends of International Migration since 1965: What Existing Data Reveal, *International Migration*, 37, 21-37.

Eidesstattliche Versicherung

Ich versichere hiermit eidesstattlich, dass ich die vorliegende Arbeit selbständig und ohne fremde Hilfe verfasst habe. Die aus fremden Quellen direkt oder indirekt übernommenen Gedanken sowie mir gegebenen Anregungen sind als solche kenntlich gemacht. Die Arbeit wurde bisher keiner anderen Prüfungsbehörde vorgelegt und auch noch nicht veröffentlicht.

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