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Working Paper

Labor markets in the global economy: How to prevent rising wage gaps and unemployment

Kieler Diskussionsbeiträge, No. 305

Provided in Cooperation with:
Kiel Institute for the World Economy (IfW)

Suggested Citation: Gundlach, Erich; Nunnenkamp, Peter (1997) : Labor markets in the global economy: How to prevent rising wage gaps and unemployment, Kieler Diskussionsbeiträge, No. 305, ISBN 3894561521

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KIELER DISKUSSIONSBEITRÄGE

KIEL DISCUSSION PAPERS

305

Labor Markets in the Global Economy: How to Prevent Rising Wage Gaps and Unemployment

by Erich Gundlach and Peter Nunnenkamp

CONTENTS

- The strikingly different labor market performance of major industrial countries suggests that neither globalization nor skill-biased technological change necessarily result in rising unemployment or declining wages of low-skilled workers. Rather, globalization and technological change cause labor market problems in those economies that fail to adjust sectoral production structures in accordance with their comparative advantages.
- Labor market outcomes in Germany – especially when compared with the United States – suggest that high unemployment is the price for insufficient wage flexibility. However, the experience of Japan and the United Kingdom points to missing links in the debate on labor market effects of globalization and skill-biased technological change. In Japan, both unemployment and wage disparities remained low. The contrasting experience is provided by the United Kingdom, where the rising wage gap did not prevent high unemployment of low-skilled workers.
- All major industrial countries have been confronted with fiercer import competition and outsourcing in low-skill labor-intensive industries. But the response to this common challenge has different remarkably. Japan has outperformed its major competitors in restructuring manufacturing employment towards more sophisticated lines of production, and in achieving an appropriate pattern of trade specialization. Hence, structural change is the key to avoid labor market problems in the era of globalization.
- Different labor market outcomes are closely related to differences in the rate of factor accumulation, which comprises physical, human and technological capital. Especially industrial countries currently plagued with high unemployment have little choice but to forego consumption today in order to improve future real incomes and employment opportunities of low-skilled workers. Thus, successful structural change does not come for free.

INSTITUT FÜR WELTWIRTSCHAFT KIEL • August 1997

ISSN 0455-0420

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I. Introduction and Summary

Since the late 1970s, labor markets of many industrial countries suffer from either rising unemployment or from widening wage gaps between high- and low-skilled workers. Over the same time span, international trade and capital flows have intensified and thereby shaped the vision of a global economy: Globalization has become the economic catchword of the 1990s.

Yet, the perception of globalization differs widely in public and academic debate. In public debate, globalization is mainly held to be a threat for labor markets in industrial countries. In a more closely integrated world economy with many new large competitors such as China, India, and Indonesia, jobs of low-skilled workers are expected to disappear in a "giant sucking-sound" and their wages are expected to fall in a "race to the bottom". In academic debate, such presumed effects of a move towards a global economy are heavily discounted for a number of theoretical and empirical reasons. At present, the predominant view seems to be that exogenous skill-biased technological change is the main culprit for the observed labor market problems of industrial countries.[1]

We suggest an alternative interpretation that tries to bridge the gulf between public and academic debate. Our idea is motivated by the significant differences in the labor market performance of four large industrial countries since the late 1970s, namely the United States, Japan, Germany,[2] and the United Kingdom. Fundamentally different outcomes should come as a surprise if either globalization or technological change are at the root of the labor market problems because these shocks should be common to all countries. Nevertheless, we find that each economy considered appears to represent a special case of its own.

In the United States, the wage gap between high-skilled and low-skilled workers has widened while the level and the structure of unemployment have largely remained constant. By contrast, unemployment of low-skilled workers has risen while the wage gap has hardly changed in Germany. These two cases seemingly fit into the pattern to be expected if either globalization or technological change or both have caused the labor market outcomes. However, the goodness of fit is less clear for the United Kingdom where the wage gap has risen, but unemployment of low-skilled workers has increased as well. In the case of Japan, the labor market outcome is completely at odds with explanations based on globalization or technological change: both the wage gap and the unemployment of low-skilled workers have remained basically unchanged.

These empirical puzzles have been largely neglected in the debate up to now. In our view, they call for a reconsideration of prevailing hypotheses. We begin our analysis by a brief review of the empirical evidence and the theoretical arguments that have been advanced in favor of the globalization hypothesis and the skill-biased technological change hypothesis. We conclude that the empirical facts are consistent with the idea that globalization *may* cause labor market problems in industrial countries. The impact of skill-biased technological change is more difficult to assess empirically but it cannot be ruled out on the basis of our findings.

Against this backdrop, we evaluate possible explanations for the observed variety in the structure of unemployment, wages, and employment in the four economies considered. Large differences in changes in manufacturing employment provide a starting point for an assessment of alternative

1 For seminal contributions to the debate, see Lawrence and Slaughter (1993), Bhagwati and Dehejia (1994), Krugman (1995), and, for a dissenting view, Wood (1995). For recent summaries of the debate, mainly with a focus on the United States, see the contributions to the symposia on "Income Inequality and Trade" and on "Wage Inequality" in the Journal of Economic Perspectives (1995, 1997).

2 We refer to West Germany as far as is possible by internationally comparable statistics. We explicitly note the use of pan-German data for years after 1989.

hypotheses. We find that Japan performs best although import competition in low-skilled labor intensive goods and outsourcing of low-skilled labor intensive production have been stronger than in the other three industrial countries. Therefore, globalization per se cannot be held responsible for the labor market problems in industrial countries. Rather, globalization seems to have a negative impact on the labor market of those economies that fail to achieve a sectoral structural adjustment which corresponds to their comparative advantages.

The same reasoning can be applied with regard to skill-biased technological change. Negative labor market effects of skill-biased technological change can apparently be largely avoided by sectoral structural adjustment towards capital and skill intensive industries, as in the case of Japan. However, successful structural adjustment does not come for free. It requires a high rate of factor accumulation. We find that differences in the rate of factor accumulation are closely related to the observed differences in labor market outcomes. Combining the empirical evidence for investment rates, schooling, and R&D expenditures to an aggregate measure of factor accumulation, our results suggest that Japan is well ahead of its competitors. Hence Japan is our success story. By comparison, the other three economies suffered from labor market problems, each in a distinct way and to a different degree.

Our general conclusion is that much of the recent debate on the presumed negative labor market implications of globalization or skill-biased technological change is somewhat misleading with regard to the implied consequences for economic policy. An intensified international division of labor and productivity enhancing technological change are both likely to improve real income or employment in the long run. This is not to deny that in industrial countries, there will be winners and losers of the sectoral structural change necessary to realize the long run gains. But from a macroeconomic perspective, such negative short run adjustment costs should not be confused with the overall positive long run effects.

Although probably appealing at first sight, confining the international division of labor and the application of new technologies, or hindering sectoral structural adjustment, are precisely the wrong economic policy answers to reduce the present labor market problems of industrial countries. The good news for economic policy makers is that the case of Japan can be considered as an example of a successful strategy to master the challenges of globalization and technological change, at least compared to the labor market performance of other industrial countries. Japan has managed to adjust to a changing world economy with rising real incomes but without running into the unemployment problems of Europe and the US problem of drastic wage dispersion.

The less good news, especially for industrial countries with high rates of unemployment, is that improving future real incomes and employment opportunities of low-skilled workers means to forego consumption today. This is necessary to finance the required additional investment in physical and human capital. The way back to labor markets with full employment *and* socially acceptable wage gaps may prove difficult particularly for economies like Germany with a long tradition of rather inflexible labor markets.

II. Globalization versus Technological Change: What Is New and Why Does It Matter?

Facts about Globalization

Globalization or technological change can only be considered as potential causes of labor market problems of industrial countries if they themselves are new phenomena or at least follow a new direction since the late 1970s. To begin with globalization, the world economy of today is, of course, very different from the world economy of two decades ago. Some developing countries (DCs) have already managed to join the club of industrial countries and others are likely to follow suit, some large DCs have emerged as strong competitors on world markets for labor intensive goods, and the number of countries effectively participating in the world economy has grown substantially after the move towards liberalization in many DCs and after the end of socialism in Central and Eastern Europe. These changes may be one reason why it is justified to use the term globalization as indicating a new development.

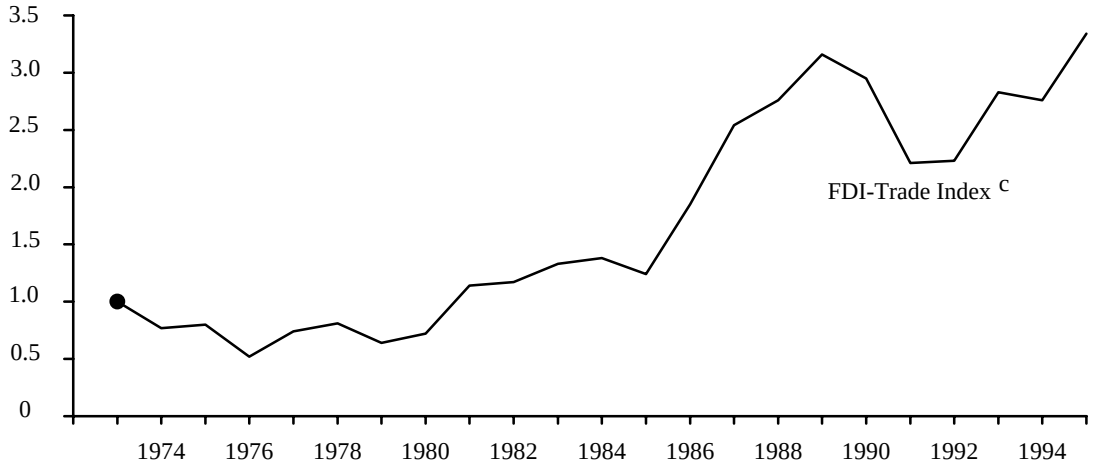
Another reason is that there is a new quality in the increasing international division of labor. While international trade has grown faster than international production for more than thirty years (GATT, var. iss.), the main new aspect is the surge in foreign direct investment (FDI) and in non-equity forms of international investment cooperation (Nunnenkamp et al. 1994). FDI flows have increased even faster than international trade flows since about 1980 (Figure 1).[3] In addition to rising FDI flows, other forms of international investment cooperation such as licensing, joint ventures, and strategic alliances have become more important in recent years as the number of international interfirm cooperation agreements has roughly doubled over the 1980s (OECD 1994). All this should contribute to making new technologies, and partly also firm specific capital, more mobile internationally.

Moreover, the international mobility of physical capital, which has been surprisingly low until the mid 1970s, has substantially increased since the 1980s. Figure 2 shows so-called Feldstein-Horioka coefficients,[4] calculated for a sample of OECD countries for each year in 1960-1995 and for decade averages. These coefficients are estimated by a regression of the investment rate on the saving rate. For a closed economy, saving equals investment. Hence a coefficient of 1 implies that there is no international capital mobility. By contrast, a coefficient of 0 implies perfect international capital mobility since domestic saving rates would be uncorrelated with domestic investment rates. As it stands, international capital mobility is still far from being perfect but it is apparently on the rise. This result suggests that soaring FDI flows are at least partly reflecting real international capital flows.

3 Figure 1 shows the *increase* of FDI relative to the *increase* in trade, not the total amount of FDI relative to trade. In total values, world trade flows were about 20 times larger than world FDI flows in the mid 1990s (GATT, var. iss.; IMF, var. iss.).

4 The seminal paper is Feldstein and Horioka (1980). See Feldstein (1994) for a brief review of the subsequent literature.

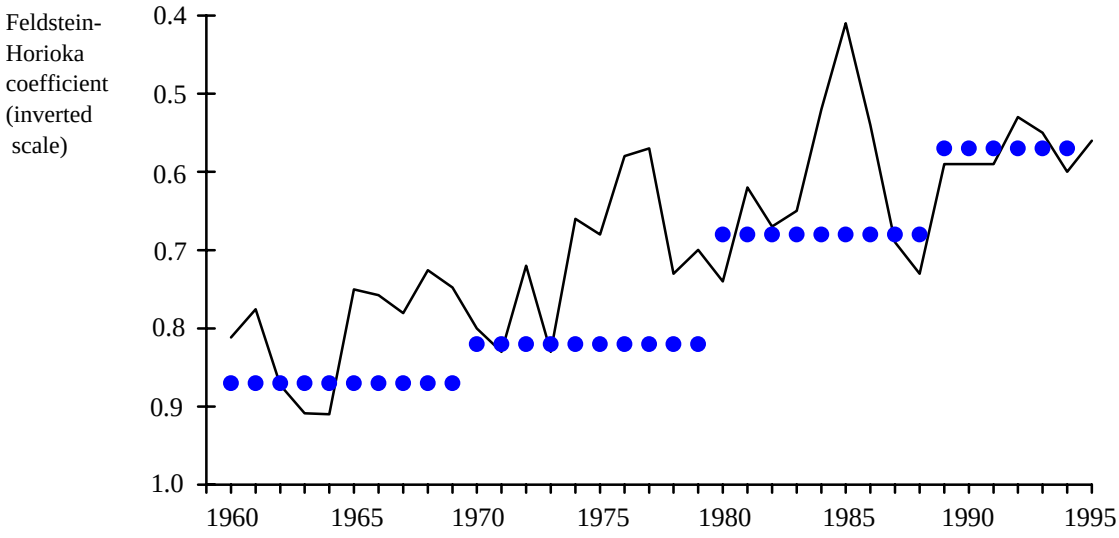
Figure 1 — The Changing Relation of World Trade[a] and FDI[b] Flows, 1973-1995



[a]World merchandise exports. — [b]World foreign direct investment inflows. — [c]World FDI divided by world trade, 1973 = 1.

Source: GATT (var. iss.); IMF (var. iss.).

Figure 2 — International Capital Mobility[a], 1960-1995



[a]Feldstein-Horioka coefficients estimated for annual data (——) and for period averages (○) based on regressions of investment rates on saving rates for 23 OECD countries including West Germany. Data for 1960–1988 taken from Sinn (1992); 1995 excluding West Germany.

Source: OECD (1996b).

All three aspects of globalization - international trade, technology transfer, and capital flows - are dominated by OECD economies up to now. But this is beginning to change. The dynamic East and Southeast Asian economies are rapidly gaining trade and FDI shares, as are some countries in Latin

America and in Central and Eastern Europe. Taken as a group, DCs have roughly doubled their share in world exports of manufactures since 1980 and accounted for almost 40 percent of world-wide FDI flows in recent years, with a strong upward trend especially since the mid-1980s. A more detailed discussion of trade and FDI data reveals that closer economic integration is not confined to regional integration clubs, that DCs are strongly involved in international technology transfer, and that FDI flows to DCs are not just concentrated on a few fairly advanced hosts (Gundlach, Nunnenkamp 1996).

The recent integration of relatively poor countries into the world economy creates new possibilities for the international division of labor. What makes globalization different from previous increases in the international division of labor is the possibility for an international fragmentation of production, i.e., a slicing up of the value chain (Krugman 1995) due to the relatively new mobility of technology and capital flows. The bottom line is that such a development should result in a "lifting all boats" effect (Bhagwati and Dehejia 1994). Globalization should raise the wages or employment of skilled and unskilled workers, because there are potential overall benefits to be derived from an increase in specialization on a world-wide scale. As shown below, however, this will only come true if globalization is accompanied by structural change towards high value added industries and an expansion of the service sector in industrial countries.

Low-skilled workers in industrial countries are most likely to face strong adjustment pressure under globalization. Since China started economic reforms in the late 1970s and India in the early 1990s, the potential world-wide supply of low-skilled labor has increased dramatically. These two economies represent almost 40 percent of the world population. Hence their successful competition for internationally mobile capital and technology can be expected to have stronger effects today than international competition by countries like Singapore and Hong Kong, which roughly represent 0.1 percent of the world population, has had in the past. If the international mobility of technology and capital flows continues to rise, it may become increasingly difficult to maintain substantial international wage differences between workers with comparable skills in the same industry. Hence, sectoral structural change is required as it may provide an escape way for otherwise unavoidable downward adjustment either in the form of declining wages or rising unemployment, mainly of low-skilled workers. It is just that globalization may have shortened the time span available for successful adjustment.

Identifying Technological Change

It is more difficult to assess whether exogenous skill-biased technological change could have played a comparable role. Although predominantly favored as hypothesis for explaining the labor market problems of industrial countries, it is unclear whether skill-biased technological change has increased similar to the international division of labor since the early 1980s. The reason is that technological change is notoriously difficult to identify in empirical analyses. One has to keep in mind that growth rates of total factor productivity, which mainly serve as an indicator of technological change, are measured as a residuum. As such, they may reflect a combination of measurement errors, omitted variables, and true technological change. Apart from these technical problems, it remains unclear how it should be possible to disentangle empirically movements along a production function from shifts of the production function (Nelson 1973). Therefore, total factor productivity growth is usually measured by holding constant an a priori given production function. By implication, a certain form of technological change is assumed from the beginning.

This assumption is critical because only a specific form of technological change could have caused the present labor market problems of industrial countries. The effect of technological change on relative wages and employment opportunities of low-skilled workers depends on a combination of its total rate of change, its intensity in specific sectors of the economy, and its bias against skills. Neutral technological change, which is unbiased against sectors and skills, should lead to a comparable "lifting

all boats" effect as an increase in the international division of labor. And even skill-biased technological change would not necessarily cause labor market problems in the form of rising unemployment or declining wages of low-skilled workers if it is neutral across sectors (Leamer 1996).

Such kind of technological change seems to have prevailed in the past. The history of technological change is a history of unprecedented prosperity, not a history of inevitable impoverishment. For technological change to be the key culprit of labor market problems in industrial countries, one has to assume that technological change has slowed down and thus lifted all boats by less, and has become more skill-biased and more focused on skill-intensive export sectors since the late 1970s than before. Up to now, these possibilities have not been tested empirically, as even proponents of the skill-biased technological change hypothesis admit (Bhagwati and Dehejia 1994).

Second Thoughts on Most Favored Arguments

Given the problems in detecting possible changes in the form of technological change, proponents of the skill-biased technological change hypothesis have concentrated on discounting the empirical evidence brought forward for the presumed labor market effects of globalization. Two routes have been taken to question the empirical relevance of globalization. One argument, derived from growth theory, says that DCs may be delinked from international technology flows in the era of globalization. Hence globalization cannot cause labor market problems for low-skilled workers in industrial countries if DCs were to lose their ability to initiate a catching-up process and were to fall further behind instead (Freeman and Hagedoorn 1994). The other argument relates to the Stolper-Samuelson theorem derived from standard trade theory, which states that globalization should reduce the relative wage of low-skilled workers in industrial countries in response to a decline of the relative price of low-skilled labor intensive goods. Hence globalization cannot be responsible for labor market problems in industrial countries if the relative price of low-skilled labor intensive goods does not fall (Bhagwati and Dehejia 1994).

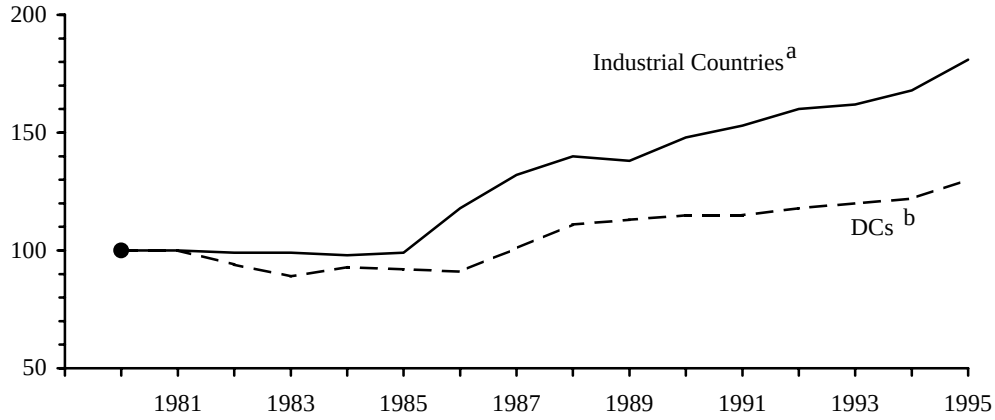
In our view, both arguments are flawed for theoretical and empirical reasons. Moreover, the subsequent discussion suggests that considering globalization and skill-biased technological change as complementary or even alternative explanations for labor market problems is somewhat misleading. This is not to deny that globalization and technological change could actually exert a substantial impact. But neither of the two nor a combination of both provides a sufficient explanation of the observed variety of labor market outcomes.

Relative Prices

We first look at changes in relative prices, where empirical research has mainly focused on US data. Up to now, the evidence is rather mixed. Lawrence and Slaughter (1993) maintain that output prices of low-skilled labor intensive goods have not declined relative to the prices of skill intensive goods. Their findings have been criticized by Sachs and Shatz (1996) for using gross output prices rather than value-added prices and for looking at a very limited number of sectors. Avoiding these deficiencies, their own results show that US prices of low-skill intensive products have fallen markedly in 1979-90. In turn, these results have been criticized by Bhagwati (1996) for arbitrarily omitting computers from the data, which is supposed to be a high-skill intensive product with a declining relative price.

Aggregate international evidence still seems to support the Sachs-Shatz findings for the United States. Minford et al. (1995) show that the unit-value index of manufactured exports of DCs has declined relative to the export unit-value index of industrial countries, especially since the mid 1980s. This result is further accentuated if one takes into account that industrial countries produce relatively more low-skill intensive goods than DCs produce high-skill intensive goods (Figure 3): The unit-value

Figure 3 — Export Prices for Industrial Countries and DCs, 1980-1995



[a]Export price index of machinery and transport equipment (Germany, Japan, Sweden, United States), 1980 = 100. — [b]Unit value index of DCs' manufactured exports (estimate for 1995), 1980 = 100.

Source: UN (var. iss.).

index of manufactured exports of DCs has risen more slowly than the export price index of machinery and transport equipment of (four) industrial countries. In relative terms, it has declined by about 25 percent in 1980-1995.

Different empirical results notwithstanding, it should be noted that a decline in the relative price of low-skilled labor intensive goods is neither a sufficient nor a necessary condition for labor market effects of globalization. It is not a sufficient condition because in the standard 2x2 trade model, globalization and skill-biased technological change would work in the same direction. In this model, changes in the factor price ratio can only come about by changes in the goods price ratio. But a change in the goods price ratio is also the channel through which skill-biased technological change would influence the factor price ratio. Therefore, concluding that globalization is not important as a cause of labor market problems because relative goods prices have not changed, as has been suggested by Lawrence and Slaughter (1993), comes close to concluding that skill-biased technological change cannot be the cause either (Leamer 1996). Or the other way round, both globalization and skill-biased technological change could be the cause of changes in relative goods prices.

Baldwin and Cain (1997) have attempted to circumvent this problem. They subtract a measure of technological change from the observed changes in the goods price ratio in order to identify a measure of the net effect of globalization. For the case of the United States, they find that the net effect of globalization on the goods price ratio and, therefore, on labor markets is negligible. Using the same approach, Lücke (1997) reports the same finding for Germany and the United Kingdom. However, this methodology runs into the aforementioned problems of measuring technological change. E.g., the estimated rate of total factor productivity growth will be biased by an inappropriate measurement of human capital or the exclusion of industry specific factors of production such as R&D expenditures. Moreover, the direction of bias may vary from industry to industry, depending on the industry specific relevance of human capital and other factors of production. On top of this, the principal question remains whether capital accumulation and technological change, proxied by total factor productivity growth, can be treated as independent factors of production.

Avoiding these difficulties, a separate line of research has focused on changes in the factor content of international trade. Borjas et al. (1992) and Wood (1995) conclude that the observed changes could explain the labor market problems of industrial countries. Bhagwati and Dehejia (1994) have criticized

this approach as unconvincing because changes in the factor content of the exports and imports of a country may reflect a change in preferences or an increase in the current account deficit. If so, changes in the factor content of trade do not necessarily have an impact on relative goods prices and, therefore, on relative factor prices. Nevertheless, this line of research has documented that there is a coincidence between observed changes in the structure of international trade and the structure of wages.

What is more, it may be unjustified to reject a possible causal relation between trade and labor markets only on the basis of the standard trade model. In an extended version of the standard trade model, as suggested by Sachs and Shatz (1996), a decline in the relative price of low-skilled labor intensive goods may not even be a necessary condition for adverse labor market effects of globalization. Once physical capital mobility is allowed for, labor markets may be affected by globalization without any change in relative goods prices. This could happen if, as a response to increasing import competition from DCs, outsourcing of low-skill intensive domestic production leaves unchanged the total supply of low-skill intensive products in the home market. Such an impact of outsourcing is revealed by empirical evidence for the US labor market (Feenstra and Hanson 1996).

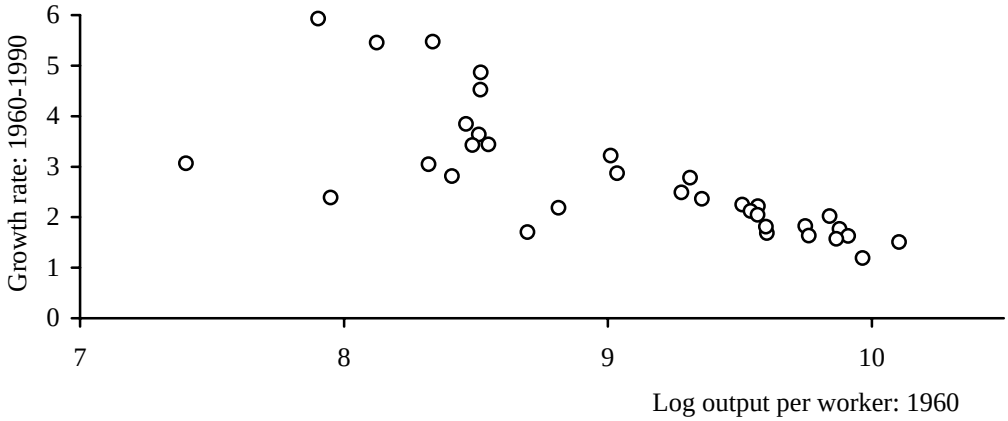
Convergence

Turning to the issue of catching up, the recent literature on convergence has established that there is a tendency for conditional convergence to hold in cross-country data.[5] But *conditional* convergence is not sufficient to allow for an impact of globalization on labor markets because it only means that each economy converges to its own steady state. If steady states differ across countries, there will be no tendency towards factor price equalization. Hence with conditional convergence, absolute international disparities in wage or productivity levels may even widen.

Absolute divergence is indeed what can be observed in the world economy as a whole (Pritchett 1995). A different picture emerges when we look at the performance of those economies that have pursued relatively open trade regimes and protected private property rights. Sachs and Warner (1995) list 34 countries, mainly OECD countries and Southeast Asian economies, that share these features. This specific sample of countries displays a long-run tendency towards absolute productivity convergence (Figure 4). A regression of the growth rate of real GDP per worker in 1960-1990 on the log of real GDP per worker in 1960 produces an adjusted R squared of about 60 percent and an implied convergence rate of 2 percent, which can be rationalized by reasonable parameterizations derived from a growth model with partial capital mobility (see Barro et al. 1995). This finding suggests a tendency towards absolute factor price equalization among economies with reasonably efficient economic policies.

5 For recent surveys, see, e.g. Sala-i-Martin (1996) and de la Fuente (1997).

Figure 4 — Absolute Convergence among Open Economies[a], 1960-1990



[a]Countries with undistorted external trade regimes.

Source: Sachs and Warner (1995); own calculations.

The same reasoning is supported by empirical evidence for a sample of DCs. Many DCs have been found to be open to capital flows according to the Feldstein-Horioka criterion (Montiel 1994). In theory, convergence rates should be about 2.5 times higher for open than for closed DCs if the share of (physical) capital in factor income is about twice as high in DCs as in industrial countries, which is suggested by circumstantial evidence. Empirical results for a sample of open and closed DCs actually confirm a statistically significant difference between the two convergence rates of the predicted size (Gundlach 1997). This supports the view that globalization could have an impact on labor markets by intensifying the otherwise probably fairly slow tendency towards factor price equalization.

However, an empirically confirmed tendency towards factor price equalization does not necessarily imply that real wages of low-skilled workers in industrial countries will fall to levels prevailing in DCs, or fall at all. Such a fall may be prevented by remaining differences between DCs and industrial countries in factor intensities and sectoral structures of the economies. In other words, a tendency towards convergence of productivity and factor prices can be considered as a necessary but not as a sufficient condition for labor market effects of globalization.

Taken together, we maintain that it is extremely difficult if not impossible to empirically disentangle the relative importance of globalization and skill-biased technological change for the labor market performance of industrial countries. In the end, they may prove to be the same thing, especially if capital accumulation and technological change cannot be treated separately as has been suggested in the growth theory of Scott (1989). Against this backdrop, the following presentation of the different labor market performance of four industrial countries since the late 1970s will substantiate our basic proposition: Neither globalization nor skill-biased technological change necessarily result in labor market problems in advanced economies.

III. Labor Market Performance of Four Industrial Countries: Stylized Facts

Much of the recent public debate has blamed globalization for the labor market problems that have plagued industrial economies since the late 1970s. The widening wage gap between high-skilled and low-skilled workers in the United States and the rise of unemployment in Europe, especially of low-skilled workers, have attracted most attention, also in academic debate. The considerable variety of labor market outcomes in major industrial countries should deserve even more attention. We highlight this variety by looking at what we consider to be four prototype cases, namely the United States, Germany, the United Kingdom, and Japan.[6] What we find is somewhat at odds with conventional wisdom. If globalization or skill-biased technological change or both were at the root of labor market problems of industrial countries, rising wage gaps should have been the price to be paid for preventing rising unemployment of low-skilled workers. However, such a clear-cut link from either globalization or skill-biased technological change to labor markets does not seem to exist.

Unemployment and Wages: Two Puzzles

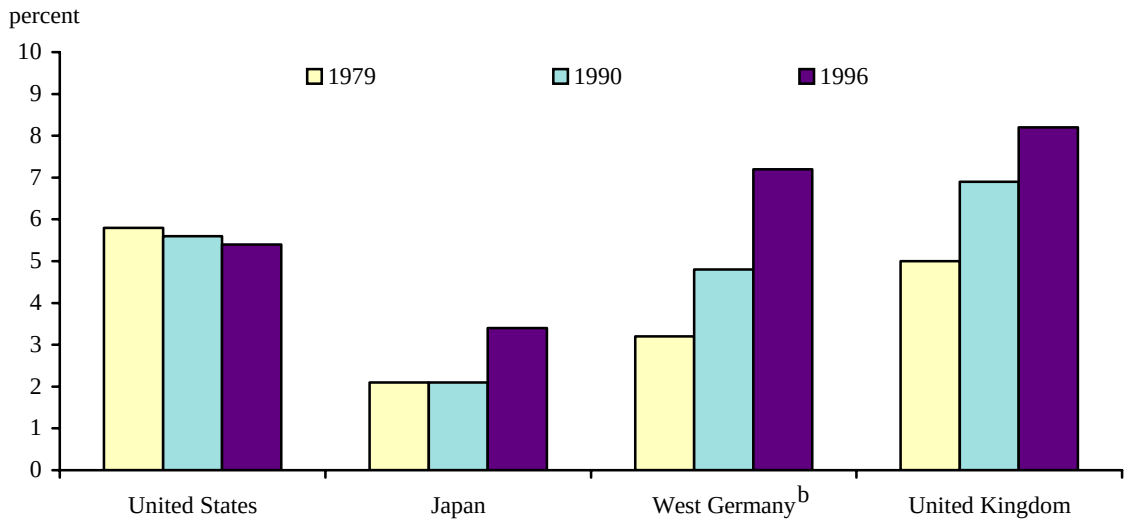
Unemployment in most European economies has steadily increased since the late 1970s. This is in stark contrast to the United States, where the rate of unemployment is back to levels that prevailed two decades ago. At present, unemployment is about twice as high in Europe as in the United States, which is the opposite of the situation in 1970 (Siebert 1997). This empirical fact strongly suggests that the different development of unemployment rates in the United States and in Europe reflects more than just different approaches to measuring unemployment.

There are differences within Europe as well. Especially in the United Kingdom, the rate of unemployment has fallen in recent years. Still, standardized unemployment rates calculated by the OECD reveal that unemployment in the United Kingdom and especially in Germany is much higher today than in 1979 (Figure 5). In Japan, unemployment has also increased since 1990. But this increase mainly reflects the deep Japanese economic recession in the 1990s rather than a long-run trend. By international standards, Japan's unemployment rate is still the lowest even compared to the United States, and this has not changed since the late 1970s. Our bottom line is that we have two economies operating at or near full employment,[7] and two economies operating substantially below full employment.

6 For more detailed information on the labor markets of the United States, Japan, and the United Kingdom, see the recent contributions by Addison (1997), Chuma (1997), and Nickell (1997).

7 Especially in the case of Japan, substantial underemployment could bias the unemployment statistics. We return to this point below when we compare productivity growth rates in manufacturing.

Figure 5 — Unemployment Rates, 1979-1996[a]



[a]OECD standardized unemployment rates. — [b]Estimate for 1996.

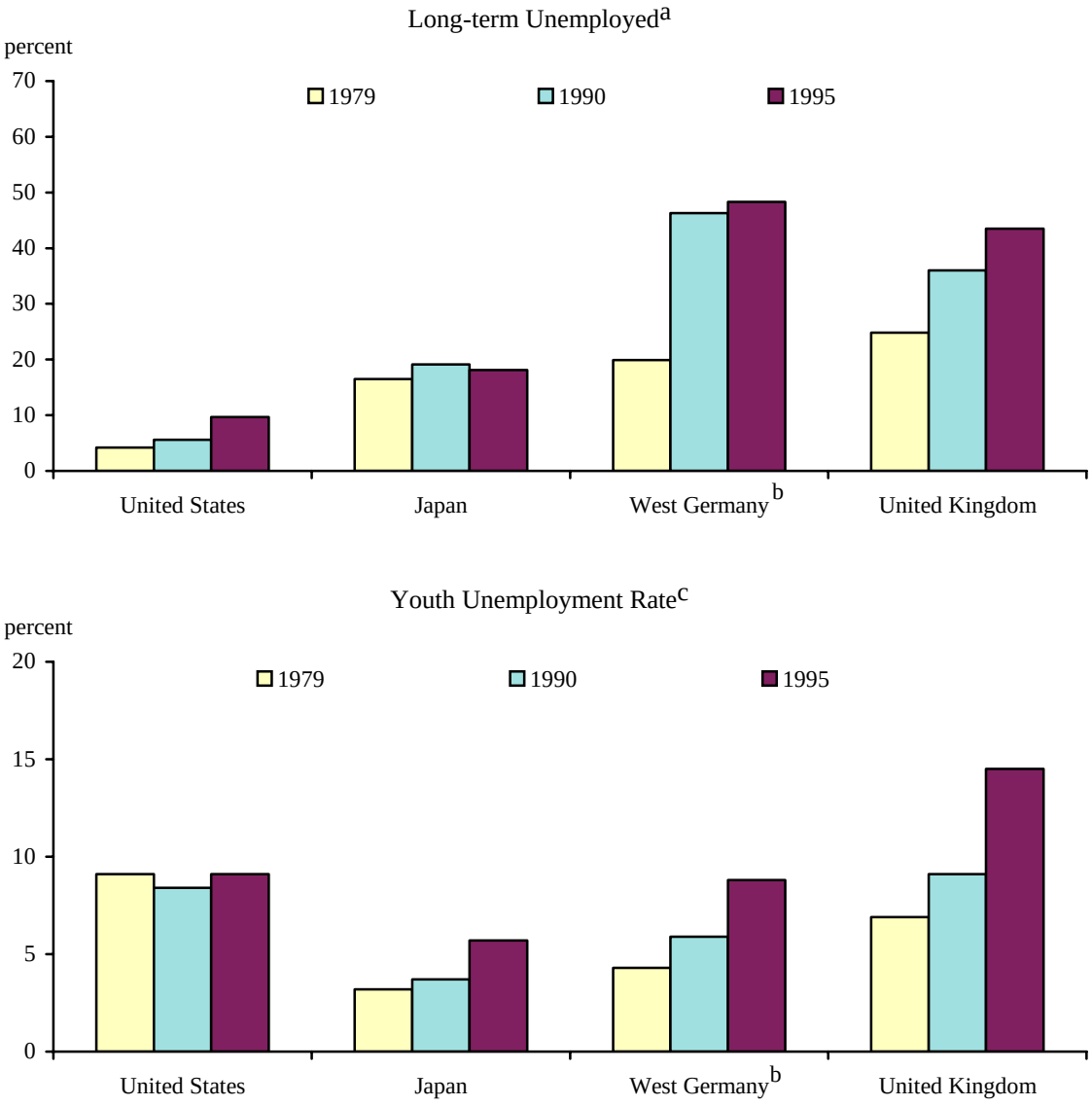
Source: OECD (d).

A similar pattern emerges when we look at the structure of unemployment with regard to different skill levels. The lower end of the spectrum of qualifications is conventionally proxied by measures such as long-term unemployment and youth unemployment. These measures indicate that unemployment of low-skilled workers has become a more severe problem in Germany (with the exception of youth unemployment) and in the United Kingdom than in Japan and the United States (Figure 6). This is again in contrast to the situation in 1979, when Japan, Germany, and the United Kingdom faced rather similar long-term and youth unemployment rates. That is, changes in the *structure* of unemployment also suggest that employment opportunities, especially of low-skilled workers, have worsened in Germany and in the United Kingdom compared to Japan and the United States.

According to conventional wisdom, more favorable employment opportunities simply reflect moderate real wage growth and a more differentiated wage structure. If so, the stylized facts on the level and structure of unemployment would nicely fit into the pattern to be expected if globalization or skill-biased technological change were at the root of the observed changes. However, the empirical evidence on earnings suggests a more complicated story.

Recent changes in real earnings of median paid workers point to a first empirical puzzle (Figure 7). The real earnings of median paid workers are defined as the earnings of the fifth decile in the earnings distribution, deflated by the consumer price index. These earnings declined in the United States by more than 5 percent in 1985-1995. By contrast, real earnings of median paid workers increased in Japan, in Germany, and in the United Kingdom, and the increase was rather similar in a range of about 20 percent for these countries. Accordingly, the more favorable unemployment record of the United States relative to Germany and the United Kingdom does not come as a surprise. However, the case of Japan is striking because median real earnings have grown at European rates, but the level and structure of unemployment has not.

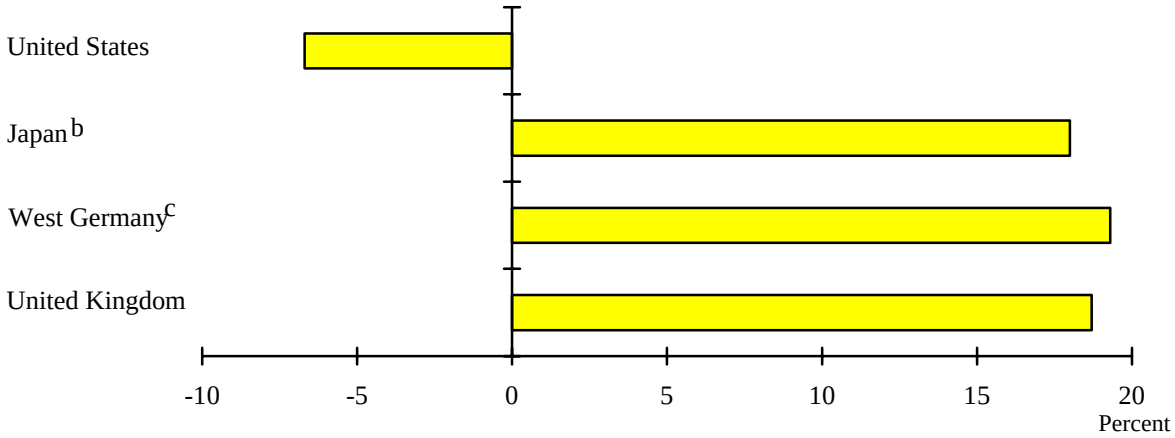
Figure 6 — The Structure of Unemployment, 1979-1995



[a]12 months and over, percentage of total unemployment. — [b]1995 pan-German data. — [c]Age 20-24, percentage of total age group in the labor force.

Source: OECD (a).

Figure 7 — Median Real Earnings, 1985-1995[a]



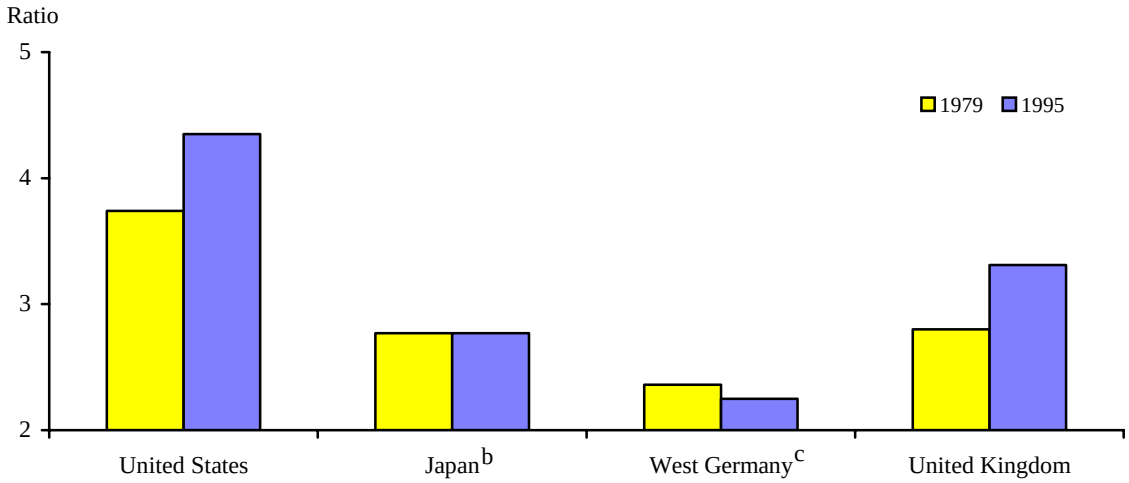
[a]Percentage change of men's earnings of decile 5 of the earnings distribution deflated by the consumer price index; not annualized. — [b]1984-1994. — [c]1983-1993.

Source: OECD (a: 1996).

The second empirical puzzle comes from changes in the distribution of earnings between low-skilled and high-skilled workers. It can reasonably be assumed that the higher end of the earnings distribution represents the wages of high-skilled workers, and the lower end represents the wages of low-skilled workers. Consequently, we divide the earnings of high paid (male) workers by the earnings of low paid (male) workers to obtain a measure of the wage gap between high- and low-skilled workers. Figure 8 then suggests that the wage gap is about twice as high in the United States as in Germany. In 1979-1995, the wage gap has widened in the United Kingdom and in the United States whereas it has slightly narrowed in Germany and remained unchanged in Japan. Here, Japan and the United Kingdom represent a puzzle. Despite a widening wage gap, low-skilled unemployment has increased in the United Kingdom (similar to Germany, where the wage gap narrowed). Conversely, low-skilled unemployment has largely remained unchanged in Japan (as in the United States), although the wage gap has not widened (in contrast to the United States).

Summarizing, the empirical picture requires a more differentiated explanation than pointing to a simple dichotomy of either widening wage gaps or rising unemployment of low-skilled workers. While labor markets in Germany and the United States perform as could be explained by the globalization and the skill-biased technological change hypotheses, labor markets in Japan and the United Kingdom do not. To come to grips with these empirical puzzles, we look at changes in the sectoral pattern of employment next. Our contention is that different degrees of sectoral structural change can explain why economies perform differently when hit by the same set of external shocks such as globalization or skill-biased technological change.

Figure 8 — The Wage Gap[a], 1979 and 1995



[a]Earnings of high paid workers (decile 9) divided by earnings of low paid workers (decile 1). — [b]1979 and 1994. — [c]1981 and 1993.

Source: OECD (a:1996).

Employment by Sectors: Manufacturing Matters

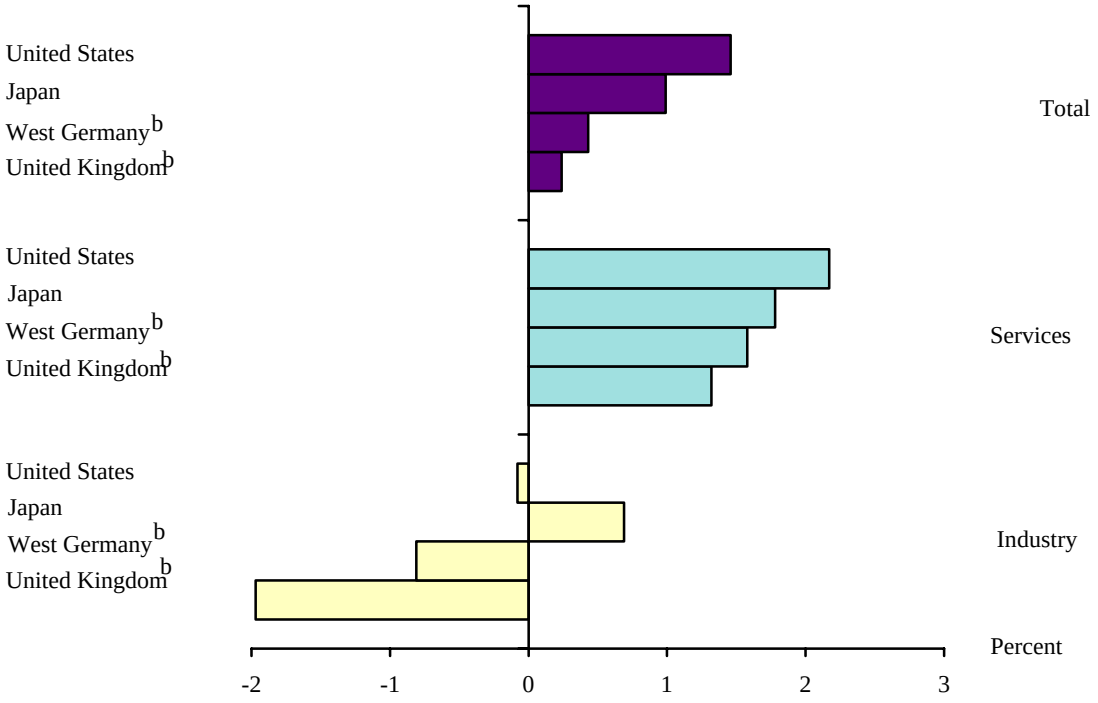
On average, the service sector accounted for about two thirds of total civilian employment in major industrial countries in 1995 (OECD a: 1996, 191).[8] Employment in industry was clearly of minor importance even in Germany, where 38 percent of the labor force was still employed in the industrial sector. It is equally well known that the impressive job creation in the United States was virtually restricted to the service sector.[9] Nevertheless, employment trends in the service sector do not provide a sufficient explanation for the contrasting labor market outcomes in major industrial countries. Differences in employment generation in services are apparently too small to account for the significant differences in unemployment rates. This is not to ignore that the comparatively high employment growth in services has helped the United States to prevent unemployment from rising to, say, the German level. However, employment growth in services in Japan, Germany and the United Kingdom differed less than could be expected from differences in the growth rates of total employment (Figure 9).

This is not to deny that there are differences in the growth of employment in services, but the four industrial countries reveal more sharply diverging trends in industry employment, and these differences bear close resemblance to different unemployment records. Industry employment increased in Japan only, where overall unemployment was exceptionally low. Consequently, the share of industry employment in total civilian employment remained more or less constant in Japan in 1979-1995, which contrasts with significant relative losses in industry employment in the other three industrial countries

8 In the four countries considered here, the service sector's employment share ranged from 59 percent in Germany to 73 percent in the United States. For a detailed assessment of employment trends in Germany's service and industrial sectors, see Klodt et al. (1997).

9 Both total civilian employment and employment in services rose by 26-27 million between 1979 and 1995 (OECD a: 1996, 191).

Figure 9 — Employment Trends in Major Industrial Countries, 1979-1996[a]



[a]Average annual rate of change of civilian employment. — [b]1979-1995.

Source: OECD (g); Statistisches Bundesamt (var. iss.).

(OECD a: 1996, 191). Furthermore, the decrease in industry employment was less pronounced in the United States than in European countries[10] (Figure 9), where unemployment was higher than in the United States.

One may suspect that industry employment has risen in Japan because sectoral structural change has been delayed. Deindustrialization, i.e., the decline of industry employment relative to total employment, will not occur if the typical pattern of higher productivity growth in manufacturing than in services does not hold for Japan.[11] A possible reason for such an outcome could be that Japan has delayed the restructuring of manufacturing output and employment, notably labor retrenchment in industries in which advanced economies no longer have a comparative advantage. If so, productivity growth in manufacturing should be lower in Japan than in other advanced economies. Lower productivity growth in Japan than in other advanced economies could also point to higher rates of underemployment, and thus explain Japan's exceptionally low unemployment rate (see footnote 6).

Yet, the empirical evidence presented in Table 1 is in conflict with this line of reasoning:[12]

10 Relative to total civilian employment, industry employment decreased by 7 percentage points in the United States between 1979 and 1995, compared to 13 percentage points in the United Kingdom (OECD a: 1996, 191).

11 This proposition follows implicitly from the argument that "deindustrialization appears to reflect mainly the impact of unequal rates of productivity growth in manufacturing and services" (IMF 1997: 80). For a theoretical discussion, see Inman (1985) and Gundlach (1994).

12 The United Kingdom is not included in Table 1 because data on value added in constant prices are not available from OECD statistics.

Table 1 — Growth of Output, Employment and Productivity in Manufacturing and Services, 1979-1994[a] (percent)

	United States[b]	Japan	West Germany[b]
Value added (constant prices)			
manufacturing	1.6	3.3	0.4
services	3.0	4.2	3.9
Employment[c]			
manufacturing	-1.1	1.2	-0.5
services	2.6	2.6	2.0
Value added per employee			
manufacturing	2.8	2.2	0.9
services	0.4	1.5	1.8

[a]Annual averages. Services include: wholesale and retail trade, restaurants and hotels; transport, storage and communication; finance, insurance, real estate and business services; community, social and personal services. — [b]1979-1993. — [c]Number of employees.

Source: OECD (f: Volume II).

Comparing Germany and Japan, similar trends are observed in services,[13] which confirms what has been said above. This refers to value added, employment and productivity growth.

The difference in productivity growth between manufacturing and services was most pronounced in the United States. This difference was comparatively small in Japan, but the pattern of higher productivity growth in manufacturing than in services still holds. This should result in deindustrialization. It is rather for Germany that the pattern of productivity growth should have retarded deindustrialization.

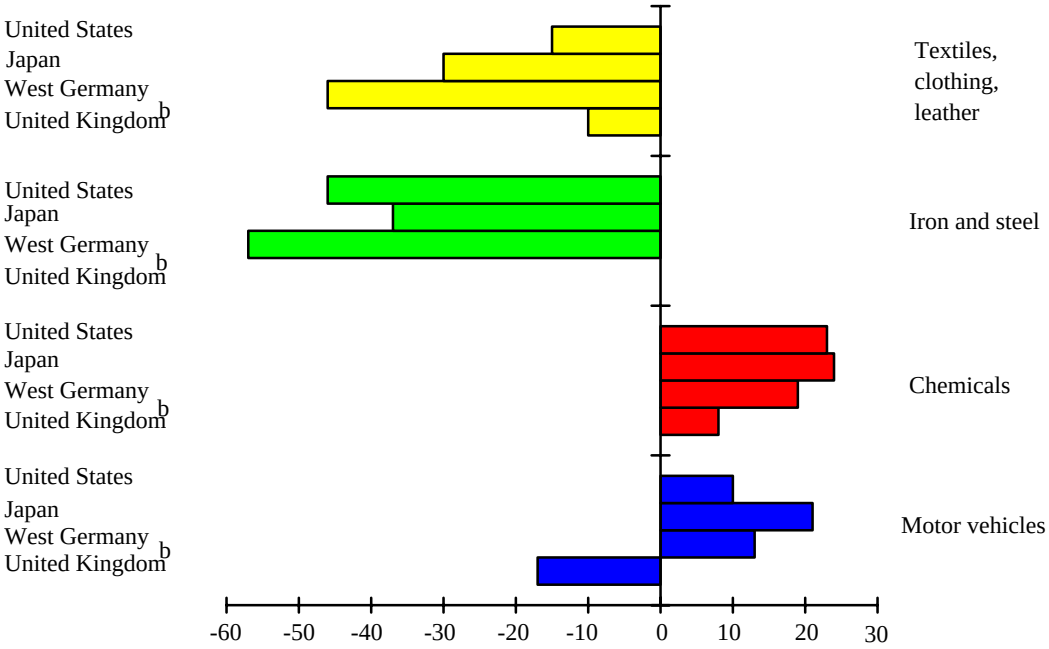
Productivity growth in manufacturing was somewhat lower in Japan than in the United States, but considerably higher in Japan than in Germany. With this productivity record, it is difficult to see how underemployment could be a more severe problem for Japan than for Germany. This suggests that structural change within manufacturing is more likely to be delayed in Germany than in Japan.

The issue of structural change within manufacturing can be analyzed more closely by portraying employment trends in particular manufacturing industries. In Figure 10, we consider four prototype industries: (i) textiles, clothing and leather, the production of which is relatively labor intensive and standardized, (ii) iron and steel, which represents a standardized capital intensive industry, (iii) chemicals, the production of which is also capital intensive but technologically more advanced, and (iv) motor vehicles, which stands for a relatively advanced human capital intensive industry. Successful restructuring within manufacturing then means that employment should shift away from the former two industries to the latter two industries, in which advanced economies are likely to possess a comparative advantage.

Figure 10 assesses structural change in manufacturing in terms of the percentage deviation of employment changes in the industries listed above from the change in aggregate manufacturing employment. It turns out that the decrease of employment in textiles, clothing and leather, relative to the change in overall manufacturing employment, remained modest in the United Kingdom and the United States, where flexible wage policies helped to contain employment losses in labor intensive industries. With more or less unchanged wage dispersion in Germany and Japan, the relative decrease of employment in textiles, clothing and leather was more pronounced, notably in Germany. Likewise, the relative decrease of employment in the iron and steel industry was higher in Germany than in Japan. Not surprisingly, flexible wages in the United States were hardly effective in containing employment losses in this capital intensive industry.

13 Services, as defined in the following, include: wholesale and retail trade, restaurants and hotels; transport, storage and communication; finance, insurance, real estate and business services; community, social and personal services.

Figure 10 — Changes in the Structure of Manufacturing Employment[a], 1979-1994



[a]Percentage deviation from change in aggregate manufacturing employment. — [b]1985-1994. Data for iron and steel not available.

Source: OECD (c).

In absolute terms, Japanese employment in textiles, clothing and leather fell by an average annual rate of 1.4 percent in 1979-1994. This was not only considerably below absolute employment reduction in Germany (4.7 percent per annum in 1979-1993), but also below employment reduction in the United States (2.2 percent) (OECD f: Volume II).[14] At first sight, one may take this as an indication of delayed structural change in Japan. However, employment (number of employees) in textiles, clothing and leather accounted for about 5 percent of aggregate manufacturing employment in Japan in 1993/94, whereas this share was about twice as high in the United States. Moreover, Japan revealed the lowest share of employment in this labor intensive industry among the three countries throughout the 1970s. That is, rather than having delayed structural change, Japan seems to have started restructuring earlier than other industrial countries.[15] Consequently, employment in textiles, clothing and leather was a more serious issue in the United States than in Japan in the 1980s and 1990s.

Successful restructuring in manufacturing depends on whether employment reduction in labor intensive and standardized lines of production goes along with relatively high employment growth in industries in which advanced economies possess a comparative advantage. Here again, Figure 10

14 Absolute employment figures are not available for the United Kingdom from OECD statistics.

15 Timely adjustment in the textiles, clothing and leather industry may have been easier in Japan than in Germany and the United States. Differences in the ratio of employees to all persons employed in this industry in 1979 between Japan (67 percent) on the one hand, and Germany (93 percent) and the United States (99 percent) on the other hand point to a comparatively small average firm size in Japan. This structural peculiarity may have supported adjustment flexibility in Japan. The increase in the ratio of employees to all persons employed to 76 percent in 1994 indicates a process of concentration in Japan's textiles, clothing and leather industry. In Germany and the United States, this ratio has barely changed since 1979.

points to remarkable differences across major industrial countries. The case of the United Kingdom is particularly striking. While employment retrenchment was fairly low by international standards in labor intensive industries, the failure to expand employment in more sophisticated industries seems to be a major reason for labor market problems in this country. The United Kingdom represents the only country where employment in the motor vehicle industry declined even relative to aggregate manufacturing employment. In addition, relative employment growth in chemicals (advanced capital intensive) in the United Kingdom remained substantially below that in the other three countries.

Japan provides the contrasting case. While relative employment growth in the chemical industry of Japan was only slightly higher than in the chemical industry of the United States, Japan stands out by a wide margin in terms of relative employment growth in the motor vehicles industry. Figure 10 further suggests that the United States ranked only third with respect to employment restructuring in this industry, though by a small margin compared to Germany.

Taken together, employment trends in manufacturing are clearly related to labor market outcomes in major industrial countries. Structural change appears to be the critical issue in countries attempting to prevent both high unemployment and widening income differentials when subjected to fiercer worldwide competition. Japan has been most successful in avoiding labor market problems mainly by restructuring manufacturing employment. It fits into this picture that the United Kingdom, where income differentials widened but unemployment problems remained, has a particularly poor record on structural change.

IV. Adjustment to Globalization in Manufacturing: Trade and FDI Flows

The subsequent analysis of trade and FDI patterns provides further evidence on the differences between major industrial countries in terms of adjusting to the changing international economic environment. First, we show that the adjustment needs stemming from import pressure and outsourcing were at least as pronounced in Japan as in Germany, the United Kingdom and the United States.[16] In other words, the poor labor market performance of European countries is not because these economies were subject to more severe competitive pressure. Second, we present some indicators which suggest that industrial countries responded differently to apparently similar challenges. Specifically, successful restructuring of exports has helped Japan to avoid negative employment and wage implications of fiercer world-wide competition. By contrast, trade patterns support the notion of a particularly slow pace of structural change in the United Kingdom, which may explain why significant wage differentiation did not prevent relatively high levels of unemployment.

Import Pressure and Outsourcing

We assess import trends and the magnitude of outsourcing by means of FDI, in order to check whether adjustment needs differed between major industrial countries and whether such differences were related to labor market outcomes. Adjustment needs tend to be related positively (i) to the growth of imports in industries that are relatively labor intensive and use standardized technologies, especially the growth of imports from non-OECD countries, and (ii) to the relative importance of outward FDI in

16 Japan's large current account and trade surpluses may encourage the view that there must be special barriers such as the often quoted Japanese business organizations (keiretsu) to accessing the Japanese market. If so, the Japanese economy may not be subject to the same degree of international competition than the US or European economies. However, recent research has shown that such a claim cannot be maintained. There is little empirical evidence that Japan's trade regime is different and although Japan's economic institutions may be distinctive, there is little empirical evidence that they produce outcomes which distort the international economic system (Saxonhouse 1993; Drysdale 1995).

such industries.[17] According to Table 2, overall imports of labor intensive and standardized goods rose two- to threefold in the United Kingdom and Germany between 1980 and 1994. The growth of such imports was much more pronounced in the United States and Japan. Labor intensive and standardized imports from non-OECD countries soared more than tenfold in Japan, whereas import pressure from non-OECD countries was rather weak in the United Kingdom. As a result, the two European countries accounted for a declining share in labor intensive and standardized OECD imports from non-OECD countries, whereas Japan and the United States absorbed a rising share of such imports. Moreover, about two thirds of labor intensive and standardized imports of Japan and the United States originated from non-OECD countries in 1994, compared to less than 40 percent in Germany and the United Kingdom. All this implies that the weak labor market performance of the latter two countries cannot be attributed to more serious import related adjustment needs.

Table 2 — Imports of Labor Intensive and Standardized Goods in Major Industrial Countries[a]

	United States	Japan	Germany[b]	United Kingdom
Imports, 1994 relative to 1980, from:				
World	6.2	8.3	2.9 (2.1)	2.2
non-OECD	6.5	10.6	4.4 (2.9)	1.5
Share in OECD imports from non-OECD (percent):				
1980	32.2	6.2	13.6	23.3
1994	42.2	13.3	12.2 (8.0)	7.0
Share of imports from non-OECD in total imports (percent):				
1980	61.5	53.2	25.7	56.5
1994	64.1	67.8	39.9 (35.7)	39.2

[a]Sum of the following SITC categories: leather (61), cork and wood manufactures (63), non-metallic manufactures (66), office machines and ADP equipment (75), furniture (82), travel goods (83), clothing (84) and footwear (85). 1994-figures are estimated on the basis of growth rates in 1980-1993 for categories 61, 63, 82 and 85 (SITC revision 2), in order to minimize distortions arising from discrepancies between SITC revisions 2 and 3. For the remaining categories, such discrepancies were marginal or non-existent. — [b]Data for 1994 refer to unified Germany. Figures in parentheses are estimates which correct for the break in imports resulting from German unification in 1990. These estimates are based on average West German import growth rates in 1980-1989 and pan-German import growth rates in 1991-1994. These growth rates are used to calculate the unification-adjusted figures for 1994.

Source: OECD (b).

This reasoning is supported by the - admittedly tentative - empirical evidence on outsourcing. The assessment of outsourcing via outward FDI in industries that suffer from comparative disadvantages in advanced industrial economies is subject to considerable data constraints. On the one hand, outsourcing may take place in various ways, such as offshore processing and subcontracting, that escape FDI statistics.[18] On the other hand, the motives underlying outward FDI are mixed and it is almost impossible to discriminate between outsourcing motives (or, in UNCTAD's jargon, efficiency seeking FDI) and market related motives (market seeking FDI).[19] Furthermore, in contrast to trade statistics, the sectoral disaggregation of FDI statistics is typically not differentiated enough to cover

17 For the manufacturing industries the production of which is considered to be relatively labor intensive and standardized, see note *a* in Table 2. In all these industries, the OECD as a whole had a considerable import surplus in 1989, vis-à-vis both the world and non-OECD countries.

18 On the role of offshore processing and subcontracting in globalized production of textiles and clothing, see Nunnenkamp et al. (1994: 74ff.) and the literature given there.

19 UNCTAD (1996b: 97) defines efficiency seeking FDI as FDI that seeks to optimize gains from integrating geographically dispersed manufacturing and service activities within corporate systems. This type of FDI is considered to be the hallmark of the response of multinational corporations to the changing international environment, while "one of the most important traditional FDI determinants, the size of national markets, has decreased in importance" (ibid).

the spectrum of labor intensive and standardized industries considered in Table 2. Finally, comparable data on industry specific FDI relations between major industrial countries and particular host countries and regions are not available. As a consequence, the picture on the significance of outsourcing remains rough and incomplete.

We focus on outward FDI in the textiles, leather and clothing industry, which is clearly labor intensive relative to other manufacturing industries covered by FDI statistics (OECD 1996a). In addition, we compare the share of non-OECD hosts in total FDI outflows of major industrial countries, and in particular the share of South and East Asia. This is because efficiency seeking FDI is widely believed to figure more prominently in various Asian host economies than in other parts of the Third World.[20] Hence, adjustment pressure related to outsourcing should be higher in industrial countries with relatively large outward FDI in textiles, leather and clothing on the one hand, and in South and East Asia on the other hand.

The available evidence leads us to reject the idea that outsourcing resulted in stronger adjustment pressure in European economies than in other countries. Outward FDI stocks in manufacturing, i.e., the sector in which global sourcing takes place primarily, expanded at a similar rate in all countries except Germany, where outward FDI stocks in manufacturing were rather stagnant (Table 3). Outward FDI in the textiles, leather and clothing industry figured most prominently in Japan.[21] Comparing the share of this industry in outward FDI stocks in total manufacturing across our four sample economies, suggests that outsourcing of Japanese production of labor intensive goods started earlier than elsewhere.[22] The regional distribution of FDI outflows provides another indication of relatively low adjustment pressure in European economies stemming from outsourcing. The share of non-OECD hosts and particularly the share of South and East Asia in German and UK FDI outflows remained substantially below the respective shares in Japanese and US FDI outflows. The United States undertook more than a third of

Table 3 — Outward Foreign Direct Investment of Major Industrial Countries

	United States	Japan	Germany[a]	United Kingdom
Outward FDI stocks in manufacturing, 1994 relative to 1985 (national currency)	2.3	2.4	1.2	2.3[b]
Share of textiles, leather and clothing in outward FDI stocks in manufacturing (percent)				
1985	1.3	8.2	1.1	n.a.
1994	1.1	4.8	2.6	2.8
Regional shares in total FDI outflows, 1985-1994 (percent):[c]				
Non-OECD[d]	37.3	27.8	9.8	16.0
South and East Asia	8.2	14.8	2.5	5.1

[a]OECD figures cover unified Germany from mid-1990 onwards.— [b]1994 relative to 1987. — [c]Period averages. — [d]Mexico included.

Source: UNCTAD (1996b: Annex table 5); OECD (1996a).

20 Especially in FDI relations among Asian countries, efficiency seeking FDI plays a significant role (UNCTAD 1995: Box V.4; UNCTAD 1996a: 81-86).

21 In absolute terms, outward FDI stocks in this industry in 1994 amounted to US$ 1.8 billion in Germany, US$ 2.4 billion in the United States, US$ 3 billion in the United Kingdom, and US$ 6.2 billion in Japan (OECD 1996a).

22 For further evidence to this effect, see Oman (1989) and Nunnenkamp et al. (1994).

total FDI in the non-OECD area in 1985-1994. However, US investors preferred Latin American over Asian FDI locations. In Latin America, the bulk of FDI is widely considered to be market seeking, rather than efficiency seeking, which is because of lasting import substitution strategies pursued by many Latin American governments in the past (Nunnenkamp 1997). By contrast, the high share of South and East Asia in Japanese FDI outflows supports the view that efficiency seeking FDI played a comparatively important role for Japan.

Patterns in Trade Specialization

The evidence presented so far indicates that delaying structural change was no reasonable option for Japan. The pressure to adjust was apparently more pronounced than in other industrial countries. Trade data indeed suggest that Japan adjusted rather rapidly to fiercer worldwide competition, especially in comparison with the United Kingdom. In this context, the IMF argues that the rise in the share of manufacturing output in real GDP in Japan reflects "the rising manufacturing trade surplus in Japan" (IMF 1997: 78). Strikingly, however, Japan's trade surplus in total manufacturing remained stable at about 10 percent of GDP since the late 1970s, while the share of manufacturing output in real GDP increased exactly since then (IMF 1997: Charts 20 and 21). Hence, the restructuring of trade within manufacturing appears to be more important for real output growth and employment generation in manufacturing than the overall trade balance.

Table 4 compares the export performance of major industrial countries in relatively capital and skill intensive SITC categories, in which these countries should have a comparative advantage.[23] It turns out that industrial countries differed remarkably in making use of the opportunities provided by globalization by expanding capital and skill intensive exports. Comparing 1980 and 1994, such exports more than tripled in the case of Japan, whereas they did not even double in the case of the United Kingdom. As a result, it was mainly the United Kingdom whose share in total OECD exports of capital and skill intensive goods declined between 1980 and 1994. Among the four economies considered here, only Japan reported a rising share in OECD exports of capital and skill intensive goods.

Table 4 — Exports of Capital and Skill Intensive Goods of Major Industrial Countries[a]

	United States	Japan	Germany[b]	United Kingdom
Exports, 1994 relative to 1980	2.3	3.2	2.4 (2.3)	1.8
Share in OECD exports (percent)				
1980	18.6	13.8	19.4	9.4
1994	17.0	17.0	18.0 (17.4)	6.7

[a]Sum of the following SITC categories: organic chemicals (51), dyeing materials (53), pharmaceuticals (54), perfumes, etc. (55), manufactured fertilizers (56), paper products (64), power generating machinery (71), specialized machinery (72), metalworking machinery (73), general industrial machinery (74), road vehicles (78), other transport equipment (79), scientific instruments (87), and photographic apparatus, optical goods and watches (88). 1994-figures are estimated on the basis of growth rates in 1980-1993 for category 72 (SITC revision 2), in order to minimize distortions arising from discrepancies between SITC revisions 2 and 3. For all remaining categories, such discrepancies were marginal or non-existent. — [b]Data for 1994 refer to unified Germany. Figures in parentheses are estimates which correct for the break in imports resulting from German unification in 1990. These estimates are based on average West German import growth rates in 1980-1989 and pan-German import growth rates in 1991-1994. These growth rates are used to calculate the unification-adjusted figures for 1994.

Source: OECD (b).

23 For the manufacturing industries considered to be relatively capital and skill intensive, see note *a* in Table 4. In all these industries, the OECD as a whole had a considerable export surplus in 1989.

A more detailed assessment of manufactured imports and exports on the two-digit SITC level provides further evidence on the degree of specialization in trade.[24] First of all, it is notable that the variation in export growth rates across manufacturing industries was largest in Japan (standard deviation: 2.1), and particularly low in the United Kingdom (1.0) and Germany (0.7). The calculation for Germany may be distorted because data for 1994 refer to unified Germany, whereas data for 1980 refer to West Germany. However, the picture changes little if the standard deviation is calculated on the basis of West German export trends in 1980-1989.

Furthermore, changes in the export and import structure of Japan are correlated with the trade balance of the OECD as a whole in the SITC categories under consideration. Taking the trade balance of the OECD in 1989 as an indicator of revealed comparative advantage (RCA) of industrialized countries,[25] export growth should be positively correlated with RCA values and import growth should be negatively correlated with RCA values. This is indeed the case for Japan, where the correlation coefficients are 0.36 for exports and -0.53 for imports. Correlations are much weaker for the other three countries, and some of them even have an unexpected sign. Most surprisingly perhaps, RCA values are correlated negatively with export growth of both the United Kingdom and the United States.

The correlation coefficients change little if RCA values are computed for OECD trade with non-OECD countries instead of OECD trade with the world as before. The alternative RCA values are correlated with the growth of exports to non-OECD countries and with the growth of imports from non-OECD countries. This alternative procedure accounts for the possibility that the correlations reported for total exports and imports are shaped by the prominence of intra-industry trade among OECD countries in various SITC categories. Nevertheless, we find that Japan still reveals statistically significant correlation coefficients with the expected signs. However, RCA values continue to be correlated negatively with export growth in the case of the United Kingdom and in the case of the United States if the calculation is based on trade with non-OECD countries.

V. The Secret of Success: Factor Accumulation

Two conclusions emerge from the preceding analysis. First, the empirical evidence on low-skilled labor intensive imports and outsourcing indicates that the strongest adjustment pressure coincides with the most favorable labor market performance, namely in the case of Japan. Second, the idea that the relatively positive labor market experience of Japan may reflect delayed sectoral structural adjustment does not square with the observed changes in the structure of employment in manufacturing and international trade. Rather, successful restructuring in the past appears to have supported the labor market performance of Japan while structural rigidities appear to be a major reason for the labor market problems in the other industrial countries, notably in the United Kingdom.

This raises the obvious question of what determines success and failure in adjusting the sectoral structure of an economy to global economic change. The determinants that have been identified for the case of DCs are openness, macroeconomic stability, and factor accumulation (Gundlach, Nunnenkamp 1996). For industrial countries, differences in openness and macroeconomic stability play a relatively minor role, at least for the period since the late 1970s. Therefore, the role of factor accumulation deserves closer inspection.

24 The subsequent calculations are based on 30 two-digit SITC categories (SITC 5-8). SITC categories 57-59, 81 and 89 were excluded because of large discrepancies between SITC revisions 2 and 3. We consider exports and imports in 1994 relative to 1980.

25 We measure revealed comparative advantage as the difference between OECD exports and imports divided by the sum of OECD exports and imports. Consequently, our indicator of revealed comparative advantage may range from -1 (no exports) to 1 (no imports).

We use a broad concept of capital including physical, human, and technological capital to identify differences in the rate of factor accumulation between the four economies considered. We measure physical capital accumulation by the average share of investment in GDP. Human capital accumulation is more difficult to assess. We use average years of schooling as an indicator of past investments in human capital. To control for possible differences in the quality of education, we introduce measures of student cognitive performance in various international tests of academic achievement. Finally, we use the average share of R&D expenditures in GDP to identify possible differences in the rate of technological capital accumulation.

Table A 1 in the appendix presents an overview of our basic results. We calculate average investment rates from the Penn World Tables (PWT 5.6 1994) for the 1970s and the 1980s. For the 1990s, we use investment rates from World Bank (var. iss.). To make both data series comparable, we adjust the World Bank data by the average difference between the two series in 1990-1992. This adjustment has only a small impact on the relative size of investment rates. We find substantial differences in investment rates, which are fairly constant over time: Japan's investment rate is about 10 percentage points higher than the German rate, about 15 percentage points higher than the US rate, and about twice as high as the rate of the United Kingdom.

There are also large differences in the quantity and quality of schooling. According to the calculations by Barro and Lee (1994), the average person over age 15 had nearly three more years of schooling in the United States than the average person in the other three countries in 1990, which is a slight reduction of differences compared to 1980. The quality of schooling is measured by student achievement in standardized international tests in the fields of mathematics and science. Such tests have been performed for certain levels of primary and secondary education for a number of countries since the 1970s. Hanushek and Kim (1995) combine all of the available information on mathematics and science scores to develop a single index measure of the quality of education. Their results indicate that the quality of schooling is better in Japan than in the other three countries, and especially better than in the United States (Table A 1).

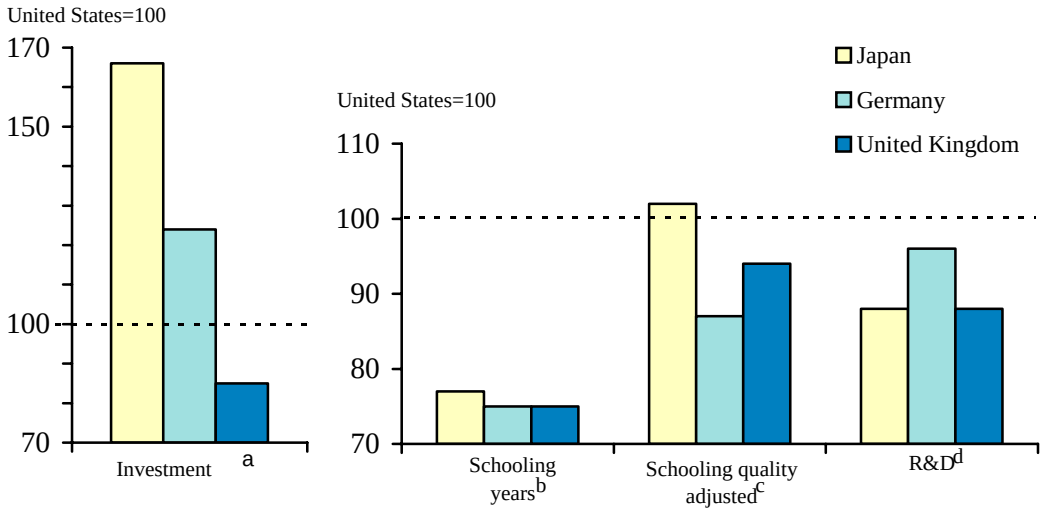
The accumulation of technological know-how has also been suggested as an important factor of production that may explain differences in output performance across OECD economies (Nonneman and Vanhoudt 1996). Table A 1 reveals that differences in R&D expenditures, which serve as a proxy for technological capital accumulation, appear to be of minor importance across the four economies considered. Nevertheless, the long-run increase of R&D expenditures in Japan should be noted. In the 1990s, Japan has spent relatively more on R&D than the other three countries.

In the following, we focus on average investment rates and average R&D expenditures in 1970-1989 and on average years of schooling in 1990 as an indicator of past investments in human capital. This is because the effects of factor accumulation are likely to appear with a lag on labor markets. To make comparisons across countries easier, Figure 11 presents all measures in relation to the US level. Furthermore, we multiply the quantity and quality measures of schooling to obtain a quality adjusted proxy of human capital formation.[26]

Figure 11 reveals that the significant lead of the United States in the quantity of schooling is substantially reduced, and vanishes completely compared to Japan, once the quality of schooling is taken into account. It also turns out that Germany performs better than the United States in investment

[26] Multiplication of the measures of quantity and quality of schooling can be justified as follows. Consider a conventional production function with human capital as one of the input factors. The true measure of human capital formation is not known but assumed to be quantity times quality of schooling. An empirical test of this assumption amounts to entering quantity and quality as separate right-hand-side variables of the production function and testing the restriction that their estimated regression coefficients be equal. Preliminary regression results derived from cross-country data suggest that such a restriction cannot be rejected for statistical reasons.

Figure 11 — Factor Accumulation Compared



[a]Average share of investment in GDP, 1970-1989. — [b]Average schooling years in 1990. — [c]Average schooling years multiplied by quality index. — [d]Average R&D expenditures as a share of GDP, 1970-1989.

Source: See Table A 1.

but worse in all other fields. Japan is clearly ahead of Germany with regard to physical and quality adjusted human capital formation. Another remarkable finding is that the United Kingdom lags behind all countries in all fields, except for quality adjusted schooling where Germany takes the last position.[27]

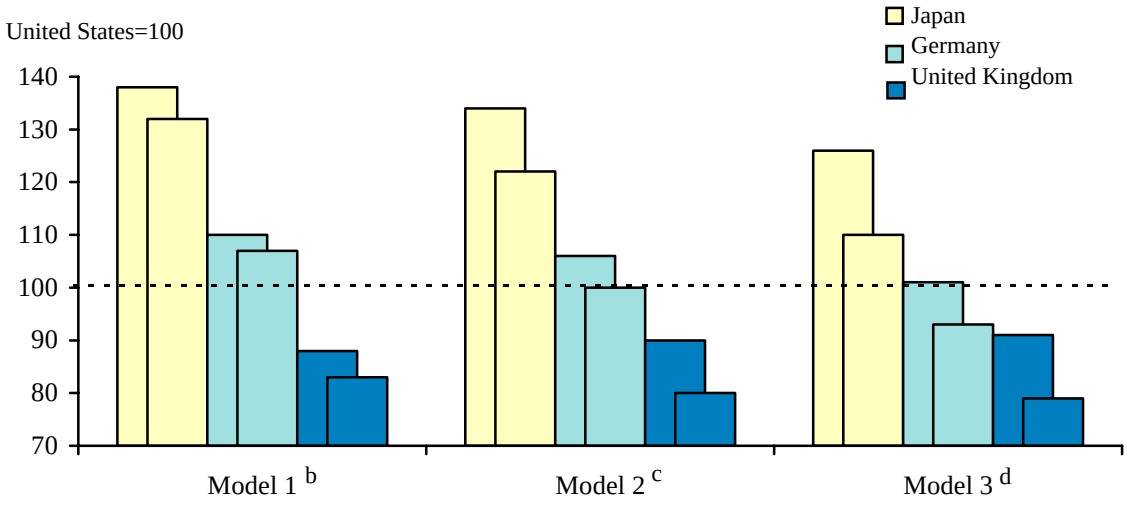
The next question is how the different indicators of factor accumulation can be aggregated into a single measure of capital formation. Such a measure would allow for an overall assessment of the observed differences. We summarize our findings by weighting each input factor by its production elasticity. To check the robustness of our calculations, we use alternative proxies for human capital (quantity of schooling and quality adjusted schooling) and different sets of production elasticities for physical, human, and technological capital. We apply three sets of production elasticities that have been estimated for slightly different models in recent contributions to the empirics of economic growth. The general production function underlying all models reads:

$$Y = K^{\alpha}\left(H*Q\right)^{\beta} T^{\gamma} L^{(1-\alpha-\beta-\gamma)},$$

where Y is GDP, K is physical capital, H is quantity of human capital, Q is quality of human capital, T is technology, and L is the labor force. Model 1, estimated by Nonneman and Vanhoudt (1996), suggests that $\alpha = 0.35$, $\beta = 0.15$, and $\gamma = 0.085$. Model 2, estimated by Mankiw et al. (1992), ignores technology accumulation and suggests that α and β equal 0.33. Model 3, estimated by Gundlach (1995), also ignores technology accumulation but suggests that $\alpha = 0.3$ and $\beta = 0.5$. Based on these production elasticities and the data shown in Figure 11, aggregate indexes of overall capital formation are presented in Figure 12 (and in Table A 2), again relative to the results for the United States.

27 The unfavorable result for Germany may be surprising. The German system of education and training is widely believed to be superior to that of the United Kingdom. It is consistent with this view that youth unemployment is lower in Germany than in the United Kingdom. This may point to shortcomings of our indicators of investments in human capital. Germany may have its strengths in vocational training and apprenticeships, which escape the indicators used here.

Figure 12 — A Capital Gap: Three Models[a]



[a]For each model, estimates for two measures of human capital as discussed in the text. Estimates with schooling quantity represented by fully visible bars; estimates with schooling quantity times quality in the background. — [b]$\alpha = 0.35$, $\beta = 0.15$, $\gamma = 0.085$. — [c]$\alpha = \beta = 0.33$. — [d]$\alpha = 0.3$, $\beta = 0.5$.

Source: Table A 2.

Our calculations are fairly robust across the two alternative measures of human capital and also across the different sets of production elasticities. The findings help explain the empirical puzzles that we observed for the labor markets in section III. On the one hand, Japan has had a higher rate of overall factor accumulation than all other countries in 1970-1989. We consider this to be the basic reason for Japan's comparatively good labor market performance since the late 1970s. On the other hand, the United Kingdom has had a less successful labor market performance than the United States because of a substantially lower overall rate of factor accumulation, notwithstanding similar changes in the wage gap.

The results for Germany and the United States are also striking. On average, Germany and the United States display a fairly similar index of overall factor accumulation. We interpret this finding as indicating that Germany and the United States face comparable labor market problems in the sense that the rising unemployment of low-skilled workers in Germany is the counterpart of the widening wage gap between high- and low-skilled workers in the United States. However, this comparison should not be misinterpreted as indicating a comparable need for adjustment in Germany and the United States. The need for adjustment is stronger in Germany because high and rising levels of unemployment imply losses in the stock of human capital, at least if human capital is not only accumulated at school but also on the job. Such losses do not show up in our data which, therefore, probably underestimate the required adjustment for economies with high levels of unemployment.

On the basis of these results, it is tempting to speculate about the future. Present rates of factor accumulation may hint at future prospects for labor markets. Data for the 1990s (Table A 1) suggest that Japan has further increased investment and R&D expenditures, both in absolute terms and relative to the other three economies.[28] Thus, Japan is more likely than not to keep its relatively good labor market record over the next years, at least compared to the United States, Germany, and the United Kingdom.

28 For average years of schooling, no data are available for the 1990s.

Table A 1 — Components of Factor Accumulation

	United States	Japan	Germany	United Kingdom
Investment[a]				
1970-1979	21.5	37.2	28.5	18.9
1980-1989	21.0	33.4	24.4	17.0
1990-1994	19.6	37.4	25.8	16.7
Schooling				
Quantity[b] 1980	11.9	8.5	8.4	8.3
1990	11.7	9.0	8.8	8.8
Quality[c]	52.3	69.3	60.8	65.6
R&D[d]				
1970-1979	2.5	1.9	2.2	2.2
1980-1989	2.7	2.7	2.7	2.3
1990-1994	2.7[e]	2.9	2.5[f]	2.2

[a]Average investment as a share of GDP, in percent. — [b]Average years of schooling in the total population over age 15. — [c]Test scores transformed into "percent correct" format. — [d]Average R & D expenditures as a share of GDP, in percent. — [e]1990-1996. — [f]1990-1995.

Sources: Barro and Lee (1993); Hanushek and Kim (1995); OECD (e); PWT 5.6 (1994); World Bank (var. iss.).

Table A 2 — A Capital Gap: Three Models[a,b,c]

Alternative models	Schooling quantity	Schooling quantity times quality
Model 1: $\alpha = 0.35$, $\beta = 0.15$, $\gamma = 0.085$		
Japan	132	138
Germany	107	110
United Kingdom	83	88
Model 2: $\alpha = 0.33$, $\beta = 0.33$		
Japan	122	134
Germany	100	106
United Kingdom	80	90
Model 3: $\alpha = 0.3$, $\beta = 0.5$		
Japan	110	126
Germany	93	101
United Kingdom	79	91

[a]United States = 100. — [b]General production function: $Y = K^{\alpha}(H*Q)^{\beta}T^{\gamma}L^{(1-\alpha-\beta-\gamma)}$, where Y is GDP, K is physical capital, H is quantity of human capital, Q is quality of human capital, T is technology, and L is the labor force. — [c]See Nonneman and Vanhoudt (1996) for model 1, Mankiw et al. (1992) for model 2, and Gundlach (1995) for model 3.

Source: Table A 1; own calculations.

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