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Employment and productivity in industrialized economies

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Employment trends in the industrialized economies became remarkably divergent in the 1970s and 1980s. Inter-country variations in the growth rates of gross domestic product (GDP) were much narrower than variations in employment growth (see table 1 for an overview of key variables). Cross-national research shows that employment growth in European countries has been much slower than in the United States. This has been explained by the obvious institutional differences between North America and Europe, with the suggestion that the "overregulated" European economies were unable to respond to shocks in the world economy. "Eurosclerosis" is the term that best describes this view of the impact of institutions on economic and labour market performance. As clear as the diagnosis from this cross-national research is the therapy: deregulate labour markets in the European economies and the forces unleashed by unregulated markets will bring full employment back to Europe (for proposals along these lines, see Donges, 1992; OECD, 1990, Chapter 5; OECD, 1994, Part III).

Meanwhile, the political experiments of the Thatcher Government in the United Kingdom, the increasing social problems in the United States and experience in eastern Europe with markets not embedded in an institutional environment have raised doubts about the promised effects of deregulation. These doubts have been reinforced by detailed studies of the impact of institutions on economic performance and employment, which have questioned the results of oversimplified analyses (for example, Buttler et al., 1995; Abraham and Houseman, 1993; Schettkat, 1992; and Sengenberger, 1987). Calmfors and Driffill (1988) and Freeman (1988b), for instance, have shown that both centralized and decentralized wage-bargaining systems can produce favourable employment outcomes. In the case of a centralized wage bargaining system, unions are expected to internalize the negative effects of excessive wage increases, whereas in a decentralized system the market is

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Table 1. Annual growth rates, 1979-89, per cent

Country	Real GDP	Employment	Employment/ population	Labour productivity	Real consumption wage	Real product wage
Australia	3.4	2.5	1.0	0.9	0.4	0.4
Belgium	2.0	–0.2	–0.3	2.3	0.6	1.2
Canada	3.0	1.8	0.9	1.3	0.6	1.2
Germany (Fed. Rep.)	1.7	0.6	0.5	1.3	0.8	0.8
Denmark	1.8	0.8	0.8	1.2	0.4	0.7
Finland	3.7	1.0	0.6	3.0	2.9	2.5
France	2.2	0.3	–0.2	2.0	n.a.	n.a.
United Kingdom	2.3	0.4	0.2	1.8	n.a.	n.a.
Iceland	3.3	2.4	1.3	1.3	0.3	1.0
Italy	2.4	1.1	0.9	1.3	1.4	0.7
Japan	3.9	1.5	0.9	2.9	1.6	2.1
Norway	2.7	1.0	0.7	2.0	0.5	1.3
Portugal	2.7	0.5	0.6	2.2	...	...
Sweden	2.1	0.8	0.5	1.5	0.2	0.8
United States	2.5	1.6	0.6	0.8	0.4	0.6

Source: Computations are based on OECD National Accounts data tapes and OECD database.

expected to enforce aggregate wage restraint. More recent work, however, emphasizes inter-industry patterns of productivity and wage growth. Appelbaum and Schettkat (1993) argued that the differing sectoral patterns in employment trends could be explained by the institutional differences in wage bargaining which shape employment outcomes during periods of excess supply of labour. During the 1970s and 1980s, when the industrialized economies experienced labour market disequilibrium, national institutions became more important in shaping these inter-industry trends. However, as shown below, this is largely due to the fact that inter-industry differences in productivity and endogenous demand developments mean that such economies react in differing ways to substantial structural changes.

It is argued here that endogenous forces have moved the industrialized economies from a regime characterized by a positive correlation between industry-specific employment and productivity growth (Salter, 1960) to one characterized by a negative correlation between these variables. While it may be easy for market forces to shift labour into more productive, higher-wage industries, as required in the earlier regime, the possibilities for expanding employment in industries where productivity or pay are lower, as the later regime requires, will depend on the institutional setting. When Richard Freeman evaluated "the European view that the United States has no unemployment problem" (1988a), he emphasized the low income growth in the United States and suggested that there might be a trade-off between

employment and income (or productivity) growth. Appelbaum and Schettkat (1993) presented a theoretical argument that related the lower overall productivity and income growth in a given economy to the increasing prominence of industries with lower productivity growth rates. These trends are explained by the low price-elasticity for products of industries with high productivity growth and the high price-elasticity for those of industries with low productivity growth.

In this article empirical evidence is provided to show that the positive correlation between productivity growth and employment growth, which Salter argued was characteristic of industrialized economies in the early decades of this century, has disappeared. The new relationship between these growth rates is analysed in the following section, with particular reference to price behaviour and the elasticities of product demand. Next, alternative explanations for the inverse relationship between employment growth and productivity growth are evaluated: some are partly compatible with those put forward in this article, while others are not. The implications of the arguments are presented in the final section.

Inter-industry patterns of employment growth and productivity growth

Industrial society

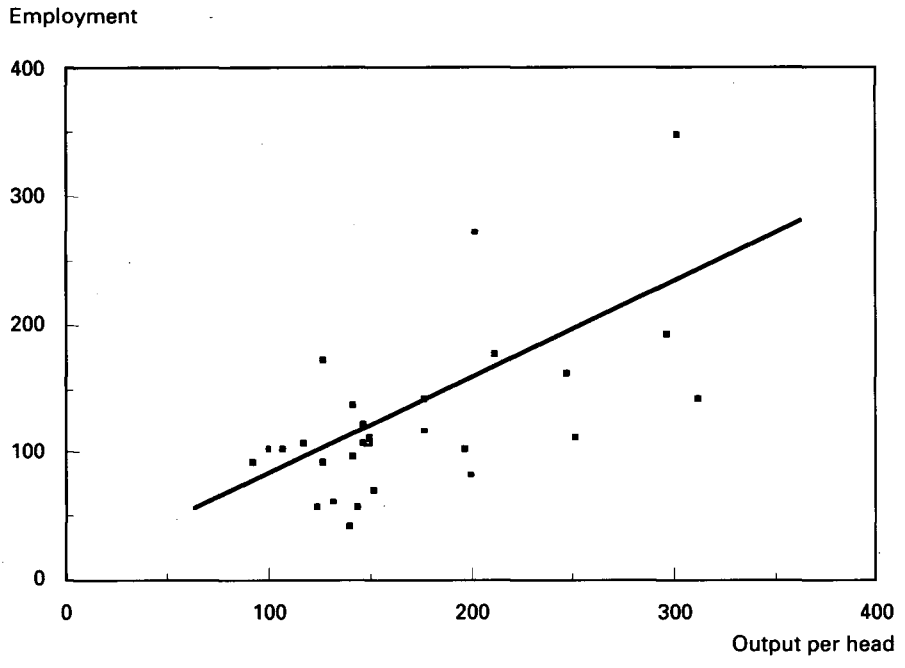
In his seminal study of structural change in the British economy, W. E. G. Salter (1960) examined the empirical relationships between the long-run growth rates of output, labour productivity, earnings, prices and employment over the period 1924-1950. Salter's key findings in this analysis across 28 mining, manufacturing and public utility industries were, firstly, that no systematic relationship existed between the growth of earnings per worker and productivity growth[1] by industry (p. 115). He therefore concluded that wage increases were determined by economy-wide, rather than industry-specific, conditions. Secondly, a negative relationship existed between the growth of prices and productivity growth (p. 120): industries with the most rapid productivity growth also showed a decline in prices.[2] Thirdly, a positive relationship existed between the growth of employment and productivity growth (p. 124), shown in Salter's figure 21 and reproduced here as figure 1. Salter noted the importance of this finding for discussions of technological unemployment:

> Whether increased labour productivity in an individual industry tends in itself to expand or contract employment in that industry relative to the average movement depends upon, first, the direct effect of the possibility of producing

[1] Salter used output per employed person as the measure of productivity.

[2] Salter also found a positive relationship between the growth of real product wages and the growth of output per employed person (p. 160), which follows from the first two findings.

Figure 1. The relationship between changes in employment and in output per head, 1924-50 (1924 = 100)



Source: Salter, 1960, p. 124, figure 21. Reproduced by permission.

> the same output with less labour and, second, the indirect expansive effect arising out of lower costs. This result suggests that the expansive effect has predominated in the majority of cases ... (Salter, 1960, p. 123).

The explanation for the predominance of the employment expansion effect in Salter's analysis was that increases in labour productivity were accompanied by reductions in total costs and relative prices. Large increases in output were associated with these reductions in relative prices. Thus relative prices fell in industries in which labour productivity grew and demand for the output of these industries increased because it was highly price-elastic. A theoretical framework for analysing the effect of price elasticities on employment as productivity increases is developed in Appelbaum and Schettkat (1993).

Salter described the overall pattern of development of the British economy between 1924 and 1950 as follows:

> This empirical analysis suggests that uneven rates of productivity growth are closely associated with the main features of the inter-industry pattern of growth. Industries which have achieved substantial increases in output per head have, in general, been successful in other respects: their costs have risen the least, the relative prices of their products has fallen, output has expanded greatly, and in most cases employment has increased by more than the average. On the other

> hand, industries with small increases in output per head are generally declining industries – at least in relative terms. Their costs and selling prices have risen the most, output has increased much less than average (or even fallen), and increases in employment are below average (Salter, 1960, p. 124).

Thus unequal rates of productivity growth across industries altered relative costs and prices and induced shifts in the structure of output and employment towards industries with above average productivity growth, especially those facing a highly price-elastic demand for output. If "industrial society" has any empirical meaning, it must refer to this positive correlation between productivity growth and the expansion of output and employment by industry.

An inverse relationship between employment growth and productivity growth

The quarter century following the Second World War is often characterized as a Golden Age for the industrialized economies (see the articles by Singh in this issue). The most important features of labour market trends in such economies during this period were low rates of unemployment, high productivity growth, increasing real incomes and declining wage differentials. Manufacturing accounted for a large and stable share of total employment during these decades and aggregate productivity growth remained high. To a greater or lesser degree, all the industrialized market economies experienced the endogenous development processes described above for the United Kingdom. These endogenous processes were probably weakest in the United States, where employment growth may have been distributed more or less equally across high and low productivity growth industries (Salter, 1960, Chapter XIII).[3]

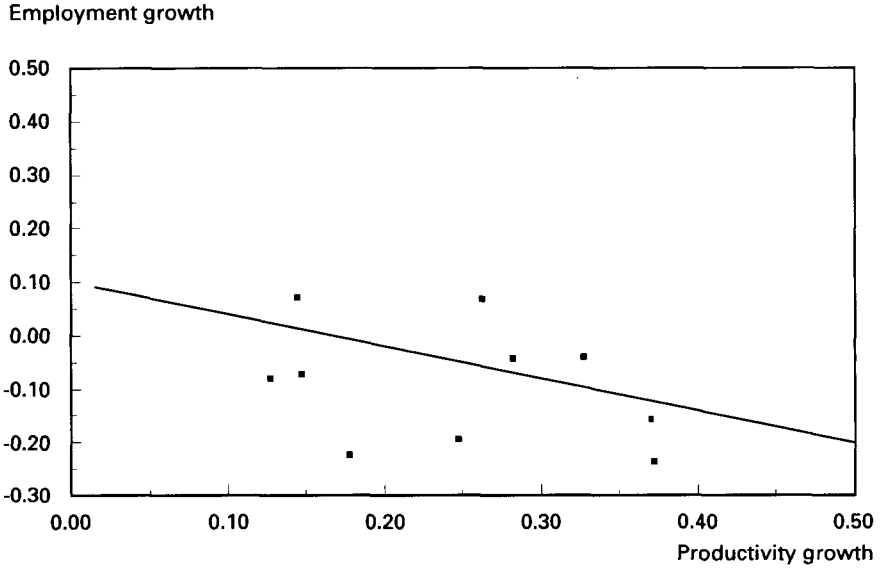
The growth of industries producing household durables became the hallmark of this expansionary period. In this context, Keynesian demand management policies, which pumped up income whenever private demand for goods and services faltered, were highly successful at maintaining full employment while simultaneously creating income growth. Rising income was often translated into higher demand for manufactured goods, whose relative prices were falling. This reinforced the endogenous growth process and obviated the need for more finely tuned sectoral policies. Finally, productivity gains were driven by economies of scale as markets for mass-produced goods expanded. Positive feedback effects from full employment and expanding markets in mass production industries thus led to further productivity gains and income growth as the scale of operations increased. In these circumstances, institutional differences among the industrialized economies were largely, though not entirely, irrelevant to labour market outcomes.

[3] Salter found a zero correlation between employment growth and productivity growth in a sample of 27 industries in the United States over this period.

Thus, with highly price-elastic demand for both goods and services, markets for the output of industries with high and rising productivity (and falling prices) tended to expand. At the same time, markets for the output of industries with slow productivity growth tended to be stifled by the increase in relative prices. In extreme cases the relative price of some services with low productivity growth, such as those provided by railway porters or domestic servants, increased to such an extent that demand tended to be extinguished. Amongst the industries with high productivity growth, on the other hand, restrained wage growth allowed for even quicker expansion.[4]

By the 1980s, however, industries with higher productivity growth were experiencing slower growth in employment. This can be seen in figure 2,

Figure 2. The relationship between employment growth and productivity growth in manufacturing, mining and construction in 15 OECD countries, 1979-89



[4] This process formed the basis for the famous Rehn-Meidner or "Swedish" model of industrial development (Meidner and Hedborg, 1984). This model sought to accelerate the process of reallocating labour to high productivity growth industries through a deliberate policy of solidarity wage increases. The consequence of such a policy is that wages in industries in which pay is below the median grow more rapidly than the average wage, while wages in industries that pay more than the median wage grow more slowly than average. Firms with low productivity growth either improve their mode of production or disappear from the market, whereas those with above average productivity growth gain from a solidarity wage policy, as a result of which employment in firms with high productivity growth can be expected to increase faster than if wages were more flexible.

which shows the inter-industry pattern of employment growth and productivity growth for the OECD countries in the 1980s. In some industries employment stagnated, or even declined, as growth in demand failed to keep pace with the rate of productivity growth. In many countries now industries with low productivity growth are experiencing the most rapid employment growth. With few exceptions, substantial increases in employment have occurred only in those countries where employment in activities with low productivity growth (usually services) has expanded sufficiently to offset stagnant or declining employment in high productivity growth activities (usually manufacturing). Countries which have not been successful in shifting employment from manufacturing activities to service activities have generally experienced little employment growth.

It is argued here that the shift from full employment to unemployment in the industrialized economies is caused not by exogenous factors, rigid labour markets or policy mistakes, though these may exacerbate the problem, but rather by the endogenous development process itself. This explanation is predicated on the fact that the price elasticity of demand for many consumer durables has declined over time as household wealth and, as a consequence, the stock of durable goods have increased. Price and income elasticities of demand depend on levels of consumption previously achieved. As income increases and the demand curve shifts outward, the absolute value of the elasticity of demand at any price declines, a relationship known as Harrod's Law. Moreover, current relative prices reflect past productivity growth in the various industries and therefore tend to be lower in industries that have experienced more rapid productivity growth. As a result, the process of economic development itself has led to a decline in the absolute value of the price elasticity of demand for manufactured goods. The result is that employment now expands less rapidly (and in some instances even declines) in industries in which productivity growth is most rapid.

This shift from a positive (or zero) correlation between productivity growth and employment growth to a negative correlation has contributed to the end of the virtuous circle of economic development in industrialized economies. It marks a change that is often, though imprecisely, described as the shift from an industrial society to a service economy. This change in the inter-industry pattern of employment growth and productivity growth has weakened the feedback link from income growth to productivity growth, a link which operated through the economies of scale achieved by mass production industries as markets for the output of high productivity growth industries expanded.

The relationship between productivity growth and employment growth by sector (excluding agriculture) is shown in table 2 (column 2) for the 15 OECD countries for which sectoral data drawn from the OECD National Accounts data tape are available for at least five years. The correlation coefficients between productivity growth and employment growth in the 1980s are reported, using two-digit industrial sectors where available. There is a significant negative correlation for 11 countries and no significant

relationship for four countries. Except for the Federal Republic of Germany, no country even approaches a positive relationship between employment and productivity growth. The only surprise is the relatively weak negative relationship between employment growth and productivity growth for Sweden, but this appears to be due to the changing hours of employment for that country, one of the few for which the OECD data include work-hours of wage and salary workers by sector. Use of the work-hours data yields a significant negative correlation coefficient of 0.60.[5] Column 3 reports the correlation between employment growth and productivity growth for goods-producing industries only. Six countries exhibit a significant negative correlation for these sectors.

Columns 4 and 5 of table 2 examine the inter-industry relationship between productivity growth, on the one hand, and the growth of wages and of prices, on the other. To facilitate comparisons across countries with very different rates of price and wage inflation, nominal wages for each industry within a country have been divided by the implicit price deflator for the consumption component of GDP. Dividing industry wages in each country by this scalar leaves the inter-industry wage pattern within that country unchanged, but yields data on real consumption wages, corrected for the effects of domestic inflation. The results shown in column 4 are remarkably similar to those obtained by Salter, even though he examined nominal wages. With the exception of three small countries (Belgium, Denmark and Iceland), there is no systematic inter-industry relationship between the growth rates of wages and those of productivity in the industrialized economies. This suggests that in most of these countries the growth of nominal wages in an industry is not directly linked to productivity movements within the industry, but reflects economy-wide developments,[6] whether because strong unions and centralized bargaining link wage growth by industry to the overall growth of productivity in the economy or, conversely, because wage bargaining is entirely decentralized, labour mobility is high and wage growth is determined by the supply of and demand for labour throughout the economy. Despite the diversity in labour market institutions across the OECD, the major countries exhibit similar patterns of behaviour where nominal wages are concerned. This is surprising, especially in the case of the United States, where an increase in decentralized wage

[5] The United States is the only one of the 15 countries analysed here to report sectoral employment in terms of full-time-equivalent employees. The measures of employment and productivity are thus not distorted by differences in the use of part-time workers, either by sector or over time. The distortions in the data from other countries could be overcome by taking into account work-hours of all persons employed by sector. Unfortunately, however, work-hours are available in the OECD data for wage and salary workers only, and then for only a small number of countries. The distinction is between "all persons employed", which includes the self-employed, and "wage and salary earners", which does not.

[6] Conclusions cannot be drawn from these coefficients about the relationship between overall wage growth and overall productivity growth. The results suggest only that the inter-industry pattern of wage growth is not correlated with the inter-industry pattern of productivity growth.

Table 2. Correlation coefficients for the growth rates of productivity with other variables, 1979-89 [a]

Country	No. of sectors	Correlation coefficients – growth rates of productivity with growth rates of:							
		Employment: [b] All industries	Employment: [b] Goods production	Real consumption wages [c]	Product prices [d]	Real product wages [e]	Real wage gap [f]	Real profits [g]	Profit shares [h]
	1	2	3	4	5	6	7	8	9
Australia	11	–0.71 **	–0.57 *	0.33	–0.46	0.56 *	–0.39	0.91 ***	0.91 ***
Belgium	17	–0.39	0.00	0.80 ***	–0.68 ***	0.83 ***	–0.74 ***	...	...
Canada [a]	27	–0.40 **	–0.49 **	0.13	–0.62 ***	0.61 ***	–0.31	0.25	–0.08
Denmark	24	–0.65 **	–0.64 ***	0.66 ***	–0.51 **	0.63 ***	–0.78 ***	0.71 ***	0.66 ***
Finland	24	–0.54 **	–0.13	0.34	–0.76 ***	0.59 ***	–0.51 **	0.43 *	0.36 *
France [a]	25	0.00	–0.24	...	–0.71 ***	...	...	...	...
Germany (Fed. Rep.)	23	0.04	0.00	0.27	–0.84 ***	0.87 ***	–0.64 ***	0.58 **	0.08
Iceland	22	–0.52 **	–0.57 **	0.63 ***	–0.34	0.87 ***	–0.14	–0.19	–0.17
Italy	10	–0.85 ***	–0.93 ***	0.33	–0.87 ***	0.45	–0.66 *	0.28	–0.34
Japan	17	–0.05	0.00	0.26	–0.52	0.62 **	–0.58 **	0.78 ***	0.66 **
Norway	22	–0.42 *	–0.51 *	0.20	–0.64 ***	0.63 ***	–0.13	0.18	0.11
Portugal [a]	20	–0.43 *	–0.33	...	–0.64 ***	...	...	...	...
Sweden [a]	25	–0.39 *	0.00	0.17	–0.61 ***	0.36 *	–0.42	0.43 *	0.21
United Kingdom	14	–0.79 ***	...	...	–0.34	...	...	...	...
United States	25	–0.72 ***	–0.65 ***	0.00	–0.83 ***	0.93 ***	–0.29	0.32	0.27

* $p < 0.1$. ** $p < 0.01$. *** < 0.005.

[a] Canada and Sweden, 1980-89; France and Portugal, 1979-90; United States 1979-87. [b] Employment refers to all employed persons; productivity refers to real output per employed person – except for the United States where employment refers to full-time-equivalent employees plus the self-employed and productivity is real output per employed person so defined. [c] Nominal compensation per wage and salary employee in each sector (full-time-equivalent employees for the United States) divided by the implicit price index for consumption derived from the real and nominal GDP accounts. [d] Implicit price index for output of each sector. [e] Nominal compensation per wage and salary employee in each sector (full-time-equivalent employees for the United States) divided by the implicit price index for each sector. [f] Real wage gap for an industry sector is the difference between the growth rates of the real product wage and productivity. [g] Operating surplus divided by the implicit price index for output for each sector. [h] Sector operating surplus divided by sector GDP.

Source: Computations are based on OECD National Accounts data tapes and OECD Database.

bargaining was expected to result in a tendency for nominal wage growth across industries to track industry productivity growth. The situation is essentially the same within the sub-periods 1979 to 1984 and 1984 to 1989.

After the United States, the countries showing the lowest correlation between the growth of real consumption wages and that of productivity across industries are Canada and Sweden, followed by Norway, Japan and the Federal Republic of Germany. In these countries, advances in productivity translate into lower unit labour costs. It should be emphasized that "wage" costs refer to all labour costs and include non-wage labour costs such as social insurance contributions and wage taxes.

Inter-industry wage inequality in the United States is high. The inter-industry pattern of real consumption wage growth reported here implies, however, that further increases in wage inequality in the 1980s resulted rather from intra-industry increases in overall wage inequality and/or from inter-industry shifts in employment.[7] There is some weak evidence in the data that inter-industry wage differentials narrowed in Italy and Finland and stronger evidence that they widened in Belgium, Denmark and Iceland.

The relationship between the growth of product prices and productivity growth by industry (column 5) is also similar to that found by Salter. The correlation coefficient between these variables is negative for all countries and, except for Australia, Iceland, and the United Kingdom, significant. For a great many industrialized economies, despite the diversity in institutions, it is still the case that relative prices fall quite fast in industries with the most rapid productivity growth. This is especially true of the United States in the 1980s, where, in spite of the weakened position of the unions, the non-wage share of output has not increased, even in industries with higher productivity gains. Instead, relative product prices have fallen in these industries; this should have increased average real consumption wages, even in the absence of union-won increases in nominal wages. The slow growth in average real consumption wages in the United States is therefore due mainly to slow growth in labour productivity. The well-documented decline in the real consumption wage of the median worker (Mishel and Bernstein, 1994) results from increasing wage inequality, which can be partly explained by the decline in union coverage.

What has changed since the earlier decades of this century is that large price decreases in high productivity industries no longer result in large increases in output and employment. In many countries the industries with small increases in productivity are now generally the expanding industries.

Distributional effects

As shown above, there is no systematic relationship between the growth of nominal wages and that of productivity in the OECD countries, whereas

[7] Freeman and Katz (1995) found that increases in wage dispersion were caused mainly by intra-industry developments.

there is a negative relationship between the growth of product prices and productivity growth. This implies that there must be a positive relationship between productivity growth and the growth of real product wages (that is, industry compensation including benefits and social insurance contributions per person, divided by industry price), which represent wage and non-wage labour costs from the employer's point of view. Column 6 of table 2 confirms that a significant positive relationship exists for every country except Italy and Sweden.

Column 7 compares the real wage gap by industry with productivity growth by industry. The wage gap – defined as the growth rate of real product wages minus the growth of productivity – is negative whenever productivity growth in an industry is greater than the growth in the real product wage. The relationship between the growth of productivity and the wage gap is significantly negative for Belgium, Denmark, Finland, the Federal Republic of Germany, Italy, Japan and Sweden, indicating that, in these countries, labour's share of output in high productivity growth industries declined in the 1980s. This suggests either that non-wage costs are increasing systematically with productivity growth in these countries or that the profit share is increasing. The possibility that the profit share is increasing can be tested by analysing the growth rate of real operating surplus (the best proxy for profit available in the OECD data), as shown in column 8. For each of these countries (except Belgium, for which data are not available, and Italy), and also for Australia, there is a significant positive relationship between the growth of the volume of real operating surplus and the growth of productivity. The volume of operating surplus may be increasing because output grows faster in industries with higher productivity growth, either for competitiveness (or Schumpeterian) reasons, or because firms in higher productivity growth industries have increased the profit share. Column 9 shows that in Australia, Denmark, Finland and Japan the profit share has increased faster in industries with higher rates of productivity growth, so that a rising profit share is at least partly responsible for the wage gap in these industries.[8] This is not the case in the Federal Republic of Germany, Italy and Sweden, however, where the systematic relationship between the growth of the operating surplus and the growth of productivity appears to reflect the greater competitive success of firms in higher productivity growth industries. The squeeze on labour's share in these countries results from an increase in other components of the non-wage share.

Price and wage data by industry sector for the 1970s are available in the OECD National Accounts for only a few countries. Table 3 reports the correlation in the Federal Republic of Germany, Italy, Japan and the United States, between productivity growth and the growth of real consumption

[8] For Finland and Japan, which have the highest rates of productivity growth, the squeeze on labour's share in higher productivity growth industries occurred despite rapid increases in real consumption wages in the 1980s (see table 1).

Table 3. Correlation between productivity growth and the growth of real consumption wages, product prices and real product wages in selected countries, 1969-79[1]

Country	Real consumption wages	Product prices	Real product wages
Germany (Fed. Rep.)	–0.13	–0.73***	0.74***
Italy	0.25	–0.71***	0.35
Japan	–0.36	–0.88***	0.71***
United States	–0.13	–0.92***	0.95***

* p 0.05. ** p 0.01. *** p 0.005.
[1] Italy and Japan, 1970-79.

wages, product prices and real product wages. A comparison of these results with those reported in columns 4, 5 and 6 of table 2 indicates that for the Federal Republic of Germany, Japan and the United States product prices were much more responsive to productivity gains by industry in the 1970s than in the 1980s. In all four countries the tendency for the non-wage share of output to increase in industries with higher rates of productivity growth was smaller in the earlier decade. In the United States there appears to have been a tendency for the wage share of output to increase in higher productivity growth sectors. The rising profit share in Japan is a phenomenon new to the 1980s.

Alternative explanations

While the inverse relationship between sectoral employment growth and productivity growth in the industrialized economies seems to have gone largely unnoticed, the declining share of manufacturing employment in those economies has been the subject of much discussion. It is worth considering the arguments that have been put forward regarding this topic, since they may provide alternative explanations for the phenomena described in the previous section. The evidence presented suggests that some of the explanations are not persuasive and can be rejected. Others, however, are compatible with the analysis in this article or may be subsumed within it.

Trade among the industrialized economies

One of the more conventional explanations for the declining share of employment in manufacturing in many industrialized economies is that trade in manufactured goods is responsible for "deindustrialization". Most of the competition for markets lies within the industrialized economies themselves, involving trade within sectors of similar products (OECD, 1994, p. 28). Singh's (1989) empirical analysis of the economy of the United Kingdom in the 1970s suggests that, in the case of an industrialized economy with an "inefficient" manufacturing sector, trade with other industrialized

economies like Japan and Germany will lead to a net loss of manufacturing jobs. However, the question of the relative competitiveness of industrial sectors in particular countries is different from the question of whether the differences in competitiveness – and the resulting trade among industrialized economies – account for the negative relationship between employment growth and productivity growth in some countries. The view that trade accounts for this negative relationship is equivalent to asserting that, in the absence of intra-sectoral trade, there would be no inverse relationship between employment and productivity growth rates.

This assertion can be tested by examining the inter-industry pattern of employment growth and productivity growth across the 15 OECD countries in the sample. Both employment and productivity growth for each industrial sector are calculated as a weighted average of the country growth rates for that sector.[9] The correlation between employment growth rates and productivity growth rates by industry is reported in table 4. The findings indicate that the negative relationship between employment growth and productivity growth by industry applies to the OECD countries as a whole. Thus although it may have had a disproportionate effect on countries with an "inefficient" manufacturing sector, trade between the industrialized economies is not the fundamental explanation for the negative inter-industry relationship between employment and productivity growth rates.

Table 4. Relationship between the growth rates of employment and productivity by industry sector, 15 OECD countries,[a] 1979-89 [b]

	One-digit industry sectors	One-digit industry sectors plus detailed manufacturing
Correlation coefficient	0.64 *	0.61 **
No. of sectors	10	18

* p 0.05. ** p 0.01. *** p 0.005.
[a] See table 2 for countries. [b] See table 2.

Trade with less industrialized economies

The increasing capacity, since 1950, of less developed countries to produce manufactured goods is documented by Singh (1984, 1989, 1994). In the 1960s and 1970s even the countries of sub-Saharan Africa increased their share of world manufacturing employment, and the newly-industrialized countries (NICs) of Asia and Latin America began to compete with the industrialized economies in some industries. Before 1973 the annual growth rate of real manufactured exports was about 10 per cent per year in both the

[9] The sector weights are equal to the ratio of each country's employment in the sector to total employment in the sector of all 15 countries.

industrialized and the developing economies. Since then, however, the rate of growth of exports has fallen substantially in the industrialized countries but increased considerably in the NICs, with the majority of their exports going to the industrialized economies. The impact that trade with the developing countries has on employment in the OECD countries is usually thought to be quite small, with the exception of the clothing industry. In 1990, OECD imports of manufactured products from developing countries were about 1.5 per cent of GDP, while OECD estimates of penetration ratios for 1984-1985 place the share of imports from developing countries in the consumption of manufactures by OECD countries at 3.7 per cent (Wood, 1994, p. 97). Although the figure is higher for some countries, notably the United States and the United Kingdom, it does not appear large enough to explain the overall decline in OECD manufacturing employment, nor can it explain why the reduction in employment tends to be most pronounced in industries in which productivity gains are highest. This conventional view of trade with the Third World cannot, therefore, explain the inverse relationship between employment and productivity growth rates in the industrialized countries.

An interesting and original analysis is that of Wood (1994) who argues that the effects of trade on labour markets in both the North (developed economies) and the South (developing economies) are much greater than this type of standard analysis suggests. No attempt is made here to assess the accuracy of his estimates of the effect that trade has on the employment of unskilled workers in developed countries; rather, the concern is with the implications of his argument for the relationship between employment and productivity growth rates.

Wood argues that conventional measures understate the impact of trade on employment in the North for several reasons. First, North-South trade in manufactures consists mainly of the exchange of more skill-intensive goods from the North for less skill-intensive goods from the South, thus reducing the demand for unskilled labour in the North. There is no reason, however, why the decrease in employment should be disproportionately larger in industries with more rapid increases in productivity. On the contrary, with exports from the North concentrated in industries with high skill intensity, which Wood points out are frequently industries with high capital intensity as well, it might be reasonable to expect more rapid increases (or smaller declines) in employment in these industries.

Secondly, estimating the effects of trade on employment in the North by using an accounting decomposition of the sources of change assumes that productivity growth is exogenous, whereas Wood argues that trade itself raises labour productivity in two ways. First, trade causes a shift in the composition of output in the North as firms move from the production of goods that make intensive use of unskilled labour into activities that make more use of skilled labour. As the former are, naturally, often more labour-intensive and less capital-intensive than the latter, this change in the composition of output has the effect of raising productivity. Second, many

firms in the North have reacted to competition from the South by devising "defensive" unskilled-labour-saving innovations – new production techniques that use less unskilled labour and raise labour productivity. On the first point, the aggregate employment effects of the change are unclear, but there is no reason to suppose that it will cause employment to grow more slowly (or shrink more rapidly) in industries experiencing more rapid productivity growth. As for defensive technological progress, the effect on employment of this, or any other, increase in productivity depends on the fall in relative prices and the price elasticity of demand, as seen above. If the price elasticity is such that the expansion of demand is smaller than the increase in productivity, then employment will decline. Wood may be right about the effect of trade on defensive technical progress, but the effect of defensive technical progress on employment in the affected industries is subsumed in the earlier analysis.

Maturity of industrialized economies

It has been argued (Rowthorn and Wells, 1987; Baumol, Blackman and Wolff, 1989) that over long periods of time the real output of services in mature economies[10] rose at the same rate as the real output of manufacturing. As a result the output shares of the two broad sectors in real GDP remained constant. Their rates of productivity growth, however, were very different. The rising share of employment in services and in private household expenditure can be explained by the low rates of productivity growth in services. Rowthorn and Wells concluded: "With a *given* pattern of output, differential productivity growth will always cause the pattern of employment to shift away from the most dynamic sectors towards those in which productivity is rising more slowly" (op. cit., pp. 15-16). Some empirical support for the argument that the share of services in real output is constant can be found in a cross-section analysis of 34 countries in 1975 (Kravis, Heston and Summers, 1983), the main conclusion of which was that in the mid-1970s economies with higher national income had a much higher share of services in nominal expenditure, but the share of real expenditure on services was roughly constant.

In more recent work examining data on the United States over the period 1973-88, Rowthorn (1992) found evidence of an increasing role for demand factors in the growth of output shares. In particular, he found that the output of services grew much faster than that of goods. Appelbaum and Schettkat (1993, table 1) also observed that, while nominal expenditure and output data exaggerated the trend towards services, the share of services in real output also showed an increase in Canada, France, the Federal Republic of Germany, Japan, Sweden and the United States between 1963 and 1983.

[10] Mature economies are economies in which the rapid drop in agricultural employment has already occurred and only a small percentage of the workforce is engaged in food production.

Similarly, Krugman and Lawrence (1994) observed that the share of manufacturing output in GDP in the United States had declined between 1970 and 1990 as goods became relatively cheaper. This evidence from various sources supports the argument being made here that the more rapid growth of employment in services is the result both of inter-industry differences in productivity growth and of changes in demand patterns.

An artifact of aggregation

The negative relationship between employment growth and productivity growth derived using sectoral data from the OECD National Accounts is contradicted by microeconomic evidence which suggests that the employment performance of more productive firms (and of more innovative firms, even those which invest heavily in process innovation) is better than that of less productive firms (see Scholz, Penzkofer and Schmalholz, 1990). This raises the question of whether the negative relation between employment growth and productivity growth is simply a statistical artifact.

It may be argued that industries as defined in National Accounts data are too heterogeneous and do not represent the relevant markets. It may be that firms with declining employment simply find themselves in sub-markets in which demand declines. If productivity in these sub-markets is lower, their decline will raise average productivity in the industries in which they are found. In that case, increases in productivity and decreases in employment may occur simultaneously in heterogeneous industries. This process may occur even if employment increases in the high productivity growth segment of the industry. Industry averages may be misleading indicators. While this effect is logically possible, however, heterogeneity would have to be concentrated in manufacturing industries in order to explain the inter-industry pattern seen above. It seems unlikely that this is the case.

Alternatively, it may be that, while industries in the National Accounts define sufficiently homogeneous markets, firms are heterogeneous with respect to productivity growth. At the microeconomic level, firms with high efficiency gains are able to grow and to expand employment. Higher productivity drives prices down, which may push less efficient firms out of the market if they cannot earn a normal rate of return at the lower price. However, this will not cause industry employment to decline if the elasticity of demand for industry output is greater (in absolute value) than 1. Any decline in supply due to the exit of less competitive firms from the industry will be more than compensated by an expansion of supply from the more efficient firms. Thus employment in the industry should grow so long as demand is price-elastic and will decline only if this condition is not met. Even so, employment in the most efficient firms will continue to increase.

It must therefore be concluded, first, that the inverse relationship between employment growth and productivity growth by industry is not a statistical artifact. It is not caused by the existence of firms that are heterogeneous with respect to productivity performance in a homogeneous

market nor by heterogeneous sub-markets in an industry which affect the results systematically.

Conclusion

This article demonstrates that the development process of industrialized countries has shifted from the "industrial model", which is characterized by a positive correlation between industry-specific productivity growth and employment growth, to a "post-industrial model", which is characterized by a negative relationship between these variables. Employment is now growing in industries with below-average productivity growth rates.

The main theoretical argument presented here is that this shift in the development process of industrialized economies can be explained by factors endogenous to the process itself rather than by exogenous shocks. The empirical findings do not show wage-setting behaviour in industrialized economies to be substantially different from that analysed by Salter (1960) in his study of the British economy between 1920 and 1950. Nor are price-setting mechanisms substantially different. Yet although changes in these two variables are frequently cited as the cause of employment problems, the empirical picture obtained from the OECD National Accounts data supports the view that demand elasticities for the products of industries with high productivity growth have declined with rising incomes and the accumulation of consumer durables in the industrialized economies.

According to this "post-industrial" development model, employment growth is dependent on the expansion of industries with lower productivity growth rates. A consequence is that employment growth is now very much influenced by the national institutional setting, including the welfare state as well as labour market institutions. Whereas it was relatively easy to attract workers into the expanding employment opportunities in sectors with relatively high rates of productivity growth, it has proved more difficult in some national settings than others to shift workers into industries with lower rates of productivity growth (see Appelbaum and Schettkat (1994) for a discussion of this issue).

The analysis in this article suggests that a favourable resolution of the present unhappy choice facing nations between efficiency and employment growth lies ultimately in *(a)* the development of new products capable of starting off a new Kondratieff cycle and/or *(b)* improvements in productivity in a wide variety of business, consumer and human services that are still highly price- and income-elastic. Productivity gains in these sectors, where most of the labour force in the industrialized economies is employed, would simultaneously raise real incomes and expand employment, as did the productivity gains in steel, automobiles and consumer durables in the earlier decades of this century. As for a new Kondratieff cycle based on information and communication technology, there is some evidence that one may occur, provided that the institutional and societal infrastructure for the diffusion of the new technologies is put in place (Freeman and Soete, 1994), though there

are dissenting views on the employment potential of information technology (e.g., Scharpf, 1990). Public initiatives to promote investment in the necessary human and physical infrastructure and to support the development and diffusion of new information and communication technology products should be high on any policy agenda for moving beyond the present trade-off. Increased public and private spending on both basic research and new product development is also required, as well as investigation of the applicability of new work systems to obtain continuous improvements in the efficiency and quality of existing service industries.

In the short run, this analysis suggests that employment growth, if it occurs at all, will occur in service industries; and that market forces will not deliver both high productivity growth and high employment growth. Hard choices between these outcomes may have to be made. Nations may opt for greater efficiency and find the means to spread the limited employment growth over a larger workforce through job- and income-sharing arrangements. Or they may opt for the expansion of inefficient activities that can survive only by paying low wages. But these are social and political choices on which economists can lay no special claim to expertise and on which, like other citizens, gets just one vote.

References

Abraham, Katharine G.; Houseman, Susan N. 1993. *Job security in America: Lessons from Germany*. Washington, DC, The Brookings Institution.

Appelbaum, Eileen; Schettkat, Ronald. 1994. "Das Ende der Vollbeschäftigung? Zur Wirtschaftsentwicklung in Industrieländern", in *Wirtschaftsdienst* (Hamburg), Vol. 74, No. 4 (Apr.), pp. 193-202.

—; —. 1993. *Employment developments in industrialized economies: Explaining common and diverging trends*. Discussion Paper FS 193-313. Berlin, Wissenschaftszentrum Berlin für Sozialforschung.

Baumol, William J.; Blackman, Sue Anne Batey; Wolff, Edward N. 1989. *Productivity and American leadership: The long view*. Cambridge, MA, MIT Press.

Buttler, Friedrich; Franz, Wolfgang; Schettkat, Ronald; Soskice, David (eds.). 1995. *Institutional frameworks and labour market performance*. London, Routledge.

Calmfors, Lars; Driffill, John. 1988. "Bargaining structure, corporatism and macroeconomic performance", in *Economic Policy* (Cambridge), No. 6 (Apr.), pp. 14-61.

Donges, Juergen B. 1992. *Deregulatlierung am Arbeitsmarkt und Beschäftigung*. Tübingen, Mohr.

Freeman, Chris; Soete, Luc. 1994. *Work for all or mass unemployment? Computerised technical change into the twenty-first century?* London, Pinter.

Freeman, Richard B. 1988a. "Evaluating the European view that the United States has no unemployment problem", in *American Economic Review* (Nashville, TN), Vol. 78, No. 2 (May), pp. 294-299.

—. 1988b. "Labour market institutions and economic performance", in *Economic Policy* (Cambridge), No. 6 (Apr.), pp. 63-80.

—; Katz, Lawrence. 1995. *Differences and changes in wage structure*. Chicago, University of Chicago Press.

Kravis, Irving B.; Heston, Alan W.; Summers, Robert. 1983. "The share of services in economic growth", in F. G. Adams and B. G. Hickman (eds.): *Global econometrics*. Cambridge, MA, MIT Press.

Krugman, Paul R.; Lawrence, Robert Z. 1994. "Trade, jobs and wages", in *Scientific American* (New York), Vol. 270, No. 4 (Apr.), pp. 44-49.

Meidner, Rudolph; Hedborg, Anna. 1984. *Modell Schweden: Erfahrungen einer Wohlfahrtsgesellschaft*. Frankfurt, Campus.

Mishel, Lawrence; Bernstein, Jared. 1994. *The state of working America 1994-95*. Washington, DC, Economic Policy Institute.

OECD. 1994. *The OECD Jobs Study: Facts, analysis, strategies*. Paris.

——. 1990. *Labour market policies for the 1990s*. Paris.

Rowthorn, Robert E. 1992. "Review of productivity and American leadership: The long view", in *Review of Income and Wealth* (Bristol), Series 38, No. 4 (Dec.), pp. 475-496.

——; Wells, J. R. 1987. *De-industrialization and foreign trade*. Cambridge, Cambridge University Press.

Salter, W. E. G. 1960. *Productivity and technical change*. Cambridge, Cambridge University Press.

Scharpf, Fritz W. 1990. "Structures of post-industrial society – or – does mass unemployment disappear in the service and information economy?", in Eileen Appelbaum and Ronald Schettkat (eds.): *Labour market adjustments to structural change and technological progress*. New York, Praeger, pp. 17-35.

Schettkat, Ronald. 1992. *The labour market dynamics of economic restructuring: The United States and Germany in transition*. New York, Praeger.

Scholz, Lothar; Penzkofer, Horst; Schmalholz, Heinz. 1990. "Innovation, growth and employment", in Ronald Schettkat and Michael Wagner (eds.): *Technological change and employment: Innovation in the German economy*. Berlin, De Gruyter.

Sengenberger, Werner. 1987. *Struktur und Funktionsweise von Arbeitsmärkten: Die Bundesrepublik Deutschland im internationalen Vergleich*. Frankfurt, Campus.

Singh, Ajit. 1994. *Employment and unemployment: North and South; notes for a global development agenda for the 1990s*. Mimeo. Cambridge, University of Cambridge.

——. 1989. "Third World competition and de-industrialisation in advanced countries", in *Cambridge Journal of Economics* (Cambridge), Vol. 13, No. 1 (Mar.), pp. 103-120.

——. 1984. "The interrupted industrial revolution of the Third World: Prospects and policies for resumption", in *Industry and Development* (New York), No. 12, pp. 43-68.

Wood, Adrian. 1994. *North-South trade, employment and inequality: Changing fortunes in a skill-driven world*. Oxford, Clarendon Press.