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THE PRODUCTIVITY SLOWDOWN AND ITS POLICY IMPLICATIONS

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by P.S. Andersen*

Introduction

For the last ten to fifteen years the industrial world has suffered from the problem of stagflation. Towards the end of the 1960s many countries experienced a sharp acceleration in nominal and real wage increases which was out of line with past behavioural patterns, and the recession in the early 1970s had only a small dampening effect on inflation. The commodity and oil price explosions in 1972-74 and again in 1978-80 caused a simultaneous rise in inflation and unemployment, and while the period between the two supply shocks saw a marked slowdown in inflation, price increases stayed above past rates in most countries and unemployment remained high except in North America. Following the second oil price rise unemployment has increased further and inflation has again been reduced. However, much of the deceleration can be ascribed to weakening commodity prices and neither inflationary expectations nor the "underlying rate of inflation" seem to have followed the course of actual price changes.

This can be seen from the graphs on pages 2-3.[1] Thus the recent marked decline in nominal wage increases has only in part been reflected in lower unit labour costs as productivity growth has fallen or come to a complete halt. This productivity slowdown was recognised at a relatively early stage in North America, but recent trends suggest that it might be a worldwide phenomenon. Moreover, while discussion of the causes of stagflation has often focused on the influence of supply shocks in conditions of real wage and other income rigidities, the behaviour of productivity might pose an equally serious problem. To the extent that productivity gains follow a pro-cyclical pattern the effectiveness of anti-inflationary demand policies will be weakened, as a moderation in nominal wage gains will be only in part reflected in unit

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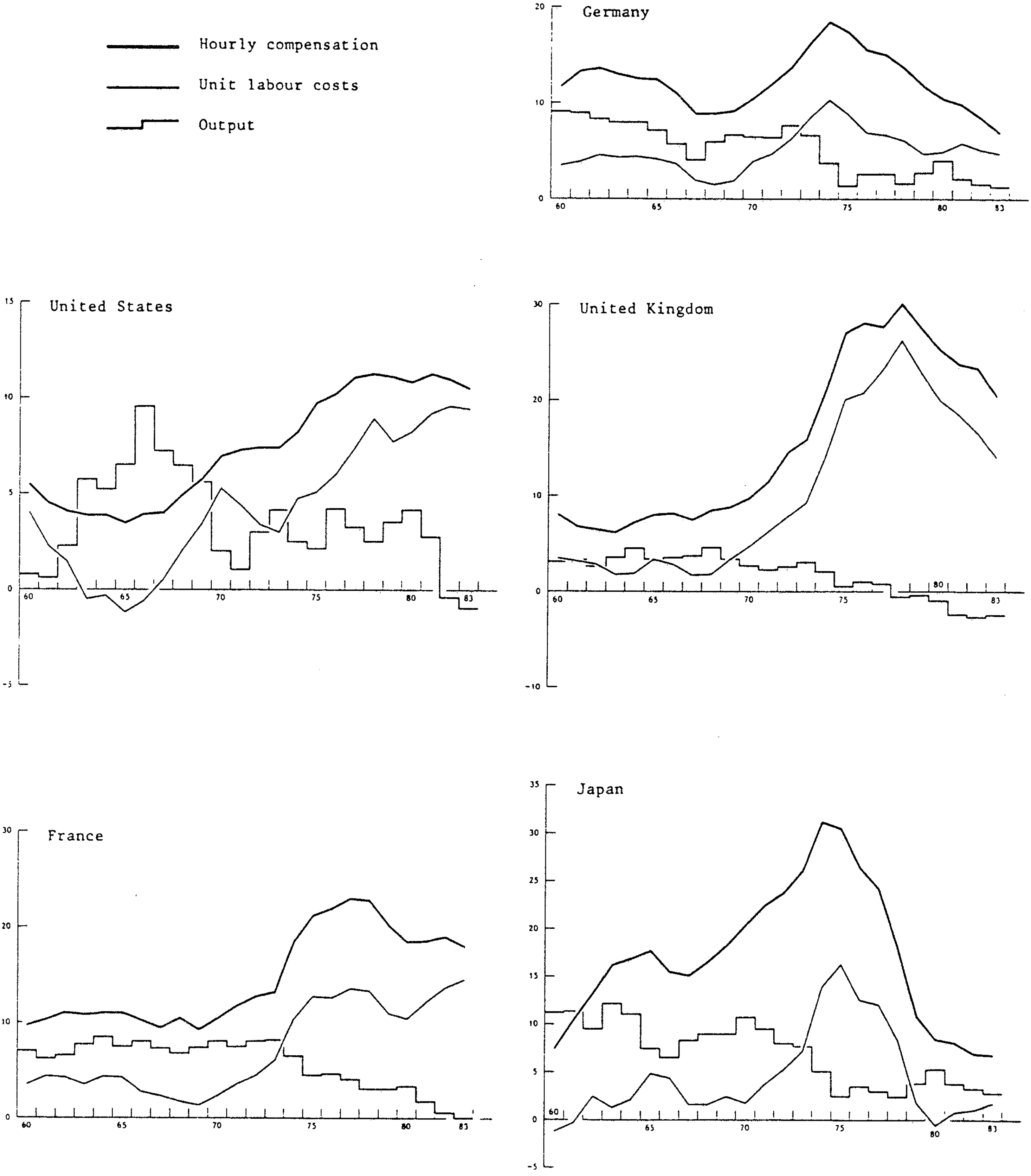
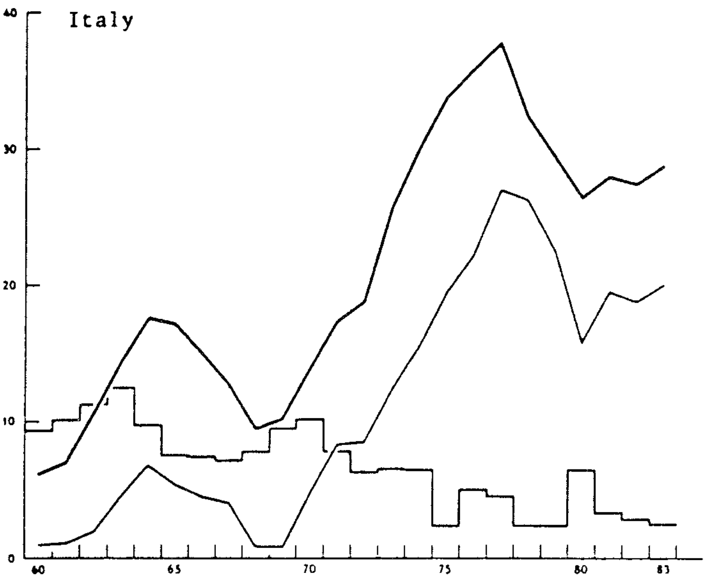
* I am grateful to Dr. W.D. McClam, Mr. J. Bispham and Dr. E. Koch of the BIS for comments made on an earlier draft of this paper.

1 The graphs as well as the tables for the manufacturing sector presented in the following are based on data published by the US Bureau of Labour Statistics for the G-10 countries and Denmark.

Manufacturing sector:
Trends in hourly compensation, unit labour costs, and output.
Annual rates of change, 5-year uncentred moving averages, in percentages.

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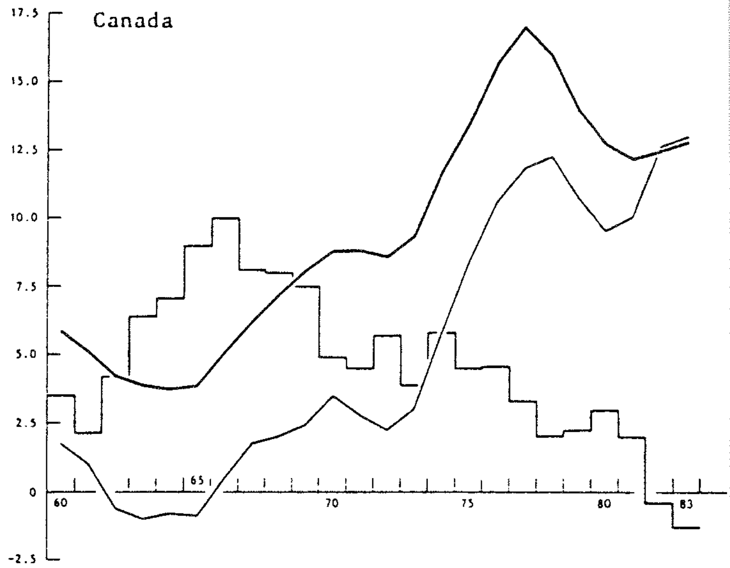
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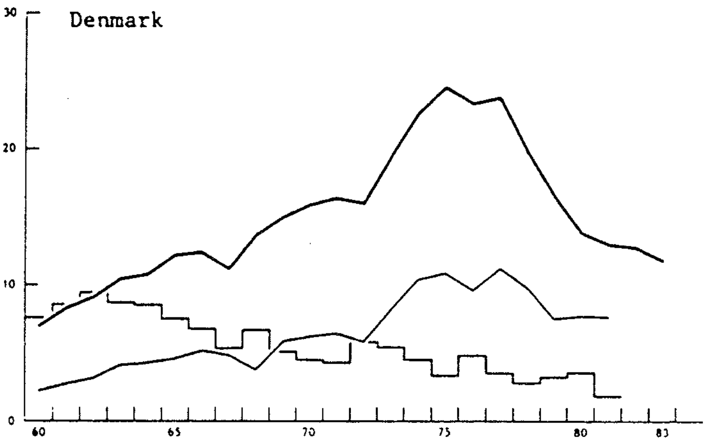
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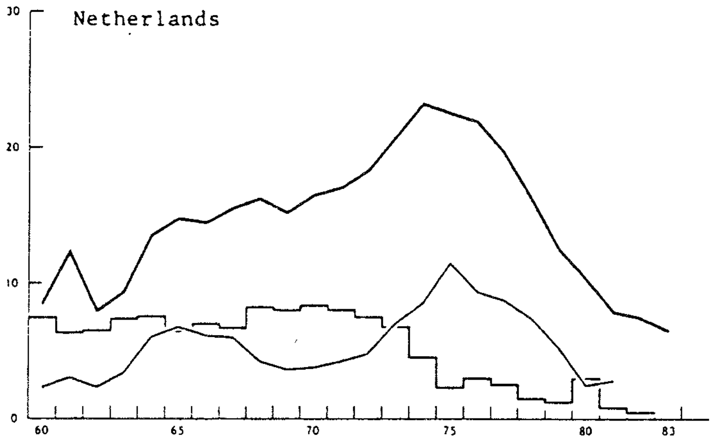
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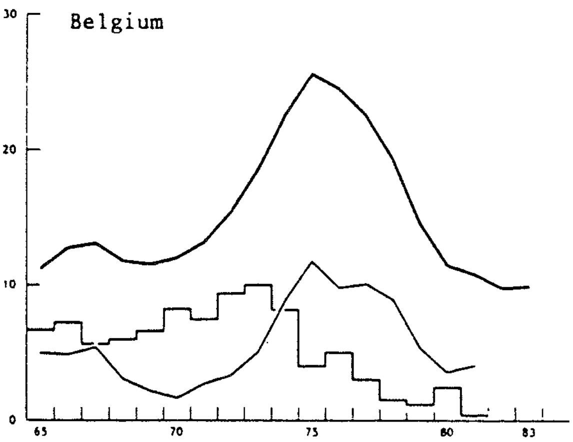
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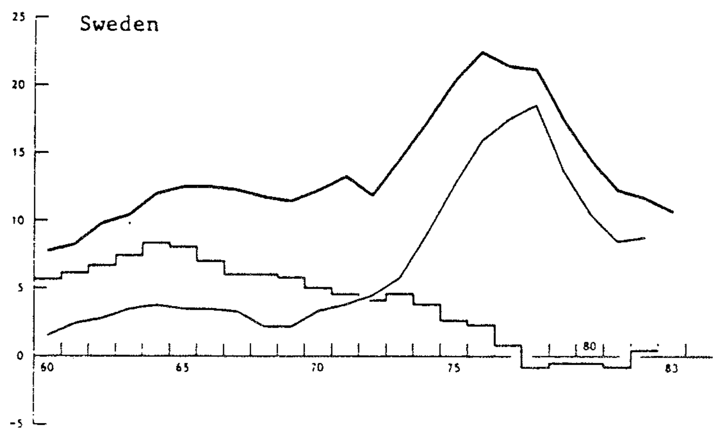
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labour cost and price trends. In addition, if the slowdown is of a more permanent nature and real wage and other income claims are rigid there is a risk of permanently higher inflationary pressures.

The purpose of this paper is twofold: it first analyses the recent productivity slowdown, attempting to distinguish permanent from cyclical changes; and, secondly, it considers the implications for anti-inflationary policies, discussing the short-run effects of more restrictive policies as well as the prospects for reducing inflation in the medium term. Accordingly, the first section of the paper looks at past and recent productivity trends and raises certain issues concerning analysis and measurement. This first section also discusses some of the factors which appear to have contributed to the productivity slowdown and presents a partial review of the empirical evidence.[2] The second section presents some new empirical estimates: it first evaluates productivity behaviour from cross-country regressions based on a sample of eleven countries and then gives complementary time series estimates for the same sample of countries. A major question in the empirical work concerns the rôle of cyclical factors, and this is further considered in the third section, which returns to the inflation problem. Starting with some empirical estimates of changes in nominal wages, this section analyses to what extent periods of slack are likely to reduce the rate of change in unit labour costs when the cyclical behaviour of both wages and productivity is taken into account. The fourth and final section summarises the findings and considers policy implications.

I. Recent trends and some contributing factors

As can be seen from Table 1, all of the eleven countries analysed in this paper experienced a significant deceleration in labour productivity growth between 1960-73 and 1973-80. For the aggregate economy the slowdown was most pronounced in Japan, while Sweden experienced

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2 The factors mentioned in this section are by no means exhaustive. Giersch and Wolter (1983) alone propose 14 hypotheses and Denison (1979) had earlier discussed at length 17 contributing factors. Among the issues that have been treated extensively in economic literature but which will not be covered in this paper are: the narrowing technological gap between the United States and other countries, government regulations, changes in the composition and skill of the labour force, investment in research and development, and measurement errors.

Table 1

Productivity trends, 1960-80

Annual averages in percentages

	Manufacturing				Total economy		
Country	1960-73	1973-80	change 1980/73-73/60	change adjusted for hours worked	1960-73	1973-80	change 1980/73-73/60
US	3.2	1.7	-1.5	-1.3	2.1	0.1	-2.0
Japan	10.0	6.9	-3.1	-3.9	8.6	3.1	-5.5
Germany	4.8	3.9	-0.9	-0.7	4.4	2.8	-1.6
France	5.4	3.9	-1.5	-1.1	4.8	2.6	-2.2
UK	3.5	1.1	-2.4	-2.4	3.0	1.0	-2.0
Italy	5.4	3.3	-2.1	-3.3	5.6	1.7	-3.9
Canada	4.4	1.6	-2.8	-2.3	2.6	0.0	-2.6
Belgium	5.9	5.0	-0.9	-0.8	4.2	2.4	-1.8
Denmark	5.0	4.4	-0.6	-1.3	3.1	1.1	-1.9
Netherlands	6.4	4.4	-2.0	-2.0	4.1	1.9	-2.2
Sweden	5.3	0.5	-4.8	-4.6	3.3	0.6	-2.7

Sources: US Bureau of Labour Statistics, OECD National Accounts and OECD Employment and Labour Forces Statistics.

the largest deceleration in manufacturing. After adjustment for hours worked Germany, Belgium and France recorded the smallest productivity slowdown in manufacturing and Germany and Belgium also registered the best performance for the aggregate economy, while here Denmark takes third place, followed by the United Kingdom and the United States. Adjustment for hours worked, which are subject to cyclical as well as trend movements, has a relatively small effect,[3] but it is relevant to note that except for the United Kingdom and Sweden the deceleration was more pronounced for the aggregate economy than in manufacturing. This suggests that structural factors played a rôle, notably in the form of changes in the distribution of employment between low and high-productivity

3 For most countries productivity measured in terms of output per hour decelerated less than output per person employed. Where this was not the case, average hours worked either fell more slowly (Italy and Denmark) or actually increased (Japan) in the 1973-80 period compared with 1960-73.

sectors.[4] However, productivity developments could also reflect different adjustment patterns in conditions of supply shocks and real wage-cost pressures.

Although most analysts now seem to have adopted 1973 as a "watershed" year, the dating of the productivity slowdown is not an obvious matter. As can be seen from the graphs, productivity growth in the United States had already started to decline around 1966-67[5] and estimates to be presented below may indicate that productivity in Germany decelerated throughout the 1960s and 1970s. At the same time, several countries experienced a short-run but quite strong acceleration in productivity increases between the two oil shocks and have only recently been exposed to productivity growth below earlier trends.

Whatever the exact timing of the slowdown - and it has probably differed considerably from one country to another - there can be little doubt that recent productivity gains have been well below earlier trends in virtually all countries. This, in turn, raises the question as to what have been the fundamental causes of this phenomenon, whether they are temporary or permanent, and what policy implications should be drawn. As noted earlier, there has been no shortage of explanations and hypotheses and in some studies one or two factors are found to account for almost all of the slowdown in a particular country. However, such results are frequently found to depend critically on the time frame chosen or on the measures and assumptions adopted and have been refuted in subsequent and alternative analyses. At the same time, and despite wide differences of opinion concerning their exact impact, there seems to be a growing consensus that five factors have, in one way or another,

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4 Sectoral shifts are more likely to affect aggregate productivity data than data for a relatively homogeneous sector such as manufacturing. In the case of the United States Norsworthy et al. (1979) estimated that inter-industry employment shifts accounted for 0.27 percentage points of the productivity slowdown in private business between 1965-73 and 1973-78, while the impact on manufacturing productivity was positive, but only 0.07 points.

5 See for instance Nordhaus (1972) and Berndt (1980). Tatom (1982), on the other hand, finds that on the basis of the latest revisions to the national accounts the slowdown does not appear to have started until 1973-74. Wachter and Perloff (1980) report that correction for compositional shifts in the labour force changes the timing of the US deceleration from around 1965 to 1973-74, while Darby (1982) argues that after such adjustments there has been no slowdown at all.

played an important rôle in both individual countries and in the industrial world as a whole:

(a) the rise in energy prices, which coincided with the productivity slowdown and affected all industrial countries, albeit not to the same extent;

(b) the decline in investment growth which has occurred in all countries partly as a cyclical phenomenon and partly in response to changing factor prices and/or lower profits;[6]

(c) the termination of favourable inter-industry and inter-sectoral employment shifts, in particular as the outflow of excess labour from the agricultural sector ceased and was replaced by strong growth in the service sectors;

(d) the world recession, as there appears to be a positive relationship between rates of output and productivity gains in both the short and the long run;

(e) the acceleration of inflation, which has increased uncertainty and led to responses that hamper an optimal allocation of resources.

The first three factors are frequently referred to as "fundamental" or "structural" causes and may be treated within a growth accounting or production function framework. The fourth factor is of an empirical and mainly short-run nature, reflecting lags in the adjustment of factor inputs to changing output conditions. However, it also results from the existence of longer-run relationships as several variables, which in a growth accounting framework are treated as a residual, are positively related to the rate of growth of output. The fifth factor is also mainly empirical though difficult to measure in precise terms. There is suggestive evidence for the United States and Canada[7] that the acceleration of inflation has coincided with a decline in overall factor productivity (as determined in aggregate production functions, see below). However,

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6 It is difficult to isolate the effect of relative factor price shifts from that of changing profits: firstly, recent large movements in relative factor prices have coincided with a general deterioration in profit shares and, secondly, investment functions for most countries are dominated by an accelerator effect and profits are frequently found to have no or only a marginal effect when relative factor prices are also included among the determinants.

7 See Clark (1980) for the United States and Jarrett & Selody (1981) for Canada.

the channels through which higher inflation may adversely affect productivity gains are not well known. In addition, the exact causal relationship is hard to identify when the formation of prices is significantly influenced by changes in unit costs, as seems to be the case in most countries. For these reasons, this fifth factor will not be dealt with here.

As a starting point for discussing the potential rôle of the first three factors mentioned above, it may be useful to adopt the approach suggested by Berndt (1980) and assume a three-factor aggregate production function, which is homogeneous of degree one:[8]

(i) $Y = A(t)\ f(M,K,E)$ where

Y = gross output

$A(t)$ = an index of overall factor productivity

M = number of working hours

K = input of capital

E = energy input.

Differentiating with respect to time, using lower-case letters for percentage changes, and letting α, β, and γ denote the cost shares of labour, capital and energy respectively, (i) can be rewritten as:

(ii) $y = a + \alpha m + \beta k + \gamma e$

This is the equation usually applied in "growth accounting" (though mostly without energy inputs) with the last three terms indicating the contributions to growth of labour, capital and energy respectively. "a" measures the change in output which cannot be attributed to any of the three inputs and may be interpreted as total factor productivity. In order to focus on productivity changes, equation (ii) can be rearranged in two alternative ways:

(iiia) $a = y - \alpha m - \beta k - \gamma e$ or

$a = \alpha(y-m) + \beta(y-k) + \gamma(y-e)$ as the sum of the shares is unity, and

(iiib) $y-m = a + (\alpha-1)m + \beta k + \gamma e$ or

$y-m = a + \beta(k-m) + \gamma(e-m)$ as $\beta + \gamma = 1 - \alpha$.

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8 This framework could easily be extended to include more factor inputs, in particular non-oil raw materials. However, since the productivity discussion has largely centred on labour, capital and energy, a three-factor production function is sufficient for the purposes of the following analysis.

According to (iiia) total factor productivity is a weighted average of individual factor productivities, but in a sense this is just an arbitrary way of distributing an unexplained residual among all three input factors. Equation (iiib) refers to the concept most often used in productivity studies, viz. labour productivity. According to this equation output per man-hour is determined by two components: overall factor productivity and changes in other factor inputs relative to labour. At a given rate of overall factor productivity growth, the rise in output per man-hour will decline (increase) if the growth of either capital or energy is slower (faster) than that of labour input. Most studies of the potential rôle of energy and capital have taken equations such as (iiib) as a starting point.

(a) Energy and energy prices

The coincidence of the two oil shocks and the worldwide slowdown in productivity growth would point to energy and energy prices as important causes, and according to several studies[9] the rise in relative energy prices can indeed explain most of the deceleration in productivity growth. However, the contribution of energy prices is less direct and obvious than it first appears:

- as pointed out by Denison (1979) and Berndt (1980) the cost share of energy is for most countries only around 5 per cent. and rarely exceeds 10 per cent. except in certain energy-intensive industries. This implies that energy inputs would have to fall considerably relative to labour in order to produce any measurable impact on labour productivity and, while there have been some savings in energy inputs, changes

9 See Tatom (1982) and earlier studies by Rasche and Tatom. The approach followed in these analyses essentially consists in estimating a three-factor Cobb-Douglas production function with relative energy prices included as a third factor. It has subsequently also been applied to Japanese and Canadian data with results very similar to those obtained for the United States. However, as pointed out by several commentators the results obtained by this procedure are likely to be biased, one reason being that with energy - or energy prices - included as a third input factor, value added is not the relevant dependent variable. In addition, the assumption that energy inputs can be replaced by relative energy prices by imposing a profit maximisation condition introduces an asymmetric treatment of the three factor inputs.

in the (e-m) component of equation (iiib) have been relatively modest;[10]

- with energy included in the production function, gross output (Y) exceeds value added, while most measures of labour productivity are based on GNP relative to employment or number of working hours.[11]

Both points imply that the impact of energy prices on labour productivity as conventionally measured is mainly of an indirect nature and can best be seen within a two-factor production function:

(iv) $y-m = a + \beta(k-m)$

where "y" now refers to value added. Within this framework there are several ways in which energy and energy prices may have exerted an influence:

(a°) Since a price-induced reduction in energy inputs will reduce the marginal productivity of capital and labour, the use of fixed cost shares as weights in assessing the growth contribution of each input factor may no longer be valid. In other words, the rise in relative energy prices is likely to affect the β - coefficient in equation (iv). Some of the results to be reported in the next section may suggest that such a shift has occurred, although it has not been directly linked to the change in energy prices.

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10 Berndt (1980) finds that (e-m) fell by only 0.25 percentage points between 1965-73 and 1973-77 and that this had a negligible impact on the overall slowdown in manufacturing productivity in the United States. Perry (1977) reports similar figures, while Tatom (1982) argues that (e-m) declined significantly in the 1970s. According to a recent study for Finland (Jokinen et al. (1982)), the negative impact of (e-m) on manufacturing productivity between 1960-73 and 1973-79 may be put at 0.25-0.30 percentage points, compared with an overall slowdown of 1.5 points.

11 This point is to be distinguished from the earlier US discussion (see Clark (1979)) as to whether output should be measured net or gross of depreciation allowances. In this context it should also be pointed out that the transition from a gross output to a value added concept is only valid when certain separability conditions are satisfied. Recent studies suggest that this may not be the case but this issue will not be discussed further here.

(b°) According to Jorgenson et al. (1981) relative factor price changes can also affect the nature of technical progress and thereby the "a" term in equation (iv). This analysis is still in its infancy, but industry results for the United States point to rather sizable and negative effects, and preliminary findings for other countries suggest a similar pattern. Changes in the composition of demand away from energy-intensive products and towards labour-intensive goods and sectors would also reduce "a". Such shifts seem to dominate the short-run response to higher energy prices, while factor substitution (see below) within individual industries and sectors is subject to a considerable time lag.

(c°) Since labour and capital are not equally substitutable for energy, the change in relative energy prices will also affect optimal capital/labour ratios and thereby the (k-m) component in equation (iv). If capital and energy are complements and labour and energy are substitutes (k-m) would decline after 1973-74 unless offset by other changes. However, while there is evidence that capital and energy are complements or significantly less substitutable than labour and energy, there is (as will be discussed below) considerable controversy with respect to the actual development of (k-m) and its possible contribution to the slowdown in labour productivity.

There are thus many ways in which higher energy prices could have contributed to the slowdown in productivity growth. However, given the indirect nature of the effects it is difficult to arrive at precise figures and this no doubt explains the very wide range of estimates available. A final problem, with important policy implications, is whether higher energy prices have affected the <u>level</u> of potential output and productivity or their <u>rates of change</u>. Valid arguments for both types of influence have been advanced but empirically it is difficult to separate the two because of partial and lagged adjustments. If, for instance, the main effect of higher energy prices has been to change optimal capital/labour and energy/labour ratios and thereby the level of potential output, future growth rates of potential output and productivity need not be affected. However, since the adjustment of factor inputs is subject to long lags the impact of such changes on optimal factor ratios will generally be reflected in a gradual deceleration in labour productivity and not in a once-and-for-all level shift.[12]

(b) Investment and the capital stock

Next to the energy issue, the discussion of changes in the capital/labour ratio as a cause of lower labour productivity growth has probably produced the widest range of views and empirical estimates, with some attributing all or most of the slowdown to the current investment slump while others see no sign of an influence.[13] The evidence given by Giersch and Wolter (1983) provides a good illustration of the controversy. When estimating equation (iv) across ten countries they obtain the following results for the industrial sector (t-statistics in brackets):

$$1960\text{-}73: \quad (y-m) = 1.52 + \underset{(5.4)}{0.81}\,(k-m) \qquad R^2 = 0.76$$

$$1973\text{-}78: \quad (y-m) = 0.67 + \underset{(1.7)}{0.43}\,(k-m) \qquad R^2 = 0.17$$

12 The study by Tatom (op.cit.) provides a good example of this problem, the effect of relative energy prices being derived from a production function in level form but the implications for labour productivity being subsequently interpreted in terms of annual rates of change.

13 Bosworth (1982) finds that while there has been some slowdown in (k-m) for the non-farm business sector in the United States, the contribution to the labour productivity slowdown is only marginal. Baily (1982) obtains a similar result for the United States non-manufacturing sectors and for manufacturing he confirms an earlier result reported in Berndt (1980) that (k-m) has not declined in recent years. On the other hand, Kopcke (1980), Kendrick (1979 and 1980) and earlier studies by Clark (1978) and Tatom (1977) assign an important rôle to changes in (k-m), and the same is true of Sargent (1982), who concludes that the strong rise in labour productivity during the 1960s was the result of an above-average increase in (k-m) induced by a falling relative price for capital. By contrast, more recent years have seen a rise in the relative price of capital, and (k-m) (and thereby labour productivity) has grown at a sub-normal rate as firms attempt to adjust capital/labour ratios downwards. Lindbeck (1982) analyses various reasons for weakening investment incentives and his cross-country regressions suggest that falling profit rates have been important. However, the implications for labour productivity are not quantified and, as will be discussed in the following section, investment growth is not statistically significant when included in cross-country regressions of labour productivity.

For the first sub-period, inter-country variations in changes in the capital/labour ratio have clearly been important, although the estimates are biased as the coefficient of 0.81 far exceeds the cost share of capital. For the second period, however, this relationship explains only a small part of the inter-country variation in productivity changes and the coefficient with respect to (k-m) is no longer significant. At the same time, the decline in the two parameters (a) and (β) might suggest that lower factor productivity growth and a smaller output elasticity with respect to capital have been important causes, although firm conclusions cannot be drawn from a relationship that essentially "breaks down".

Apart from some recent contributions cited above, most of the discussion concerning the rôle of investment and capital/labour ratios has been confined to the United States and has raised measurement problems as well as issues of a more analytical nature:[14]

(a°) One question is whether capital stock measures, when included in equations such as (iv), should be adjusted for rates of capacity utilisation. Kopcke (1980), using adjusted figures, concludes that the slowdown in (k-m) is the major cause of lower labour productivity growth while Berndt (1980), using unadjusted figures, finds that (k-m) has grown at an unchanged rate throughout the 1960s and 1970s. It is difficult to say which procedure is the more appropriate one. On the one hand, it could be argued that since "m" denotes employment and hence is adjusted for cyclical changes, a similar procedure should be applied to the capital stock. On the other hand, if a marked reduction in (k-m) is only due to lower rates of capacity utilisation the slowdown in productivity growth would seem to be largely a cyclical phenomenon, with the slump in investment

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14 A relatively minor measurement problem in this context is whether the capital stock should be measured gross or net of depreciation. As noted by Clark (1979) this seems to have only a marginal impact on (k-m).

mainly influencing potential and not actual productivity developments.[15]

(b°) Another, and equally important, issue concerns the correct measure of the capital stock. It is well-known that capital stock data are not very reliable and there is an additional risk that published figures overstate the effective size of the capital stock. According to Baily (1981) the rise in energy prices has rendered a large part of the capital stock obsolete as it cannot be profitably used at existing output prices. Using Tobin's "q" as an indicator of the extent to which the efficiency or utility of the capital stock has declined because of higher energy prices, Baily is able to explain most of the productivity slowdown as due to a lower growth rate of (k-m).[16]

Other potentially important factors affecting the growth of the capital stock and labour productivity are the average age of the capital stock and the growing share of new investments required for protection of the environment. Both of these could influence the rate of technical progress - to the extent that this is embodied - and/or the efficiency of the capital stock. However, the empirical evidence - though largely confined to the United States - indicates that they have

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15 To put it somewhat differently, the fact that the capital stock has grown more slowly relative to the total labour force but has grown at a constant rate relative to employment would suggest that lower labour productivity growth cannot be ascribed to capital shortages. A capital shortage problem will, however, be encountered in the future if previous, lower unemployment rates are to be re-established.

16 If the capital stock is adjusted for changes in the obsolescence rate as a result of shifting factor prices, measured utilisation rates will rise so that the effect of correcting for cyclical factors (see point a° above) will be smaller. Quite apart from this interdependence, adjustments for factor price shifts and rates of capacity utilisation pose similar analytical problems, as in the latter case a corrected (k-m) measure will accelerate in conditions of faster output growth, while in the former case a corrected (k-m) measure will accelerate in conditions of a faster rise in output prices. This similarity may also be illustrated by introducing the ratio of capital services to the capital stock as an additional variable (see Baily (1982)). Thus lower utilisation rates as well as unfavourable relative price changes will be reflected as a decline in this ratio and in labour productivity growth.

been of only minor importance.[17]

(c) Employment shifts

Overall factor productivity ("a" in equation (iv)) is frequently derived as a residual, but its development over time is likely to be influenced by changes in both capital and labour as well as by the growth of output (see below). If technical progress is embodied, changes in the capital stock affect labour productivity over and above what is implied by the (k-m) term in equation (iv). Moreover, changes in the composition and skills of the labour force could affect factor productivity. These labour force developments have been analysed extensively for the United States but seem to have contributed only marginally to the recent slowdown either because the changes were too small to produce a sizable impact or because there were offsetting factors.[18]

There is, however, a general consensus that changes in the sectoral distribution of employment have played a major rôle and that much of the slowdown in productivity growth can be ascribed to the cessation of favourable employment shifts as the outflow of labour from the agricultural sector "dried up". This was first noted by Kaldor for the United Kingdom and later confirmed for a number of countries in an empirical study by the OECD (1980). More recently Sachs (1982) has provided further evidence, interpreting the lower outflow from agriculture as a major factor not only in accounting for the slowdown in productivity but also in explaining the acceleration in nominal and real wage growth.

There is less agreement as regards the subsequent shift from industry towards the service sectors, as differences in productivity

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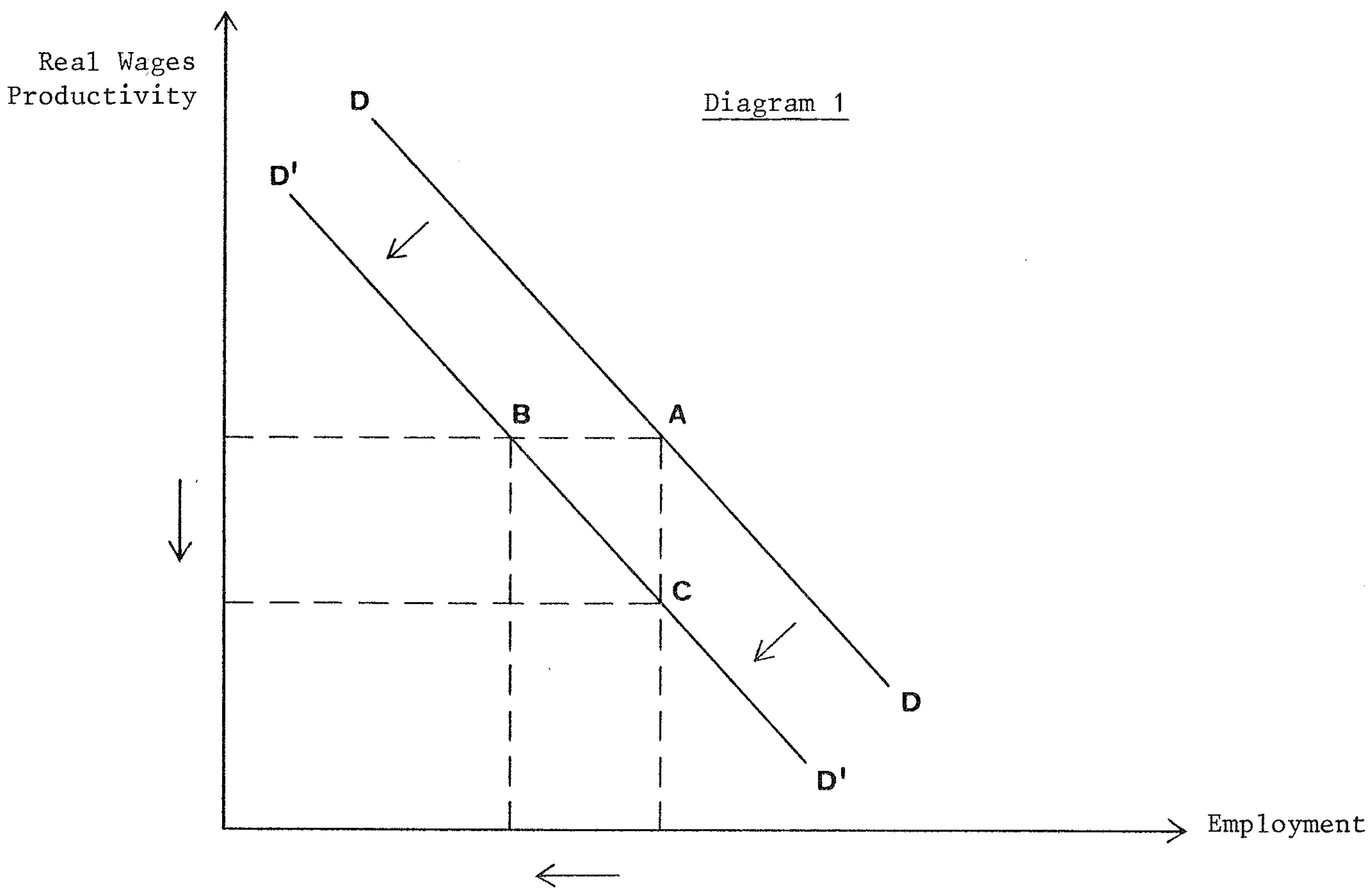
17 Even though the average age of the capital stock does not appear to have played any major rôle, a disaggregation of investment into equipment and structures may be important in assessing future productivity trends. Thus, in the United States there has been a marked shift towards machinery and equipment, suggesting that a future capital shortage may be difficult to eliminate quickly. By contrast, in Finland (see Jokinen, op. cit.) equipment investments have decelerated while investments in structures have accelerated relative to the growth of employment.

18 Wachter and Perloff (1980) make the point that compositional changes may be potentially important in some conditions. Thus a country which successfully implements employment measures in favour of unemployed workers with below-average skills and abilities will experience a deterioration in its productivity performance. However, considering the low labour force share of this group of unemployed the impact is unlikely to be very large.

levels between these sectors are much smaller than between agriculture and industry and many recent technological innovations have taken place or been applied in the service sectors. Denison (1979) argues strongly against the hypothesis that a higher employment share in services has acted as a constraint on productivity gains. Others, while recognising the measurement problems concerning the level of output per employee as well as its rate of change, have seen the growing absolute and relative size of the public sector as having direct as well as indirect adverse effects on the growth of output and productivity.

In the context of employment adjustments, it is also relevant to consider a hypothesis advanced by Giersch and Wolter (1983) which - in a comparative-static framework - is illustrated in Diagram 1. On the assumption of fixed output prices, declining marginal productivity and profit maximisation, the demand curve for labour (DD) has a negative slope and adverse supply shocks may be shown as leftward shifts of this curve. If real wages are rigid, the economy will move from the initial position at point A to point B where employment has fallen sharply but



productivity is maintained. By contrast, when real wages are flexible and wage-earners "absorb" the adverse supply shock the economy moves down along the shifted demand curve to a point such as C where employment is maintained at the initial level but productivity has declined. Consequently, cross-country variations in productivity gains during a period of adverse supply shocks might, under this hypothesis, be expected to be positively correlated with the degree of real wage rigidity but negatively correlated with employment growth.

(d) Output growth

It has long been recognised that output growth itself is an important factor in explaining productivity trends. As early as in 1949 Verdoorn found a strong positive cross-country relationship between variations in output growth and productivity gains. Moreover - and despite the law of diminishing returns - within countries higher rates of growth and capacity utilisation have tended to be associated with permanent gains in productivity increases.[19] Finally, when the production function used above is "inverted" and applied as a labour demand function on the assumption of cost minimisation,[20] the short-run elasticity of employment with respect to output is considerably below unity, giving the well-known pro-cyclical pattern of labour productivity gains.[21] In

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19 See Okun (1973), who provides a detailed analysis of the various factors contributing to permanent productivity gains and cites a comment by Solow that this relationship (i.e. the long-run increasing returns to labour) is one of the major paradoxes in economic theory.

20 More precisely, on the assumption that firms attempt to minimise costs and take factor prices and output as given exogenously, a labour demand equation may be specified as:

$$\log M_t = a + b \log Y_t + c \log(W/P_f)_t + d \log M_{t-1} + e T$$

where, in addition to the notation used above, W/P_f denotes the ratio between wages and other factor prices and T is a time trend. e is usually found to be negative, reflecting the influence of labour-saving technical progress, and c is also negative though frequently not significant. b is the short-run elasticity of employment with respect to output, while the corresponding long-run elasticity is b/(1-d) and, as noted below, usually found to be less than unity.

21 This is clearly seen when analysing labour productivity for different sub-groups of the labour force. Thus, the pro-cyclical behaviour is much less pronounced for blue-collar workers than for salaried employees, as the input of the latter group is mainly of an overhead nature.

addition, this positive relation between productivity and output growth is not merely due to lags in the adjustment of employment to fluctuations in demand, as the long-run elasticity of employment with respect to output is also less than unity, thus indirectly confirming the apparent absence of diminishing returns.

However, while there is clear empirical evidence of a positive correlation between productivity and growth the underlying causal and behavioural relations are not well identified. Firstly, an autonomous increase in productivity will boost real income, which, in turn, stimulates demand and generates stronger output growth, thus "reversing" the causal relationship discussed above. Secondly, since labour productivity is a composite variable measured as the ratio between output and employment, its development over time will be influenced by shifts in overall factor productivity, changes in the behaviour of both output and demand, and interactions between the three. Consequently, it may be inappropriate and misleading to interpret movements in labour productivity as a shift in the "behaviour" of labour productivity, since it might be the result of changes in the underlying output and employment relations.[22]

If the output effect on productivity were mainly a cyclical phenomenon productivity developments could be analysed within the growth accounting framework by estimating an aggregate production function from cyclically adjusted data. However, as discussed above, the output effect has a long-run as well as a cyclical component and the former would not be captured by this. Moreover, the assumptions underlying the aggregate production function are very restrictive and cannot incorporate all the variables which are recognised as having influenced productivity growth (see Nelson (1981)). Consequently, it was decided to use a less rigorous

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22 The factors inducing changes in output growth may affect the adjustment of employment and thereby the resulting productivity gains and in this context monetary policies may exert a direct and specific influence. Thus there is evidence for the United Kingdom (see Henry and Wren-Lewis (1983)) that the unusually strong productivity increases recorded in 1981 were in part due to the liquidity squeeze which forced firms to lay off employees more rapidly and extensively than in previous recessions, thus generating a counter-cyclical pattern of productivity changes. Similarly, changes in the sectoral composition of demand and output might affect aggregate productivity gains. However, recent evidence for the United States (see Baily (1982)) suggests that such changes have had only a marginal impact once allowance has been made for the employment shifts noted earlier.

approach and - despite the shortcomings - rely on labour productivity as the appropriate dependent variable. Thus the empirical estimates to be presented in the next section first test (on the basis of cross-country estimates) the validity of Verdoorn's law and the possible impact of structural factors such as changes in the composition of employment, investment growth and the flexibility of real wages. Secondly, and using time series estimates, an attempt is made to assess the cyclical pattern of productivity changes and whether any behavioural shifts have occurred during the post-1974 period. It will appear that much of the recent slowdown can be attributed to the decline in output growth and the widespread degree of slack, and the implications of this finding with respect to inflation and anti-inflation policies are taken up in the concluding Section IV.

II. Empirical estimates

A. Cross-country regressions

Tables 2 and 3 present results from cross-country regressions. Table 2 relates to the manufacturing sector, using changes in both output per person and output per man-hour as the dependent variable, and among the "negative" results not shown in the table it is worth mentioning that neither the outflow of labour from agriculture nor the rate of growth of investment were found to have had any significant influence. This was particularly true in the case of the investment factor for the second sub-period and in the equations explaining the deceleration in productivity growth.[23]

Verdoorn's law, which postulates a positive relationship between output and productivity growth across countries, is clearly confirmed for the 1960-73 period. For 1973-80 and in the equations relating to the deceleration in productivity growth the output effect is less significant and subject to wider fluctuations, suggesting that inter-country variations in productivity gains during this period were significantly influenced by other and largely unexplained factors.

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23 In fact, investment growth had a negative though statistically insignificant coefficient, and even when the output variable was dropped, the coefficient on investment growth was found to be negative in the 1973-80 period.

Table 2 Cross-country regression, manufacturing

Period	Dep. var.	Constant	Output	Inv. share	Real wages	Employment	$\bar{R}^2$	SE
1960-73	Y/H[1]	2.01 (2.0)	0.67 (4.5)				0.66	1.18
	Y/L[2]	1.09 (2.0)	0.68 (8.3)				0.87	0.64
	Y/H	-0.41 (0.1)	0.57 (3.1)	0.18 (0.9)			0.65	1.19
	Y/L	-1.30 (1.0)	0.58 (6.7)	0.18 (1.9)			0.90	0.56
	Y/H	0.22 (0.3)	0.26 (2.1)		0.65 (4.5)		0.89	0.66
	Y/L	0.34 (0.6)	0.51 (5.2)		0.27 (2.4)		0.92	0.52
1973-80	Y/H	2.69 (3.0)	0.61 (1.9)				0.20	1.66
	Y/L	1.35 (1.8)	0.87 (3.2)				0.47	1.39
	Y/H	1.73 (0.6)	0.52 (1.3)	0.08 (0.4)			0.11	1.75
	Y/L	0.64 (0.3)	0.80 (2.3)	0.06 (0.3)			0.42	1.42
	Y/H	0.98 (1.1)	0.27 (1.0)		0.63 (3.1)		0.58	1.20
	Y/L	-0.06 (0.1)	0.59 (2.7)		0.52 (3.0)		0.72	1.02
1973/60-1980/73	Y/H	-0.28 (0.2)	0.49 (1.7)				0.17	1.37
	Y/L	-0.50 (0.6)	0.38 (1.8)				0.19	1.01
	Y/H	-0.41 (0.3)	0.41 (1.3)	0.14 (0.7)			0.12	1.41
	Y/L	-0.58 (0.6)	0.33 (1.4)	0.08 (0.6)			0.12	1.05
	Y/H	0.57 (0.5)	0.43 (1.8)		0.39 (2.1)		0.40	1.16
	Y/L	0.18 (0.2)	0.36 (1.7)		0.15 (0.9)		0.17	1.02
	Resid. H	-1.71 (2.6)				-0.74 (2.9)	0.43	0.99
	Resid. L	-1.38 (3.1)				-0.59 (3.5)	0.53	0.66

1. Output per hour.

2. Output per person employed.

The last two columns and the results for "resid." test the Giersch-Wolter hypothesis and the empirical results are not inconsistent with this. In all equations and particularly when productivity is measured per working hour the rate of growth of real wages has a positive influence. Moreover, when residuals from the equation containing only output growth as the explanatory variable were regressed on employment changes, a significant and negative coefficient was obtained, implying that countries experiencing a productivity slowdown which was larger (smaller) than can be attributed to output growth were also countries with a small (large) decline in employment growth.[24]

The inclusion of changes in real wages and employment clearly helps to explain productivity behaviour in the 1970s. Moreover, the estimates are not inconsistent with the view that countries with flexible real wages experienced a large productivity slowdown and were thus able to maintain employment growth while countries with rigid real wages suffered only a small decline in productivity growth but saw large increases in unemployment. Nonetheless, the results should not be taken as "proof" of the Giersch-Wolter hypothesis or as identifying a causal relationship. Just as the negative relationship between inflation and the rate of productivity growth may be more indicative of certain pricing rules than of productivity behaviour, the very significant positive correlation between changes in productivity and real wages could be the result of output prices being determined as a mark-up on unit labour costs.

Turning now to the results for the aggregate economy (Table 3), an important feature is the estimated impact of sectoral employment shifts. For both sub-periods and in the deceleration equations the outflow of labour from agriculture has a significant impact, boosting productivity growth in both sub-periods and contributing significantly to the deceleration.[25] The impact of changes in industrial employment is more difficult to interpret. According to the sign of the estimated

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24 This estimation procedure was adopted since including both output and employment growth as explanatory variables in a productivity equation would come very close to estimating an identity. The decelerations in productivity, output and employment growth are measured as negative figures. A negative residual in the regression of productivity on output, therefore, indicates a particularly large deceleration, and a negative correlation between the residuals and employment suggests that large decelerations in productivity have been associated with strong employment growth.

25 See also Sachs (1982). The outflow from agriculture is likely to be influenced by supply and wage conditions in the primary sectors ("push" factors) as well as by employment opportunities in the secondary and tertiary sectors ("pull" factors). When AGRIC was regressed on OUTP the coefficient was, as expected, positive, but the R^2s were only 0.42 and 0.25 for the two sub-periods, suggesting that AGRIC has been largely exogenous.

coefficient rapid industrial employment growth tended to reduce aggregate productivity gains in the 1960s, possibly reflecting a certain degree of labour hoarding or overmanning. In the 1970s, on the other hand, when the share of industrial employment fell in most countries, productivity gains seem to have benefited from above-average employment declines probably reflecting a rapid adjustment of labour demand to weakening output trends. The deceleration equation containing both employment variables is consistent with this interpretation and, taking the coefficients from Table 3 at "face value", employment shifts appear to account for as much as 40 per cent. of the overall deceleration in productivity (see Table 4).

As regards capital formation, investment growth was not found to have any significant influence and as in manufacturing the influence of variations in the investment share is rather uncertain, particularly for the 1973-80 period. Finally, the equations with the real wage rate are consistent with the results obtained for manufacturing, with the coefficient of real wages actually being higher and more significant.

Summing up, it appears that productivity developments in both manufacturing and the aggregate economy are less well explained in the 1970s than in the 1960s although the equations focusing on the deceleration in productivity gains give quite satisfactory results for the aggregate economy. A disturbing feature is that the coefficient with respect to output growth seems to have fallen and is not very well determined for the most recent period. This may reflect the change from a régime in which fluctuations in output and employment are demand-determined to one in which supply-side factors and different adjustment patterns are important and does not necessarily influence the output-productivity nexus. It could, however, also imply that future output growth may not be accompanied by an acceleration in productivity gains as was experienced in the past, as certain supply-side factors (only some of which have been analysed) might prove to have permanent and irreversible effects.

Table 3 Cross-country regression, total economy

Period	Constant	Output	AGRIC[1]	EMIN[2]	Inv. share	Real wages	$\bar{R}^2$	SE
1960-73	-0.27 (0.3)	0.87 (5.0)					0.70	0.98
	0.25 (0.3)	0.59 (3.0)	1.38 (2.1)				0.79	0.82
	-	0.74 (10.6)	1.23 (3.1)	-1.18 (3.4)			0.96	0.35
	-3.06 (1.8)	0.24 (1.1)	2.00 (3.3)		0.28 (2.2)		0.86	0.68
	-0.56 (1.2)	0.49 (4.3)				0.49 (5.2)	0.92	0.49
1973-80	-0.08 (0.1)	0.70 (1.6)					0.14	1.02
	0.40 (0.4)	0.18 (0.4)	3.82 (1.9)				0.33	0.90
	-	0.30 (2.6)	3.12 (2.9)	-1.26 (4.4)			0.91	0.32
	-0.76 (0.5)	0.01 (0.0)	3.98 (2.0)		0.10 (1.0)		0.34	0.90
	0.12 (0.2)	0.04 (0.2)				0.59 (5.2)	0.78	0.52
1973/60-1980/73	0.46 (0.9)	0.80 (4.8)					0.69	0.62
	0.58 (1.9)	0.47 (3.7)	1.59 (4.0)				0.88	0.38
	0.46 (3.0)[3]	0.83 (8.8)	0.96 (4.2)	-0.99 (5.1)			0.97	0.18
	0.49 (1.5)	0.48 (3.6)	1.61 (3.9)		0.04 (0.8)		0.88	0.39
	-0.04 (0.1)	0.73 (6.1)				0.28 (3.1)	0.84	0.44

1. Average rate of change in agricultural employment, relative to non-agricultural employment at start of period; outflow positive. This measure of the outflow was first proposed in Sachs (1982).

2. Average rate of change in industrial employment, relative to non-agricultural employment at start of period; inflow positive.

3. Suppressing the intercept term produced the following equation:

$$\underset{(9.8)}{\text{DECEL} = 1.00\ \text{DOUTP.}} + \underset{(2.6)}{0.85\ \text{DAGRIC}} - \underset{(4.0)}{1.08\ \text{DEMIN}}$$

where "Ds" denote changes in rates of growth.

Table 4 Employment shifts and productivity changes

	1960-73	1973-80	1973/60-1980/73
Average prod.	4.20	1.50	-2.70
Contrib. AGRIC	0.83	- 0.60	-0.47
Contrib. EMIN	-0.43	0.11	-0.55

B. Time series regressions

In order to analyse more closely the output-productivity nexus and the rôle of cyclical factors, productivity equations were also estimated on time series data for the manufacturing sector in each of the countries included in the previous section. Except for Belgium, for which data are only available from 1960, the observation period was 1955-81 and the equation applied to all countries was specified as follows:

$PROD_t = a + \Sigma b_i OUT_{t-i} + c\ RESID_{t-j} + d\ DUMMY(1,2)$ with

PROD = % change in output per man-hour,

OUT = % change in output,

RESID = % deviation of actual from trend output with the latter estimated over the period 1955-81,

DUMMY(1) = dummy variable set equal to 0 for 1955-73 and to 1 for 1974-81,

DUMMY(2) = dummy variable set equal to 1 and -1 for 1968 and 1969, respectively (only included for France),

a = intercept term indicating the trend rate of productivity growth.

No attempt was made to include more "structural" variables, while two types of cyclical influences were allowed for: (i) a rate-of-change effect containing the acceleration in productivity gains in the early phase of a recovery, the subsequent slowdown as the cycle approaches a "peak", and a possible net gain reflecting the positive association between output and productivity growth; and (ii) a level effect included to measure the degree of "labour shake-out" or the existence of dampening factors in periods of slack. Needless to say, this specification provides only a first approximation to modelling a phenomenon which is essentially determined by the speed with which employment is adjusted to variations in actual and expected demand and by the existence of more fundamental factors included in growth accounting analyses.

Nevertheless, the estimates point to a consistent pattern across countries as well as to some relevant country-specific features (see Table 5). In all cases, current changes in output have a positive influence on productivity growth, with the estimated elasticities ranging from 0.7-0.8 in Japan to 0.15-0.2 in Belgium and Denmark and averaging 0.38 for all eleven countries (see Table 9). Lagged output changes, on the other hand, have a negative influence, with elasticities ranging from -0.4 in Denmark and France to -0.1 in the United States and averaging -0.26 for the eleven countries together. Considering the combined effect of current and lagged output changes, eight countries show a net productivity gain, while in two there is a net decline and in one (France) the net effect is approximately 0. All in all, therefore, these estimates are consistent with the positive relationship between output and productivity growth observed across countries. However, the coefficient with respect to output changes is considerably smaller when assessed on the basis of time series data, suggesting that labour productivity is subject to decelerating though not diminishing returns. A second, and more obvious, implication of these estimates is that in periods of decelerating output growth, productivity gains will decline.

The level effect, as measured by the deviation from trend output, is less well determined and apparently not very pronounced. In two countries, the United States and the United Kingdom, there is some evidence of a "labour shake-out" as the coefficient is negative, while in other countries periods of slack are also periods of slow productivity gains. This dampening influence is particularly strong in Japan, Denmark and the Netherlands, and on average for the eleven countries a 10 per cent. deviation of actual from trend output reduces productivity growth by 0.8 points per year. A combination of all output coefficients suggests that if output has been growing at the trend rate but then decelerates by 5 points and remains at this lower rate, the initial productivity effect will be a slowdown of 2 points (-5 x 0.38) followed by an acceleration of 0.9 points (-0.26 x -5 + -5 x 0.08) in the second year and a renewed deceleration of 0.8 points (-10 x 0.08) in the third year, as now only the build-up of slack is having an effect. According to the estimates this deceleration continues as long as output growth remains below trend and slack is growing.

Table 5 Productivity equations[1.], 1955-81

Country	Constant	Output	$Output_{-1}$	Resid[2.]	$Resid_{-1}$	Dummy[3.]	Dummy[4.]	$\bar{R}^2$	DW	RSE[5.]
US	2.03 (5.4)	0.25 (4.2)	-0.11 (1.9)		-0.06 (1.0)			0.58	1.8	.39
	2.49 (5.7)	0.22 (3.7)	-0.11 (1.9)		-0.08 (1.4)	-1.20 (1.9)		0.62	1.9	.37
Japan	3.56 (4.4)	0.68 (12.0)	-0.21 (3.7)		0.10 (3.3)			0.86	1.9	.22
		0.82 (20.8)	-0.14 (3.5)		0.16 (6.0)	3.80 (6.2)		0.90	2.6	.18
Germany	4.64 (7.7)	0.29 (3.3)	-0.15 (1.5)		0.05 (0.9)			0.25	1.7	.34
	5.51 (6.5)	0.22 (2.3)	-0.17 (1.8)			-1.35 (1.5)		0.30	1.9	.31
France	4.69 (7.2)	0.44 (4.8)	-0.36 (3.4)		0.11 (2.1)		3.75 (4.6)	0.66	1.9	.18
	5.16 (4.2)	0.40 (3.2)	-0.39 (3.1)		0.11 (2.1)	-0.40 (0.5)	3.63 (4.7)	0.65	1.9	.18
UK	3.14 (9.6)	0.41 (6.o)	-0.20 (2.2)		-0.02 (0.4)			0.59	1.4	.45
	3.50 (7.4)	0.36 (4.4)	-0.21 (2.3)		-0.03 (0.5)	-0.85 (1.1)		0.59	1.4	.45
Italy	3.55 (3.9)	0.54 (6.0)	-0.19 (1.9)		0.10 (1.6)			0.61	1.6	.40
	4.06 (3.3)	0.50 (4.7)	-0.20 (2.0)		0.08 (1.1)	-0.75 (0.6)		0.60	1.6	.41
Canada	2.80 (4.7)	0.41 (5.3)	-0.22 (2.9)	0.07 (1.2)				0.68	1.5	.34
	3.75 (6.4)	0.34 (5.0)	-0.25 (3.9)	0.06 (1.3)		-1.78 (3.1)		0.78	2.3	.28
Belgium	6.82 (10.2)	0.20 (2.5)	-0.25 (3.1)	0.17 (3.0)				0.64	2.0	.21
	7.83 (6.9)	0.13 (1.2)	-0.31 (3.2)	0.18 (3.1)		-1.01 (1.1)		0.64	1.9	.21
Denmark	6.35 (7.9)	0.19 (1.8)	-0.39 (3.2)		0.20 (3.1)			0.35	2.5	.35
	6.84 (5.6)	0.15 (1.1)	-0.41)(3.2)		0.19 (2.5)	-0.63 (0.5)		0.33	2.4	.36
Netherlands	4.79 (7.5)	0.61 (7.6)	-0.33 (3.5)		0.18 (3.6)			0.75	1.7	.27
	3.28 (3.6)	0.73 (7.9)	-0.25 (2.7)		0.20 (4.3)	1.92 (2.1)		0.79	2.0	.25
Sweden	3.36 (7.0)	0.69 (7.3)	-0.29 (2.7)		0.06 (1.6)			0.69	1.1	.33
	4.66 (6.5)	0.55 (5.2)	-0.33 (3.3)		0.04 (1.0)	-2.03 (2.3)		0.74	1.2	.30

1. Standard equation (percentage change)

   $Prod. = a + \Sigma b_i Output_{-i} + c\ Resid_{-j} + d\ Dummy\ (1,2)$. Subscript refers to lags in years.

2. Percentage deviation from trend output.
3. Dummy variable = 0 for 1955-73 and 1 for 1974-81.
4. Dummy variable = 0 except for 1968 and 1969, where it equals 1 and -1 respectively.
5. Standard error relative to dependent variable (average).

t-statistics given in brackets.

$\bar{R}^2$: coefficient of determination corrected for degrees of freedom.

In a very simplistic attempt to identify structural factors a dummy variable was included for the 1974-81 period, and there are relatively strong indications of a productivity slowdown in the United States, Germany, the United Kingdom, Canada, Belgium and Sweden. In France, Italy and Denmark the shift variable is insignificant while for Japan and the Netherlands a significant but positive shift is found. The latter is difficult to explain but might be related to rapid employment

Table 6 Alternative productivity equations

Country	Constant	Output	$Output_{-1}$	$Resid_{-1}$	Trend[1]	$\bar{R}^2$	DW	RSE
US	2.51 (3.3)	0.22 (4.1)	-0.11 (1.9)	-0.09 (1.4)	-0.05 (1.9)	0.63	1.9	0.36
Japan	0.55 (0.5)	0.80 (13.5)	-0.16 (3.3)	0.16 (5.2)	0.15 (3.3)	0.90	2.6	0.18
Germany	7.87 (6.8)	0.17 (2.1)	-0.22 (2.6)	0.04 (0.9)	-0.16 (3.1)	0.47	2.3	0.28
France[2]	5.16 (4.1)	0.40 (3.2)	-0.39 (3.1)	0.11 (2.0)	-0.02 (0.4)	0.65	1.9	0.18
UK	3.43 (7.1)	0.37 (4.4)	-0.21 (2.3)	-0.03 (0.6)	-0.03 (0.8)	0.58	1.5	0.19
Italy	2.63 (1.5)	0.56 (5.7)	-0.17 (1.6)	0.10 (1.6)	0.04 (0.6)	0.60	1.7	0.40
Canada[3]	3.73 (6.5)	0.34 (5.1)	-0.25 (3.9)	0.05 (1.1)	-0.08 (3.2)	0.78	2.3	0.28
Belgium	7.64 (6.8)	0.14 (1.3)	-0.30 (3.1)	0.17 (3.0)	-0.04 (0.9)	0.63	1.9	0.22
Denmark	6.93 (5.5)	0.14 (1.0)	-0.41 (3.2)	0.18 (2.4)	-0.03 (0.6)	0.33	2.4	0.36
Netherlands	1.37 (1.3)	0.73 (10.0)	-0.21 (2.5)	0.16 (3.9)	0.16 (3.5)	0.84	2.5	0.22
Sweden	4.58 (6.0)	0.56 (5.1)	-0.33 (3.2)	0.03 (0.8)	-0.08 (2.0)	0.73	1.1	0.31
Average	4.22	0.40	-0.25	0.08	-0.01			

1. Trend estimated for 1974-81, except for Germany, Italy and the Netherlands, where the whole observation period 1955-81 applies.
2. Also includes a dummy variable for 1968-69 as in Table 5.
3. Resid unlagged as in Table 5.

adjustments associated with either real wage costs or shifts in the composition of demand (see Section IV).

Table 6 presents an alternative set of productivity equations in which a trend term was included in order to capture possible longer-run influences. A trend was allowed for the full observation period as well as for the period after 1973,[26] and for two countries (Germany and the Netherlands) the estimates are superior to those shown in Table 5. On the whole, the alternative equations confirm the earlier pattern of cyclical influences, with the combined effect for current and lagged

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26 The difference between the shift variables included in Tables 5 and 6 is that in Table 5 the dummy variable tests whether there has been a once-and-for-all shift in the trend rate of productivity gains, while in Table 6 the dummy variable allows for a year-to-year deceleration in trend productivity growth starting in 1974. A specification which implied that the full-period deceleration in trend productivity growth "changed speed" after 1973 produced no significant results.

output changes estimated at 0.15 compared with 0.12 in Table 5. The level effect (RESID) is also of the same size, while in most countries a trend deceleration in productivity only seems to have started in 1974. However, as for the earlier shift variable, the evidence is not very firm, except in Japan, where productivity again appears to have accelerated after 1973, and in Canada and Sweden, where a deceleration of 0.08 points per year is observed.

III. Recession, productivity and inflation

Although simplistic and imperfect, the estimates presented in Tables 5 and 6 provide some guidance as regards recent trends in unit labour costs (see graphs, pages 2-3). According to the Phillips-curve relationship, nominal wage increases tend to decline in periods of recession, but if productivity growth also follows a pro-cyclical pattern the change in unit labour costs - often interpreted as reflecting the underlying rate of inflation[27] - will show only a moderate response to weak output conditions. In addition, to the extent that more permanent and adverse shifts in productivity gains are not reflected in nominal wage moderation, unit labour cost trends will become less favourable.

To test these ideas Table 7 presents estimates for changes in total compensation (i.e. wage earnings plus certain non-wage labour costs) per working hour, while Table 8 gives corresponding estimates for unit labour costs. The compensation equation was specified as:

$$COMP_t = a + b\ OUT_{t-i} + c\ RESID_{t-j} + d\ DUMMY\ (1,2) + e\ COMP_{t-1}$$

with COMP indicating the percentage change in hourly compensation and the rest of the variables defined as in Tables 5 and 6. The lagged dependent variable was included to separate short from long-run effects but could also be interpreted as a proxy for inflationary expectations and/or price changes. As for the productivity equation, cyclical factors are included in both level (RESID) and rate-of-change (OUT) form and

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27 Output prices are usually set as a mark-up on unit costs, with labour costs accounting for by far the major share. It is still an open question whether firms use actual or trend productivity gains in determining unit costs. However, even when the latter are applied actual unit labour cost developments still provide a measure of inflationary pressures, as failure to mark up prices in response to a cyclically induced weakening of productivity growth implies lower profit margins and creates an inducement to raise prices more in a future recovery.

Table 7 Compensation equations[1], 1955-81

Country	Constant	$Output_{-1}$	Resid	$Resid_{-1}$	$Comp_{-1}$	Dummy[2]	Dummy[3]	$\bar{R}^2$	h/DW[4]	RSE
US	0.42 (0.5)	0.06 (1.1)		0.08 (1.8)	0.93 (7.8)			0.74	-1.2	.21
	2.65 (3.6)	-		0.12 (3.6)	0.44 (3.0)	2.76 (3.6)		0.83	-0.8	.17
Japan	8.49 (4.1)	-		0.24 (3.5)	0.26 (1.5)			0.64	1.8	.29
	10.38 (13.7)	-		0.35 (7.7)	-	3.11 (2.3)		0.70	1.7	.27
Germany	3.66 (2.1)	0.28 (2.7)		0.08 (1.3)	0.46 (2.8)			0.46	0.2	.20
	3.50 (2.0)	0.32 (3.0)		0.11 (1.7)	0.42 (2.5)	1.20 (1.2)		0.47	-0.4	.19
France	1.83 (0.5)	0.18 (0.5)		0.08 (0.6)	0.76 (3.5)		6.53 (3.6)	0.50	n.d.	.24
	8.84 (16.2)	-		0.25 (3.1)	-	6.11 (6.4)	5.01 (5.5)	0.76	1.7[5]	.16
UK	-1.65 (0.8)	0.73 (2.7)		0.08 (0.6)	1.06 (6.7)			0.68	-0.2	.32
	3.65 (1.6)	0.25 (1.0)		0.31 (2.4)	0.40 (1.8)	7.96 (3.5)		0.79	n.d.	.25
Italy	-	0.34 (2.6)		-	0.87 (12.9)		5.23 (1.8)	0.62	0.0	.29
	5.77 (2.2)	0.15 (1.0)		0.31 (2.4)	0.27 (1.4)	9.20 (3.6)	3.38 (1.6)	0.75	2.9[5]	.24
Canada	0.30 (0.3)	0.15 (1.5)	0.12 (1.9)		0.89 (7.9)			0.75	-0.2	.22
	3.45 (4.1)	-	0.24 (4.7)		0.38 (2.6)	4.07 (3.8)		0.85	1.1	.15
Belgium	1.32 (0.7)	0.40 (3.3)	0.08 (1.0)		0.72 (5.2)			0.78	1.1	.16
	2.17 (1.2)	0.41 (3.6)	0.16 (1.8)		0.57 (3.7)	1.77 (1.7)		0.81	1.3	.15
Denmark	2.34 (0.8)	0.26 (1.3)		0.15 (1.4)	0.67 (3.6)			0.55	-2.5	.24
	7.76 (5.7)	-		0.43 (5.5)	0.11 (0.8)	4.85 (4.3)		0.74	-0.2	.18
Netherlands	6.69 (2.6)	0.19 (1.4)		0.36 (3.4)	0.26 (1.2)			0.66	n.d.	.23
	8.21 (8.1)	0.31 (2.2)		0.50 (7.3)	-	2.60 (2.1)		0.68	1.7	.23
Sweden	3.00 (1.2)	0.17 (0.9)		0.06 (0.9)	0.65 (3.3)			0.44	-1.3	.24
	7.72 (10.0)	0.16 (1.2)		0.25 (5.5)	-	5.73 (5.9)		0.68	0.0	.18

1. Standard equation (percentage change) $Comp_t = a + b\ Outp_{t-i} + cResid_{t-j} + dDummy(1,2) + eComp_{t-1}$; notation explained in footnote to Table 5.
2. Dummy variable = 0 for 1955-73 and 1 for 1974-81 except for Japan, Italy and Denmark, where 1973 = 1.
3. Dummy variable = 0 except for 1968 and 1969, where it equals 1, -1 and -1, 1 for France and Italy respectively.
4. When lagged dependent variable included, figures refer to Durbin's h-statistic; otherwise the Durbin-Watson statistic is given. For $-2 < h < 2$ the estimates do not point to autocorrelation. "n.d." indicates that h is not defined.
5. Corrected for autocorrelation.

possible structural and/or external cost changes are proxied by dummy variables.[28]

Turning to Table 7, there is clear evidence of an acceleration in compensation gains as from 1973-74, and in virtually all countries

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28 When prices are set as a mark-up on unit costs, the estimated equation may be interpreted as a reduced-form relationship except that externally induced cost changes (such as higher import prices) are excluded. This probably explains the significant coefficients obtained for the dummy variable, while in alternative estimates (not reported here) including lagged price changes instead of lagged changes in compensation the dummy variables were in most cases insignificant.

inclusion of the dummy variables improves the overall fit as well as the size of the separate coefficients.[29] On average for the eleven countries (Table 9) the annual rate of change in compensation seems to have increased by around 4 percentage points for the period since 1973-74 and the pattern of the residuals suggests that this shift has been more or less permanent, though, of course, not explained by the specification adopted here.

As to the output effects the estimates point to a relatively strong influence of the level of slack (RESID), except for Germany and Belgium, where the rate of change in output seems to have the most pronounced impact.[30] In several countries (France, the United Kingdom, Denmark and Sweden) a significant slack effect was only obtained after introducing the dummy shift variable. This could imply that the dampening impact on inflation of unfavourable labour and product-market conditions cannot be appropriately assessed unless some allowance is made for external or structural influences. It could also mean, however, that the final equation is mis-specified and that the individual coefficients should be interpreted with a great deal of caution.[31]

The lagged dependent variable for the equations including the shift variable has a coefficient ≤ 0.5 in most countries. When this is interpreted as a measure of the lag structure, the long-run coefficients

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29 This is particularly so with respect to the measured impact of lagged compensation changes in the United States, the United Kingdom, Italy and Canada. Without the shift variable the equations for these countries are dominated by an autoregressive element (i.e. current changes are mainly explained by lagged changes) though only for the United Kingdom is the equation unstable (coefficient on lagged compensation larger than 1).

30 Initially, all equations were estimated with both current and lagged output changes, but the former was never significant and when included alone had a counter-intuitive negative coefficient.

31 As the period since 1973-74 has been characterised by both higher inflation and unemployment it might be argued that the Phillips-curve relationship has broken down and that the estimates excluding the dummy variable should be taken as confirmation of this view. On the other hand, in evaluating the validity of the Phillips curve it is necessary to distinguish between movements along the curve and shifts of the curve. The coefficients obtained for the dummy variable could be interpreted as shifts of the Phillips curve while the coefficients with respect to RESID reflect the slope of the shifted curves. However, the estimation procedure is crude and to the extent that the dummy variables exaggerate the shifts, the coefficients with respect to RESID will be biased upwards in absolute terms.

are less than twice the short-run ones. Taking the average coefficients as an example, a 5 percentage point decline in output growth from trend initially reduces compensation changes only in Belgium and Canada, but after one year nominal wage gains decline by 2 points (-5 x 0.15 - 5 x 0.25) and in the second year by a further 1.8 points (-5 x 0.25 - 0.28 x 2). Assuming that output growth returns to trend in the fourth year while the degree of slack remains unchanged at 15 per cent., the annual change in compensation will eventually approach a rate which is 5.2 points (-15 x 0.25/(1-0.28)) below the initial rate.[32]

Since changes in unit labour costs are defined as compensation changes less productivity gains, an equation for unit labour cost developments could be derived from the estimates presented in Tables 5-7. Instead, unit labour cost equations were estimated separately using the same variables as for compensation and productivity changes, and these estimates (presented in Table 8) were considered partly for their own sake and partly as a check on the validity and stability of the parameters obtained and discussed above.

This last set of regressions largely supports the initial assumptions with respect to the cyclical sensitivity of unit labour costs and the impact of external or structural shifts. The initial impact of higher output growth is a reduction in the rate of change in unit labour costs, but after one year inflationary effects start to dominate (except in Japan, France and Sweden) as an acceleration in compensation is superimposed on slower productivity growth. The level of slack also plays a rôle, but a rather moderate one, as compensation and productivity changes are influenced in the same direction and therefore partly mutually offsetting. Finally, the dummy shift variable is seen to have a larger adverse effect than in the compensation equations as the acceleration in nominal wage changes is being reinforced by an adverse - albeit smaller - shift in productivity developments.

The average coefficients for the eleven countries are shown in Table 9, the last two columns giving the estimated contribution of

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32 To put these calculations into some perspective it might be noted that by 1981 the average degree of slack for the eleven countries included in the sample attained 13 1/2 per cent.

Table 8 Unit labour costs equations[1.], 1955-81

Country	Constant	Output	$Output_{-1}$	$Resid_{-1}$	ULC_{-1}	Dummy[2.]	Dummy[3.]	$\bar{R}^2$	h/DW[4.]	RSE
US	0.36 (0.3)	-0.27 (2.3)	0.42 (3.1)	0.09 (0.9)	0.79 (4.0)			0.68	-13.7	.60
	-	-0.13 (1.9)	0.27 (3.4)	0.18 (2.4)	0.48 (4.4)	4.16 (3.8)		0.87	-1.4	.45
Japan	5.79 (2.0)	-0.61 (6.5)	0.28 (1.6)	0.20 (2.8)	0.19 (1.0)	3.51 (1.5)		0.77	1.2[6.]	.93
	5.51 (2.5)	-0.51 (4.9)	0.16 (1.9)	0.30 (4.1)	-			0.81	1.5[6.]	.93
Germany	1.64 (1.0)	-0.19 (1.3)	0.45 (3.2)	0.06 (0.7)	0.31 (1.4)			0.39	n.d.	.58
			0.46 (5.8)	0.17 (2.5)	0.25 (2.2)	3.42 (3.3)		0.58	-0.5	.49
France	4.51 (1.1)	-0.86 (3.1)	0.52 (1.3)	0.08 (0.6)	0.50 (1.9)			0.59	n.d.	.51
	5.53 (2.2)	-0.60 (2.6)	0.32 (1.3)	0.15 (1.1)	-	5.51 (2.9)		0.68	1.8[6.]	.42
UK	-	-0.66 (4.2)	1.19 (6.1)	0.13 (1.0)	0.88 (13.3)			0.79	0.8	.44
	1.71 (0.9)	-0.55 (3.3)	0.67 (2.0)	0.32 (2.5)	0.41 (1.8)	7.67 (3.5)		0.87	n.d.	.36
Italy	-	-0.45 (2.8)	0.82 (5.3)	-	0.77 (7.9)		5.30 (1.5)	0.59	0.3	.61
	-	-0.42 (3.2)	0.74 (5.8)	-	0.46 (3.8)	7.15 (3.3)	4.42 (1.6)	0.74	0.2	.51
Canada	-2.15 (1.6)	-0.25 (2.1)	0.77 (5.7)	-	1.03 (7.5)			0.82	0.2	.60
	-	-0.32 (3.4)	0.42 (4.7)	0.19 (2.4)[5.]	-	9.23 (10.2)		0.91	1.8	.41
Belgium	-0.43 (0.3)	-0.33 (2.7)	0.77 (5.2)	-	0.61 (3.8)			0.66	-0.2	.45
	-4.97 (2.5)	-	1.00 (7.9)	-	0.67 (5.4)	4.51 (4.6)		0.79	-0.5	.37
Denmark	2.43 ((0.7)	-0.37 (1.8)	0.51 (2.0)	0.10 (1.0)	0.40 (1.4)			0.46	n.d.	.49
	3.49 (3.0)	-0.29 (2.1)	0.32 (2.5)	0.25 (3.5)	-	4.43 (4.3)		0.69	2.1	.37
Netherlands	2.40 (1.2)	-0.44 (3.8)	0.51 (2.6)	0.19 (2.0)	0.33 (1.7)			0.68	3.6	.37
	-	-0.30 (2.9)	0.67 (6.8)	0.17 (2.3)	0.42 (3.9)	1.83 (1.7)		0.69	0.5	.36
Sweden	0.71 (0.4)	-0.63 (2.8)	0.87 (3.8)	-	0.72 (3.9)			0.66	3.1	.56
	3.51 (2.6)	-0.53 (2.9)	0.40 (2.7)	0.22 (2.8)	-	7.26 (4.2)		0.74	1.8[6.]	.41

1. Standard equation: $ULC = a + \Sigma b_i\ Outp_{-i} + c\ Resid_{-j} + d\ Dummy(1,2) + e\ ULC_{-1}$; notation explained in footnotes to Table 5.

2. Dummy variable = 0 for 1955-73 and 1 for 1974-81 except for Italy and Denmark, where 1973 = 1.

3. Dummy variable = 0 except for 1968 and 1969, where it equals 1 and -1 respectively.

4. When lagged dependent variable included, figures refer to Durbin's h-statistic; otherwise the Durbin-Watson statistic is given. For $-2 < h < 2$ the estimates do not point to autocorrelation. "n.d." indicates that h is not defined.

5. Current value.

6. Corrected for autocorrelation.

Table 9 Summary statistics

	Average coefficients[1]						Contributions: 1980-81	
	Constant	Output	$Output_{-1}$	Resid.	Lagged dep.	Dummy	Resid.	Output
Compensation	5.52	-	0.15	0.25	0.28	3.97	-3.8	-0.2
Productivity	4.74	0.38	-0.26	0.08	-	-0.91	-1.1	-0.3
Unit labour costs	1.58	-0.35	0.49	0.16	0.26	4.85	-2.2	0.1

1. Unweighted averages of coefficients given in Tables 5-8 for equations including 1973-74 dummy variable, except for Japan and the Netherlands.

output growth and slack in 1980-81.[33] The direct effect of the widespread slack is a reduction in nominal wage growth of 3.8 percentage points (compared with a situation in which slack was 0) but one of only 2.2 points in unit labour cost increases. At the same time output growth, which on average declined from -0.6 to -1.2 between 1980 and 1981, dampens nominal wage growth further but increases the rate of change in unit labour costs owing to the adverse effect on productivity. This last influence is, of course, mainly temporary but nevertheless brings out an important point in a period of decelerating output growth: when productivity gains follow a pronounced pro-cyclical pattern while nominal wages respond to output changes and increased slack with a lag, the rate of increase in unit labour costs will moderate only slightly - or could even worsen - when a tightening of demand policies is introduced, and this impression of a persistently high underlying rate of inflation continues as long as output is decelerating. Conversely, in periods of accelerating output growth unit labour cost increases will be moderate - or could even decline - and a worsening in the underlying rate of inflation will only appear when the acceleration of output growth comes to an end.[34]

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33 Because the unit labour cost equations have not been derived directly from the compensation and productivity equations the coefficients given in Table 9 do not "add up", though the discrepancies do not seem large. The calculations discussed in the text as well as the simulations presented in Table 10 are based on the separately estimated unit labour cost equations, while Table 11 contains both implied and estimated figures.

34 The unit labour cost effects of changing rates of output growth may also be seen by rearranging the average equation in Table 9 as follows:

Original: $ULC_t = 1.58 - 0.35\ OUT_t + 0.49\ OUT_{t-1} + 0.16\ RESID + etc.$

Define: $DOUT_t = OUT_t - OUT_{t-1}$

Then: $ULC_t = 1.58 - 0.35\ DOUT_t + 0.14\ OUT_{t-1} + 0.16\ RESID + etc.$

Thus a deceleration (acceleration) in output growth by 1 percentage point will increase (decrease) the rate of change in unit labour costs by 0.35 points, while the two-year effect (disregarding effects coming through RESID and ULC_{t-1}) is a decline (increase) in unit labour costs of 0.14 points.

These short and long-run aspects may also be illustrated by simulating the effect of a hypothetical reduction in the rate of growth of output as shown in Table 10 using the average coefficients for the eleven countries. The simulation assumes that output growth falls by 2 1/2 per cent. in the first and the second years, remains constant at the new, lower rate in the third year, but then returns (by 2 1/2 points each year) to the trend rate in the fourth and fifth years with slack remaining constant at 10 per cent. from the fifth year onwards. As can be seen from the last line such a three-year recession produces quite sharp swings in the rate of change of unit labour costs, which initially rises but then settles down at a rate which is about 2 points lower than in the initial situation but at the cost of a 10 point rise in the degree of slack. The particular features of periods with decelerating and accelerating output growth are apparent in the first and the second years, when an initial worsening of inflation is followed by an improvement, and again in the fourth and fifth years, when accelerating output growth first dampens inflation but then produces a worsening.[35]

IV. Summary and conclusions

Returning to the "real" world and attempting to draw some conclusions from the estimates presented above, the following points would seem to emerge:

(i) There is clear evidence that productivity performance has become less favourable and that the deterioration is more pronounced for the aggregate economy than in manufacturing. For the latter the cross-country estimates provide a relatively poor explanation of the deceleration. However, taking the average values from the time series analysis the overall deceleration of 2.15 percentage points is "more than explained": around 1 1/2 points can be related to output and demand conditions, with slower output growth and more slack each accounting for

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35 It should be recalled that these fluctuations in unit labour costs will not be reflected in prices if firms use trend productivity changes in setting their prices. In such conditions the main effect will appear as a muted and lagged response of price changes to variations in output growth and slack, if any effect can be detected at all.

Table 10

Simulated effects of lower output growth

	1st year	2nd year	3rd year	4th year	5th year	6th year	Long run
Due to:							
Output	+0.87	+0.87	-	-0.87	-0.87	-	-
$Output_{-1}$	-	-1.22	-1.22	-	+1.22	+1.22	-
$Resid_{-1}$	-	-0.40	-0.80	-1.20	-1.60	-1.60	-2.16
Lagged ULC	-	+0.23	-0.13	-0.56	-0.68	-0.50	-
Total	+0.87	-0.52	-2.15	-2.63	-1.93	-0.88	-2.16

Table 11

Effects of output growth and slack on compensation productivity and unit labour costs

	Change in output growth	Change in slack	Total
Compensation	- 0.8	- 3.3	- 4.1
Productivity	- 0.5	- 0.8	- 1.3
Unit labour costs:			
Implied	- 0.3	- 2.5	- 2.8
Estimated	- 0.7	- 2.1	- 2.8

Note: Calculations (expressed in annual rates of change) based on coefficients given in Table 9 and average changes between the periods 1960-73 and 1973-81. The "implied" figures for unit labour costs are derived from the compensation and productivity equations while the "estimated" figures refer to the independently estimated unit labour cost equation.

3/4 points, while approximately 1 point appears as a post-1973 trend shift which may reflect the rise in energy prices. For the aggregate economy changes in the distribution of employment may explain about 1 point of the overall slowdown of 2.6 points and output factors could well account for the remainder.[36]

(ii) Concern about the slowdown in productivity growth started in the United States and together with Canada and Sweden the United States belongs to those countries in which the slowdown appears to have been most pronounced once cyclical factors have been allowed for. Germany may also belong to this group of countries, particularly when the deterioration is specified as a trend deceleration rather than a once-and-for-all shift, while in Japan and the Netherlands it cannot be excluded that the underlying productivity performance has strengthened since 1973. In the Netherlands this could in part be due to a relatively quick adjustment of manufacturing employment induced by rigid real wages, and the same behaviour may be detected in the estimates obtained for France, Italy, Belgium and Denmark, thus giving some support to the hypothesis advanced by Giersch and Wolter. The Japanese development is more difficult to interpret, as the 1973-81 period has seen a virtual "explosion" of real wages followed by a high degree of nominal and real wage flexibility after the second oil price rise. At the same time, falling employment in the manufacturing sector has helped to reduce excess demand for labour in the non-manufacturing sectors and this shift in the distribution of employment probably explains a large part of the wide discrepancy between productivity trends in the manufacturing sector and the aggregate economy.

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36 If the coefficient of Table 3 is used in assessing the output effects a figure of almost 2 percentage points is obtained. Using the average coefficients for the manufacturing sector and assuming that aggregate slack has increased to the same extent as in manufacturing, the cyclical impact for the aggregate economy may be estimated at 1.4 points (0.65 + 0.75).

(iii) Although investment has weakened and a slowdown in the rate of growth of capital/labour ratios adversely affects labour productivity according to most aggregate production functions, the actual impact of investment and capital stock developments is difficult to quantify. Various studies have come to very different conclusions, depending on whether capital stocks are measured relative to employment or the potential labour force. In addition, capital stock data are generally poor and may not have taken sufficient account of higher obsolescence rates and accelerated scrapping of plant induced by shifts in relative factor prices. All in all, it would appear that changes in the capital stock and investment have only had a marginal effect on <u>actual</u> productivity trends but are likely to reduce <u>future</u> and <u>potential</u> productivity changes. Firstly, current investment trends will eventually produce a slower growth in capital/employment ratios. Secondly, even if the latter have so far declined very little, capital/labour force ratios seem to have stagnated or fallen in most countries, implying that an attempt to regain earlier and lower unemployment rates would encounter capital shortages, entailing risks of accelerating inflation and/or declining productivity growth. Thirdly, it is likely that official capital stock measures overstate the actual degree of slack, as part of the stock is unprofitable at existing output prices. To the extent that this is the case the risk of future capital shortages and accelerating inflation is accentuated.

(iv) The supply shocks in the 1970s seem to have affected nominal wage gains far more than productivity growth. The weaker output and demand conditions in the 1973-81 period compared with 1960-73 also affected nominal wage growth more than productivity. Moreover, it is the <u>level</u> of slack which mainly explains this differential impact (see Table 11), as the effect of lower output growth is only -0.3 to -0.7 points depending on whether one takes implied unit labour cost changes or the independently estimated equations.

(v) As regards prospects for reducing inflation through a reversal of the slowdown in productivity growth, the empirical evidence does not point to any risk-free or "speedy" options:

- since most of the reduction in manufacturing productivity can be related to output and the average rate of output growth is now running some 6 1/2 percentage points below trend, further tightening of demand as a means of reducing inflation would not seem to be an optimal policy. This is particularly so as the initial impact is a worsening of inflation, whereas faster output growth would reduce unit labour costs. Moreover, a moderately expansionary policy is subject to relatively small inflationary risks as the long-run impact on inflation of, for instance, a 4 percentage point acceleration in growth may be estimated at +1/4 point. However, the cross-country estimates for the manufacturing sector could imply that past relationships between productivity and output growth are invalid for future recoveries. Moreover, other input costs (such as raw materials) are likely to show a considerably stronger acceleration in conditions of faster output growth;
- for the aggregate economy the non-cyclical decline in productivity growth seems to be largely the result of inter-sectoral employment shifts. Among these, the cessation of the outflow from agriculture has played an important rôle and, given the low employment share of agriculture in most countries, this source of productivity growth cannot be re-created, nor can this unfavourable influence be reversed. With respect to the shift from industry to the service sectors, generally stronger output growth could favour industrial employment more than employment in services, but the influence on aggregate productivity is uncertain as empirical measures and a priori views differ widely;

- policies aimed at stimulating investment would help to reduce the risk of future capital shortages and thus stimulate potential productivity growth. However, this influence is subject to very long lags and there are widely differing views with respect to the actual rôle of capital/labour ratios in the current productivity slowdown.

(vi) The relatively poor prospects for reversing the productivity slowdown basically leave traditional demand management and incomes policies as the major anti-inflationary measures. Since lower productivity growth essentially implies that the amount of resources available for aggregate demand expands at a slower pace, the associated acceleration of inflation may be interpreted as a manifestation of an unresolved distributional problem as income claims have not been appropriately adjusted. Consequently, policies which aim at moderating nominal and real income claims in line with the non-cyclical deceleration in productivity growth would seem to offer the most promising option. However, past experience tends to show that longer-run incomes policies are difficult to implement so that in a majority of countries the required moderation may only be achievable by maintaining - at least for some time - a certain degree of slack.

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