Income Distribution and Employment in the European Communities 1960 – 1982*

By Alfred Steinherr

This paper analyses the evolution of the labour share in major countries of the European Communities, the United States and Japan. The definition of the labour share is expanded to take into account the role of taxation of economic structure, of wage push, of changes in the terms of trade and of productivity growth. Their contributions to the evolution of distributive shares are computed for three subperiods of 1960 - 1982.

The relationship between employment and labour costs or labour's share is then tested, assuming a CES production function, by regressing employment on cost and demand variables.

1. Introduction

During recent years unemployment has risen in virtually all OECD economies as a result of high growth of the labour force combined with slower or negative growth in employment. Among the explanations of the employment evolution figure prominently the supply shocks of the seventies, which have imposed on OECD countries the need for major structural adjustments. These adjustments are, however, very slowly forthcoming, partly due to wage and other rigidities, so that the employment loss in declining activities has not been matched by employment creation in expanding sectors. Wage rigidities themselves, in the face of external terms of trade losses, are claimed to have contributed to declining profit shares of the corporate sector and this decline in profits is often considered as a major reason for the observed reduction in gross capital formation and hence of job creation. Furthermore, high real wage costs relative to profits might have encouraged the use of a larger part of already reduced capital formation for replacing jobs by machines instead of creating additional employment.

While restrictive demand management is likely to have exacerbated the unemployment problem in some countries this paper focusses on

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the role of distributive shares of factor payments. The evolution of factor shares is considered as particularly relevant for understanding the differences of employment growth across countries. For example, from 1973 to 1982 private sector employment in the United States has increased by over 12 million whereas it has declined by nearly 2 million in the EEC and this difference cannot be explained only in terms of the oil shocks or of the worldwide reduction in demand growth.

The paper is organised as follows. Section 2 gives reasons for focussing on distributive shares and their significance in the growth process. Section 3 proposes a detailed decomposition of the contributing factors to the evolution of distributive shares. For the major OECD countries calculations of these contributing factors are presented and interpreted in terms of the shocks which occurred and the policies pursued in these countries. In Section 4 regression analysis is applied to test the effects of changes in factor shares on employment growth. It is found that changes in income distribution are highly significant for the evolution of employment. In Section 5 the main conclusions are summarised and some policy implications are suggested.

2. The Relevance of Income Distribution for the Growth Process

For an assessment of the relationship between the evolution of income distribution and of employment, and the related issues of domestic investment and international competitivity, one would ideally wish to use an internationally-linked general equilibrium model. The difficulties of constructing and maintaining a reliable and easily understandable model of this kind are, however, formidable. Existing international models usually exhibit excessive technical complexity and analytical intractability (the "black box" property).

Short of a satisfactory international general equilibrium model, applied economists use summary indicators containing synthetised and, hopefully, useful information. Prominent use is being made of labour's distributive share (s), defined as:

$$s \equiv wE/pY \quad (1)$$

where w = wage costs (including payroll taxes), E = employment, Y = value-added at constant prices, p = deflator of value-added.

Computation of the labour share is also useful because $1 - s$ represents the share of capital income, also called the profit share when Y is defined as net national product.[1]

[1] This terminology does not correspond to the usual definitions of pure profit since included in the profit share are rents and interest payments.

In policy-oriented reports[2] it is frequently emphasised that increases in labour's distributive share above some (implicit) reference level tend to have unfavourable consequences for gross capital formation in general and for job-creating investments in particular. The effect on gross capital formation is attributed both to increased financial constraints on investment when the capital share declines, an effect which would be absent with perfect capital markets, and reduced incentives for capital formation. An additional consequence is the substitution effect due to an increase in the price of labour relative to capital.

Researchers have in general been rather unsuccessful in verifying empirically the importance of distributive shares for employment growth. One remarkable "classical" result, namely that increases in the profit share cause an increase in employment, was obtained by *Morley* (1979). He estimates unemployment in the United Kingdom as a function of the profit share and obtains a strong negative correlation between unemployment and lagged profit shares.[3] Some further evidence was obtained by the OECD (1982), where wage costs, measured by real wages or by the labour share, have a significant impact on employment growth, thus warranting close attention.

What does not emerge clearly from these considerations is whether full employment is compatible with any, finitely many, or only one value of distributive shares. This is an important question for evaluating the increases in labour shares that can be observed in some countries.

Some light can be shed on this question by the theory of income distribution under perfect competition. We use a constant-elasticity-substitution (CES) technology,[4] summarised by the production function:

$$Y = \gamma \left[\delta K^c + (1 - \delta) E^c\right]^{\frac{1}{c}} \tag{2}$$

where Y, K, E are value-added (GDP), capital and labour employment, resp.: γ, δ and c are the efficiency, distribution and substitution parameters, resp., with $c = -(1 - \sigma)/\sigma$, where $\sigma > 0$ is the elasticity of substitution. With $\sigma = 1$ the CES production function collapses to Cobb-Douglas technology.

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[2] See, for example, the Annual Report of the Bank of International Settlements, the World Economic Outlook of the International Monetary Fund, and various publications of the OECD and the EEC.

[3] However, since he does not find any significant relationship between the level of employment and profit shares, most of the impact on unemploymnt may be due to effects on the labour supply.

[4] *Arrow* et al. (1961).

When firms are on their labour demand schedule so that product wages (defined as $w = w_T/P_F$, where w_T = wage compensation per man including payroll taxes, P_F = GDP deflator at factor costs) equal marginal labour productivity, labour's share of value added (s) is obtained from (2):

$$(3) \qquad s \equiv w_T\, E/P_F\, Y$$

$$(4) \qquad = \gamma^c\, (1 - \delta)\, (Y/E)^{-c}\ ,$$

and capital's share equals $1 - s$. (4) is a relation between labour's share and average labour productivity $\pi = Y/E$. Logarithmic differentation of (4) yields:

$$(5a) \qquad \hat{s} = -\, c\, \hat{\pi} = -\, c\, (\hat{Y} - \hat{E})\ ,$$

where "^" denotes a percentage change per unit of time. (3) and (5a) imply

$$(5b) \qquad \hat{w} = \hat{w}_T - \hat{P}_F = (1/\sigma)\, \hat{\pi}\ .$$

From (5a) and (5b) it is seen that with $\sigma = 1$, an exogenous rise in the product wage is fully compensated by an increase in productivity due to an increase in the capital -labour ratio. Hence labour's share remains unchanged. With $\sigma < 1$ the adjustment in productivity is only partial and hence labour's share rises.

As to the relationship between employment and labour shares, two cases have to be distinguished. If labour markets are competitive full employment is maintained, GDP is determined by the production function, and the product wage growth compatible with full employment is determined by (5b). Hence for a given capital stock and full employment there is a unique level of real wages and of labour's share.

The other case arises when product wages are exogenously determined. As long as firms remain on their labour demand curve the production function and (5b) together determine employment and output growth.

There is therefore a mapping between product wages and employment and between the labour share and employment if $\sigma \neq 1$. If $\sigma = 1$ labour's share is constant and the equilibrium employment level is independent of the labour share.

Clearly, if firms are not on their labour demand curve because they are demand constrained the mapping between employment and product wages, or the labour share breaks down. Therefore, only "classical" unemployment can be meaningfully related to the labour share.

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The wage gap can be defined by noting that in full employment (5b) implies

(6) $$\hat{w}^* = \frac{1}{\sigma} \pi^* ,$$

where stars denote full employment values. Substracting (6) from (5b) yields the wage gap

(7a) $$\hat{w}^g = \hat{w} - w^* = \frac{1}{\sigma} (\hat{\pi} - \hat{\pi}^*) .$$

With Cobb-Douglas technology $\sigma = 1$ and the marginal product of labour is proportional to the average product, so that

(7b) $$w^g = \hat{\pi} - \hat{\pi}^* = \hat{w} - \hat{\pi}^* ,$$

i.e., product wage growth above full employment average labour productivity growth indicates a wage gap and a level of employment below full employment.

With Cobb-Douglas technology a wage gap can, of course, only arise due to the time required for real wages and productivity to adjust: in equilibrium there can be no wage gap.

Basevi et al. (1983) reject both labour shares and wage gap measures as useful indicators of the existence and size of a wage problem. They advance three arguments:

(i) With an exogenous increase in real wages the change in the competitive labour shares depends on the elasticity of substitution. From (5b) it is immediately seen that $\hat{s} \gtreqless 0$ as $\sigma \lesseqgtr 1$ and $\sigma = 1 \rightarrow \hat{s} = 0$. It is therefore important to assess the empirical value of σ. Unfortunately the empirical evidence is not conclusive. For the United States the evidence suggests a high elasticity of substitution between capital and labour so that $\sigma = 1$ seems to be a reasonable assumption whereas for the European countries the evidence suggests that $\sigma < 1$.[5] This difference between the United States and the European countries is also confirmed by the differences in the evolution of labour shares (see Tables 1 and 2 in Section 3): labour's share remained more stable during 1960 - 80 in the United States than in the European countries or Japan.

But even the evidence for the United States is not clear. *Kendrick* and *Sato* (1963) found that labour's share had been rising from 1919 to 1960. *Nordhaus* (1974) has provided evidence that a rising relative cost of labour combined with a low elasticity of substitution has caused labour's share to increase.

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[5] See *Steinherr* (1983) for a summary of econometric results.

In view of the conflicting empirical evidence and the fact that σ close to unity would imply a product wage elasticity of labour demand between -3.0 and -5.0, which is in conflict with the available empirical evidence, the case of $\sigma < 1$ is retained in this paper.

We would therefore expect that real wage growth results in increasing labour shares which will lead, with $\sigma < 1$, to a decline in equilibrium employment via condition (5a).

(ii) Basevi et al. also observe that real wage gaps vary substantially across countries, but with little relation to their employment experience. The weakness of this argument is that, as revealed by equations (5a), labour shares are not the only explanatory variable of employment growth. The possible relationship between labour shares and employment needs therefore to be tested by multiple regression. This will be done in Section 4.

(iii) Finally, as pointed out by Bavesi et al., after a real wage increase, productivity may first decline as employment is adjusted more slowly than output. Over time, labour substitution takes place and productivity increases to compensate for the rise in real wages. Labour's share will

Figure 1 a: The effects of a real wage shock on equilibrium employment and capital stock

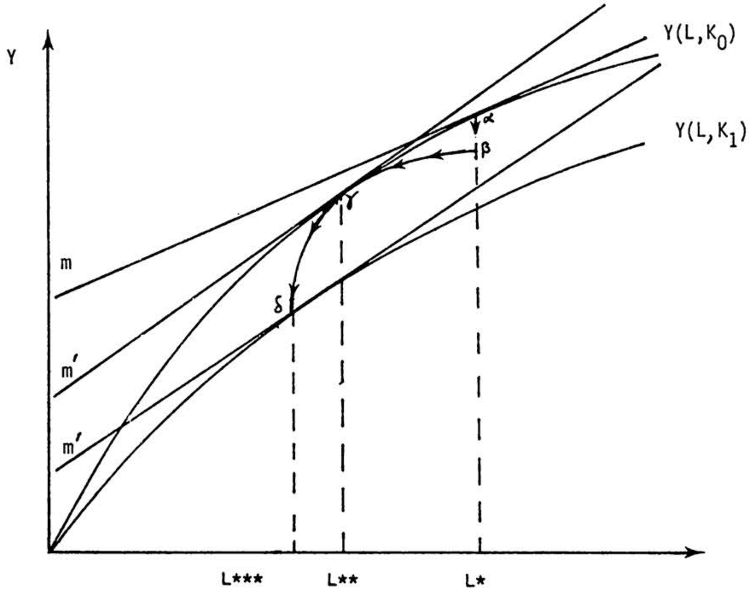
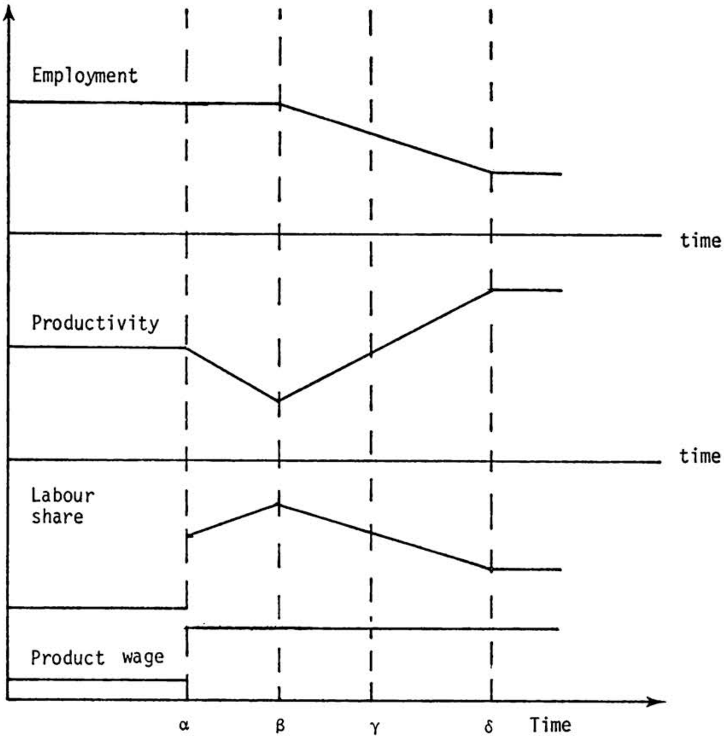


Figure 1 b: Adjustment paths of selected variables with $\sigma < 1$



therefore decline although this is achieved through a reduction in employment.

The adjustment path to a real wage shock with costs for adapting factor allocations is illustrated in Figure 1 for a stationary economy. Any underlying trend growth can be treated additively to this stationary analysis. In Fig. 1a the initial equilibrium is at point α. Due to an exogenous increase in real product wages the marginal product of labour curve m increases to m'. If employment reductions are costly, the initial reaction of firms is to reduce production from α to β. Over time, and with a given capital stock, employment would be reduced and output would decline toward the equilibrium level γ.

At this point, labour productivity, measured by a ray through the origin and point γ, would be above the productivity corresponding to α, whereas during the early adjustment process productivity falls below the level at α. (With $\sigma < 1$, the capital share at γ is lower than the one at α.) At γ, less labour is employed per unit of capital so that the marginal product of capital declines. If the cost of capital remains lower than at α, whereas productivity and the labour share (with $\sigma < 1$) constant, as would be the case in an open economy, the optimal capital stock declines. Over time therefore, as the capital stock is being reduced, the production schedule Q shifts downwards and equilibrium will be reached at a point δ. At δ, employment, the capital stock and output are are higher. Figure 1b schematises the adjustment path after a permanent real wage shock for employment, productivity, the labour share and the product wage.

The foregoing discussion, incitantly, shows that wage gaps and labour shares provide complementary information. If Cobb-Douglas technology is assumed, then in the long run the rise in average labour productivity offsets the increase in wage costs and labour's share remains unchanged. During the adjustment period where productivity falls, the wage gap, as defined in (7b), declines and gives a wrong signal whereas labour's share increases and points to an employment problem. With $\sigma < 1$, the longer-run response of productivity will not compensate for the real wage increase and labour's share will remain above the value consistent with full employment.

3. Contributing Factors to the Evolution of Labour Shares

3.1 Definitions

The definition of the labour share as in (1) is based on real wage costs and labour productivity. Wage costs (W_T) depend on several factors which are at least in the short run and under certain institutional arrangements exogenous: payroll taxes represent an important part of wage costs; either nominal or even real wages may be set by unions through implicit or explicit indexation schemes; if unions aim at real wages, then the consumer price index (P_c) enters into definition (1). The consumer price, in turn, is influenced by import prices and the structure of domestic consumption. The deflator for domestic value-added, which is relevant for producers, is the deflator at factor costs (P_F). This price, in turn, depends on world market prices for exports (P_x) and on the structure of domestic production. Hence, it is useful to expand (2) to shed light on the contributing factors to the growth of the labour share.

The OECD, for example, has expanded definition (1), after logarithmic differentiation, as follows:

(8) $$\hat{s} = \hat{W}_T - \hat{P}_F - \hat{\pi} = (\hat{W}_T - \hat{P}_c) + (\hat{P}_c - \hat{P}_M) + (\hat{P}_M - \hat{P}_F) - \hat{\pi} \ ,$$

where P_M = GDP deflator at market prices.

In definition (8), the first term on the right-hand side (RHS) measures the growth of employment compensations deflated by the consumer price index, the second term is dominated by terms of trade changes, the third component reflects indirect taxes and subsidies, and the final term corresponds to average labour productivity growth.

Definition (8) is somewhat unsatisfactory because the first term neither measures product wages nor real wage payments (consumption wages) as they enter indexation schemes or wage negotiations. Similarly, it is also not clear what is measured by the second term in addition to terms of trade effects. The following expansion remedies these two shortcomings.

(9) $$\hat{s} = (\hat{W}_T - \hat{W}_c) + (\hat{P}_M - \hat{P}_F) + (\hat{P}_c - \hat{P}_m) + (\hat{P}_x - \hat{P}_M) + \\ + (\hat{W}_c - \hat{P}_c) + (\hat{P}_m - \hat{P}_x) - \hat{\pi} \ ,$$

where P_m = import price index, P_x = export price index, and W_c = index of wage payments per dependently employed.

The interpretation of definition (9) is straightforward. The first term on the RHS measures variation in payroll taxes; the second term variations in indirect taxes and subsidies. Thus, both terms reflect taxation effects on the labour share.

The third and fourth terms reflect structural effects: $(\hat{P}_c - \hat{P}_m) < 0$ implies that inflationary pressure is imported while $(\hat{P}_c - \hat{P}_m) > 0$ indicates that internal factors aggravate imported inflation reflecting therefore the structure of domestic demand and the effects of macroeconomic demand management. The fourth term $(\hat{P}_x - \hat{P}_M)$ is positive if the country's resource allocation gives rise to a favourable international specialisation so that export prices rise more rapidly than average producer prices in the economy. This variable is therefore influenced by the structure of production of the economy.

The fifth term $(\hat{W}_c - \hat{P}_c)$ measures the growth of real wage payments and thus the wage-push contribution to the growth of the labour share. The sixth term $(\hat{P}_m - \hat{P}_x)$ stands for changes in the terms of trade and the last term $(\hat{\pi})$ for changes in productivity.

Expansion (9) only takes into account payroll taxes and indirect taxes and subsidies. The complement $1 - s$ represents the gross share of capital. Direct taxes on capital income can also be incorporated by redefining s. What is relevant for economic decisions is not the gross share but the share net of taxes. Denoting the amount of taxes (for precise definitions see the Appendix) paid by the corporate sector by TC, the net capital share can be defined as:

$$(10) \qquad 1 - s' = 1 - W_T E\,(1 + TC/E)/(P_F Y)$$
$$= 1 - W_T EZ/(P_F Y) \quad \text{where} \quad Z = 1 + TC/(W_T E) \; .$$

Moreover, rational wage bargaining should be based on net wages and not on gross wages. Denoting income taxes paid by labour by T, net wage incomes per worker are equal to $W_C\, t/P_c$ where $t = 1 - T/W_C\, E$. Incorporation of both tax effects leads to the following expansion of a redefined labour share due to the addition of business taxes:

$$(11) \qquad \hat{s'} = (\hat{W}_T - \hat{W}_c) + (\hat{P}_M - \hat{P}_F) + \hat{Z} + (\hat{P}_c - \hat{P}_m) +$$
$$+ (\hat{P}_c - \hat{P}_M) + (\hat{W}_c + \hat{t} + \hat{P}_c) - \hat{t} + (\hat{P}_m - \hat{P}_x) - \hat{\pi} \; .$$

For the empirical computations of expansions (9) and (11) several decisions have to be made.

First, the chosen level of aggregation is the economy. One reason for this choice is data availability, another the fact that we are concerned with aggregate employment. The latter is influenced by the relative price structure, in particular the terms of trade, which are part of equations (9) and (11). However, variations of the labour share in manufacturing industries are much more pronounced than for the economy as a whole. It can therefore be expected that our aggregate results hold *a fortiori* for manufacturing.

Second, the choice of time periods. Our time series extend from 1960 to 1982. We also consider three subperiods: 1960 - 1973, 1973 - 1979, 1979 - 1982. This choice is to some extent arbitrary, but the oil shocks of 1973 and 1979 may have given rise to structural changes. To test the existence of structural changes for these subperiods, we have estimated productivity as a function of time with splines for the periods 1973 - 1979 and 1979 - 1982. The results (not reproduced) suggest that trend productivity growth declined after 1973 and again after 1979. Hence, the choice of subperiods is not unreasonable.

Any measure of the change in the labour share neglects, of course, the initial starting point. The rise in the labour share can be expected to have a lesser impact on employment in countries where before 1960 the labour share was low compared to others. This holds particularly for Japan whose labour share was the lowest among the countries in the sample prior to 1960 (when an adjustment for family employment is made), although the significance of a comparison of absolute labour shares is even more problematic than a comparison of growth rates.

Third, total employment comprises employed labour, family aids, and the selfemployed. Over a 20 years period the number of selfemployed has diminished, in some countries drastically (e.g. Italy). The same is true of family aids although their total number is still very important in countries such as Italy and above all Japan. We have left family aids in the total employment data, partly because the statistical series on family aids are unreliable and partly because their shadow wage is difficult to assess. The level of labour shares is therefore seriously upward biased, and the growth rates downward biased. To assess this potential bias, labour shares are recomputed for Italy and Japan excluding family aids.

Labour productivity was computed dividing GDP by the total of employed and selfemployed. As can be seen from definition (1) this is equivalent to imputing to the selfemployed a wage rate for their labour input equal to the average of employed workers. For example, if selfemployed in agriculture earned less than the average of employed workers, this difference would implicitly be imputed to negative profits. This procedure seems to be more consistent than using only dependent employment in definition (1) with the result of declining productivity when structural shifts from selfemployment to dependent employment occur. As such shifts were very pronounced over the last 20 years a substantial bias would be introduced.

Fourth, net labour productivity is economically more meaningful than gross productivity. However, capital depreciation data is notoriously arbitrary and hence the labour share of net domestic product is less reliable. In Table 1 shares for both gross and net domestic product are shown. Their levels differ significantly but not so their evolution although the rise in net shares is more pronounced. In the remainder of the paper only the gross shares are retained.[6]

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[6] An expansion such as (9) or (11) is a local approximation whose precision depends on the magnitudes of change. The approximation error, which would not arise with multiplicative index numbers, can be illustrated with a two-period computation of the change in productivity. Indexing the first period with 0 and the second with 1, one obtains from $\pi = Y/E$:

$$\frac{\pi_1 - \pi_0}{\pi_0} = \frac{Y_1/E_1 - Y_0/E_1}{Y_0/E_0} = \frac{E_0}{E_1} (\hat{Y} - \hat{E}) \tag{12}$$

The continuous approximation yields $\hat{Y} - \hat{E}$ and the error of approximating $(\pi_1 - \pi_0)/\pi_0$ by π is equal to E_0/E_1. For small changes in $E, E_0/E_1$ is close to 1 and the error is negligeable. We indicate changes in s based on computations with (12) and on computations with approximation (9).

Table 1: **Evolution of Labour Shares: 1960 - 82**

A. Labour Productivity Measured by Gross Domestic Product per Employed (Dependent and Self-Employment)

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Belgium	0.69	0.68	0.70	0.70	0.70	0.72	0.72	0.72	0.71	0.71	0.69	0.71	0.69	0.72	0.73	0.76	0.77	0.78	0.78	0.78	0.79	0.81	0.79
Germany	0.71	0.72	0.72	0.73	0.71	0.72	0.72	0.72	0.70	0.71	0.72	0.73	0.73	0.74	0.75	0.75	0.74	0.73	0.72	0.72	0.73	0.73	0.72
France	0.73	0.73	0.74	0.74	0.74	0.73	0.72	0.71	0.72	0.72	0.71	0.71	0.70	0.70	0.72	0.74	0.74	0.75	0.75	0.74	0.76	0.77	0.75
Italy[1])	0.82	0.80	0.79	0.82	0.83	0.82	0.80	0.80	0.79	0.77	0.78	0.81	0.80	0.81	0.81	0.85	0.84	0.84	0.85	0.82	0.82	0.85	0.86
Italy[2])	0.69	0.68	0.69	0.72	0.74	0.73	0.72	0.72	0.71	0.70	0.72	0.75	0.74	0.75	0.76	0.80	0.79	0.80	0.80	0.78	0.77		n. a.[3])
Netherlands	0.67	0.70	0.71	0.72	0.73	0.74	0.76	0.76	0.75	0.76	0.77	0.78	0.77	0.77	0.78	0.80	0.77	0.74	0.74	0.74	0.74	0.72	0.72
Un. Kingdom	0.72	0.73	0.74	0.73	0.73	0.73	0.74	0.73	0.73	0.74	0.76	0.73	0.74	0.74	0.76	0.78	0.75	0.73	0.72	0.74	0.76	0.76	0.75
Un. States	0.73	0.72	0.71	0.71	0.71	0.70	0.70	0.71	0.72	0.73	0.74	0.73	0.73	0.73	0.74	0.73	0.73	0.72	0.72	0.72	0.73	0.73	0.74
Japan[1])	0.87	0.80	0.84	0.83	0.79	0.81	0.77	0.75	0.73	0.71	0.71	0.75	0.75	0.76	0.80	0.84	0.84	0.85	0.84	0.84	0.84	0.85	0.87
Japan[2])	0.59	0.55	0.58	0.59	0.57	0.58	0.56	0.55	0.55	0.54	0.55	0.59	0.59	0.61	0.64	0.68	0.68	0.68	0.67	0.67	0.68		n. a.[3])

B. Labour Productivity Measured by Net Domestic Product per Employed (Dependent and self-Employment)

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Belgium	0.78	0.77	0.78	0.79	0.78	0.79	0.81	0.81	0.80	0.79	0.77	0.79	0.80	0.80	0.82	0.85	0.86	0.87	0.87	0.87	0.88	0.90	0.88
Germany	0.78	0.80	0.80	0.81	0.80	0.80	0.81	0.81	0.79	0.79	0.81	0.83	0.82	0.83	0.85	0.86	0.84	0.84	0.83	0.82	0.84	0.85	0.84
France	0.82	0.83	0.83	0.84	0.83	0.83	0.82	0.81	0.81	0.81	0.80	0.80	0.79	0.79	0.82	0.85	0.86	0.85	0.85	0.85	0.87	0.89	0.87
Italy	0.90	0.88	0.87	0.90	0.91	0.90	0.88	0.88	0.86	0.84	0.86	0.89	0.88	0.89	0.90	0.96	0.94	0.96	0.95	0.92	0.91	0.95	0.97
Netherlands	0.71	0.73	0.74	0.76	0.76	0.77	0.79	0.79	0.87	0.78	0.80	0.81	0.81	0.80	0.82	0.84	0.81	0.82	0.82	0.83	0.83	0.81	0.81
Un. Kingdom	0.80	0.80	0.81	0.80	0.80	0.81	0.82	0.81	0.81	0.82	0.85	0.82	0.83	0.83	0.86	0.89	0.86	0.84	0.83	0.85	0.88	0.89	0.88
Un. States	0.82	0.82	0.80	0.80	0.80	0.78	0.78	0.79	0.80	0.82	0.84	0.83	0.83	0.82	0.85	0.84	0.84	0.83	0.83	0.84	0.86	0.85	0.86
Japan	1.00	0.92	0.97	0.97	0.92	0.95	0.91	0.88	0.85	0.83	0.83	0.88	0.88	0.90	0.93	0.97	0.97	0.98	0.97	0.97	0.97	1.00	1.01

Notes: 1) Including unpaid family aids. — 2) Excluding unpaid family aids. — 3) Figures for 1982 are estimates. — n. a. = data not available.

3.2 Computations

Computations were made for Belgium, Germany, France, Italy, the Netherlands, the United Kingdom, the United States, and Japan. Definitions of variables and their statistical sources are given in the Appendix. The evolution of labour shares on a gross and net basis is shown in Table 1.

In no country did labour shares decline over the period 1960 - 1982, with the highest increases occurring in Belgium and the Netherlands. For Italy and Japan, the growth of the labour share is biased due to the decline in family aids. Two alternative measures are therefore shown in Table 1.

We now turn to the contributing factors. Table 2 summarises the results with average annual growth rates and their variances for the period 1960 - 82 and the subperiods 1960 - 73 and 1973 - 79. Since data on payroll taxes is not yet available for 1982, the results for the period 1979 - 82 are slightly less detailed.

For all countries the most important elements are real consumption wage growth, terms of trade changes, and productivity growth. Across the board, tax and structural effects are less important although in some countries they are non-negligeable.

Tax Effects

Payroll taxes ($\hat{w}_T - \hat{w}_c$) contributed to a rise in labour shares in all countries with the exception of Italy. The strongest increase occurred in the Netherlands, followed by France and the United States in 1960 to 1971 and in Belgium during 1971 - 79.

Indirect taxes and subsidies ($\hat{P}_M - \hat{P}_F$) changed only marginally during the whole period. With the exception of the United Kingdom, they declined or remained constant in all other countries.

Structural Effects

The structural effects are measured by ($\hat{P}_c - \hat{P}_m$) and ($P_x - P_M$). Consumer prices grew more rapidly than import prices in all countries during 1960 - 79 except in the United States, while export prices grew less rapidly than GDP deflators at market prices. The net structural effect on labour shares was negative in most countries and marginally positive in Germany. The largest negative effect of the combined structural effect occurred in the Netherlands and in Italy.

During 1973 - 79 the picture changed completely. Import prices increased more rapidly than consumer prices in all countries, suggesting

Table 2: **Contributing factors to the evolution of Labour shares**

A. 1960–1973	$\hat{s}$ (1)	$\hat{s}$ (2)	$(\hat{w}_T - \hat{w}_c)$	$(\hat{p}_M - \hat{p}_F)$	$(\hat{p}_c - \hat{p}_m)$	$(\hat{p}_x - \hat{p}_M)$	$(\hat{w}_c - \hat{p}_c)$	$(\hat{p}_m - \hat{p}_x)$	$\hat{\pi}$
Belgium	0,3	0,5	0,5	– 0,0	1,0	– 1,4	4,9	– 0,2	4,3
	(1,6)	(1,7)	(0,4)	(0,7)	(2,2)	(1,9)	(1,7)	(1,2)	(1,2)
Germany	0,3	0,6	0,4	– 0,2	2,1	– 2,0	5,4	– 0,9	4,2
	(1,3)	(1,5)	(1,3)	(0,8)	(2,3)	(1,5)	(2,4)	(2,0)	(1,2)
France	– 0,3	– 0,0	0,4	– 0,2	2,3	– 2,3	4,9	– 0,3	4,9
	(1,0)	(1,1)	(0,7)	(0,5)	(3,0)	(2,3)	(1,3)	(1,6)	(0,7)
Italy	– 0,1	0,2	– 0,1	– 0,3	1,1	– 2,7	6,7	0,8	5,6
	(2,0)	(2,3)	(1,4)	(0,4)	(5,3)	(2,6)	(2,5)	(3,2)	(1,9)
Netherlands	1,0	1,4	0,8	– 0,1	3,6	– 4,4	5,5	– 0,2	4,1
	(1,4)	(1,4)	(0,9)	(0,5)	(2,7)	(2,1)	(1,9)	(1,9)	(1,9)
United Kingdom	0,2	0,3	0,3	0,0	0,5	– 1,0	2,9	0,4	2,9
	(1,5)	(1,6)	(0,2)	(0,9)	(5,5)	(3,1)	(1,6)	(3,4)	(1,6)
United States	– 0,0	– 0,1	0,3	– 0,0	– 0,3	– 0,2	2,0	0,3	2,0
	(1,2)	(1,2)	(0,4)	(0,2)	(4,4)	(3,3)	(1,0)	(2,2)	(1,3)

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B. 1973-1979	$\hat{s}$ (1)	$\hat{s}$ (2)	$(\hat{w}_T - \hat{w}_c)$	$(\hat{p}_M - \hat{p}_F)$	$(\hat{p}_c - \hat{p}_m)$	$(\hat{p}_x - \hat{p}_M)$	$(\hat{w}_c - \hat{p}_c)$	$(\hat{p}_m - \hat{p}_x)$	$\hat{\pi}$
Belgium	1,5	1,8	– 0,1	– 0,1	– 0,5	0,2	3,6	0,9	2,3
	(1,4)	(1,6)	(0,4)	(0,5)	(8,3)	(7,4)	(2,1)	(1,4)	(2,5)
Germany	– 0,4	– 0,3	0,5	– 0,1	– 2,0	0,5	2,3	1,5	2,9
	(1,4)	(1,5)	(0,5)	(0,4)	(8,8)	(4,3)	(1,2)	(5,1)	(1,9)
France	1,0	1,4	0,8	– 0,1	– 2,2	– 0,4	3,4	2,6	2,6
	(1,5)	(1,6)	(0,6)	(0,7)	(14,1)	(7,0)	(1,4)	(8,7)	(1,1)
Italy	0,4	0,7	– 0,3	– 0,2	– 4,9	1,3	4,1	2,5	1,8
	(2,6)	(2,6)	(2,3)	(1,4)	(17,6)	(9,0)	(2,6)	(9,4)	(3,2)
Netherlands	– 0,3	– 0,1	1,0	– 0,2	– 2,0	0,5	2,3	1,3	3,0
	(2,4)	(2,6)	(1,0)	(0,5)	(11,7)	(9,1)	(1,7)	(3,2)	(3,0)
United Kingdom	– 0,1	0,3	0,6	0,3	– 1,6	0,7	1,1	0,4	1,3
	(3,0)	(3,3)	(1,5)	(1,5)	(13,6)	(6,5)	(4,4)	(8,7)	(2,3)
United States	– 0,1	– 0,1	0,6	– 0,3	– 0,6	2,3	– 1,1	4,6	0,3
	(1,1)	(1,1)	(0,2)	(0,2)	(15,6)	(7,9)	(2,1)	(9,2)	(2,0)
Japan (2)	1,6	1,9	0,5	0,0	– 3,7	– 3,1	1,9	9,1	2,8
	(2,0)	(2,8)	(0,4)	(0,6)	(22,5)	(9,2)	(0,9)	(14,3)	(1,8)

Table 2 continued

C. 1979-1982	$\hat{s}$ (1)	$\hat{s}$ (2)	$(\hat{w}_T - \hat{p}_c)$	$(\hat{p}_M - \hat{p}_F)$	$(\hat{p}_c - \hat{p}_m)$	$(\hat{p}_x - \hat{p}_M)$	$(\hat{p}_m - \hat{p}_x)$	π
Belgium	0,2	0,2	− 0,1	0,3	− 6,3	5,1	3,1	1,8
	(2,5)	(2,6)	(2,1)	(0,3)	(0,8)	(1,0)	(2,5)	(1,5)
Germany	− 0,1	− 0,1	− 0,1	0,0	− 2,8	1,2	2,8	1,0
	(1,5)	(1,6)	(1,3)	(0,1)	(5,4)	(1,5)	(4,3)	(0,2)
France	0,6	0,9	1,6	− 0,2	− 3,5	1,5	2,9	1,4
	(1,4)	(1,5)	(0,8)	(0,3)	(4,2)	(1,4)	(7,0)	(0,8)
Italy	1,0	1,3	1,4	0,2	− 1,1	− 1,0	2,6	0,8
	(2,7)	(3,0)	(0,9)	(0,7)	(7,0)	(3,3)	(5,7)	(2,0)
Netherlands	− 1,2	− 1,3	− 1,7	− 0,1	− 4,2	4,8	0,4	0,4
	(1,1)	(1,2)	(1,6)	(0,3)	(7,1)	(5,8)	(2,3)	(0,2)
United Kingdom	0,2	0,5	1,9	1,1	5,9	− 2,9	− 3,2	2,3
	(1,9)	(2,0)	(1,1)	(0,2)	(2,4)	(2,4)	(1,3)	(2,4)
United States	0,6	0,6	− 1,7	0,1	4,2	− 1,1	− 1,4	− 0,5
	(1,1)	(1,1)	(2,2)	(0,1)	(9,3)	(2,9)	(8,9)	(1,3)
Japan	1,0	1,1	1,0	− 0,1	− 7,5	1,0	9,0	2,5
	(0,9)	(0,9)	(2,3)	(0,1)	(18,1)	(4,2)	(16,5)	(0,9)

Notes: $\hat{s}$ (1) is the average annual change in the labour share computed from the LHS of equation (9). — $\hat{s}$ (2) is computed from the RHS of equation (9).
Numbers in parenthese are variances. — For Japan data prior to 1970 is not available.

that a substantial amount of inflation was imported. The effect of the production structure raised the labour share very strongly in the United States, but was favourable for France and Japan. The total structural effect helped to reduce the growth of the labour share in Japan with an annual average of − 4.8 per cent, followed by France with − 3.6 per cent, Italy with − 3.6 per cent, and the United States with − 3.7 per cent. The variances of the structural effects are by far the largest among the contributing factors indicating that the year-by-year changes have been significant.

After 1979, Japan continued to hold successfully the growth of the consumer price index far below the growth of import prices. A similarly successful macroeconomic management is visible for Belgium, the Netherlands, and France. Very unsuccessful were the United Kingdom and the United States. But exporters received strong price increases in Belgium and the Netherlands, thereby adding to the increase in labour shares. The total structural effect was again most favourable in Japan and most problematic in the United Kingdom and the United States.

Real Consumption Wage Payments

For both periods and for all countries real consumer wages increased with the unique exception of the United States during 1973 - 79. The largest increases during 1960 - 73 occurred in Italy, Germany and the Netherlands, the smallest in the United States. During 1973 - 79 the growth of real wages decelerated in all countries, and in the United States it became even negative.

By far the most irregular consumer wage growth occurred in the United Kingdom with a variance more than double the variance in any other country for the period 1973 - 79.

For 1979 - 82, the two components $\hat{W}_T - \hat{W}_c$ and $(\hat{W}_c - \hat{P}_c)$ are merged to yield $(\hat{W}_T - \hat{P}_c)$ because W_c for 1982 was not yet available. The component $(\hat{W}_T - \hat{P}_c)$ contains therefore changes in payroll taxes and changes in real consumer wages. Product wages deflated by consumer prices grew at a substantially reduced rate after 1979 compared to 1973 - 79. In four countries they actually declined, most so in the United States and the Netherlands, marginally in Belgium and Germany. Only in the United Kingdom did they increase more strongly than before 1979.

Terms of Trade

The terms of trade change being defined as $\hat{P}_m - \hat{P}_x$ represents a loss when the change is positive. During 1960 - 73 all countries benefited from small terms of trade gains, the largest gains accruing to Germany.

In the following period a complete reversal occurred: all countries suffered from terms of trade losses; most so Japan (9.1 per cent annual average) followed by the United States (4.6 per cent). The smallest losses occurred in the United Kingdom (0.4 per cent) followed by Belgium, the Netherlands, and Germany. The oil price hike and exchange rate movements were the major factors behind the terms of trade changes. In particular, after 1973 the negative impact of higher oil prices on the terms of trade of European countries was cushioned by the appreciation of European currencies in terms of the dollar. By contrast, the U.S. terms of trade were victim of higher oil prices and of a simultaneously depreciating dollar.

Productivity Growth

Over the entire period productivity growth was highest in Italy, France, Belgium, and Germany and lowest in the United States.[7] Nevertheless, only in the United States has productivity outgrown real wages incomes. Real wage income growth exceeded productivity growth corrected for terms of trade losses most significantly in Italy (by 3.8 percentage points annually) and in France (by 1.4 percentage points annually).

Problems arose and accumulated during the period 1973 - 82. To take the example of France, during 1960 - 73 real wages increased by 4.9 per cent annual average, offset by a terms-of-trade corrected annual productivity growth of 5.2 per cent. During 1973 - 79 real wages continued to grow at 3.4 per cent while productivity growth slowed down to 2.6 per cent and terms-of-trade losses represented 2.6 per cent so that the excess of wage growth amounts to 3.4 per cent.

After 1979 productivity growth decelerated sharply everywhere except in the United Kingdom, which also is the only European country enjoying a terms of trade gain. All other European countries and Japan had terms-of-trade losses far in excess of productivity gains.

During the 1970s productivity growth in Japan remained higher than in Europe but the margin narrowed and became insufficient to compensate for the drastic deterioration of Japan's terms of trade.

Computation of formula (11), not reproduced here, indicates that changes in corporate taxes have not much affected income distribution on an after-tax basis. The averages for most countries are close to zero but the variances are very large so that important year-by-year changes

[7] The productivity data for Italy are, however, biased upwards due to unpaid family aids being left in the employment data.

have taken place. In all European countries direct taxation of labour income has increased so that after tax labour incomes as a share of gross labour incomes have declined. This effect is most pronounced in Beligum where on annual average the ratio of net to gross labour income has declined by 1 percentage point.

From the data presented in this section the following conclusions can be drawn. After 1973 real consumption wage growth decelerated significantly everywhere. But, in EEC countries and Japan, even decelerated real wage growth was still in excess of the warranted rate of growth of real consumer wages, namely the one compatible with constant labour shares. One reason is the decline in productivity growth compared to the sixties. Even more important are the terms-of-trade losses which industrial countries experienced after 1973, combined with increased payroll taxation. Thus, if one considers the terms-of-trade losses of the seventies as essentially due to changes in competitivity and to resource transfers to oil-producing countries, it would have required a more pronounced wage moderation and lighter social security contributions of employers than those which took place, to slow down the increase in labour shares.

One may thus be tempted to interpret the macroeconomic interdependencies as follows. Real consumption wage growth in excess of rates compatible with productivity growth and the terms of trade losses has induced firms to reduce employment. Governments in general attempted to stabilise this process by subsidising employment in industries with declining competitivity and absorbed a rising share of overall employment. As a consequence, and in combination with a reduced rate of investment for capacity expansion, the overall productivity declined. Faced with the need to finance rising transfer payments (subsidies, unemployment compensation) governments in some countries raised revenues by increasing payroll taxes, thereby closing the vicious circle.

The evolution of employment and of labour shares during 1960 - 1979 exhibits an inverse correlation: the labour share in Belgium rose most strongly and in the United States least while the contrary is true for employment. Only for the United Kingdom and Japan is the correlation not evident but this may be explained in terms of their starting positions. Japan had the lowest labour share in 1960 and in spite of rapid growth still in 1980 (when corrected for family aids), while the United Kingdom had in 1960 one of the highest labour shares.

Section 4 pursues this hypothesis in some detail.

4. Employment and Income Distribution: Empirical Results

4.1 Previous work

In empirical research three variables are usually retained to estimate the relationship between employment (or unemployment) and wage costs: real wage costs, the wage gap, and labour's share. Each variable has shortcomings and has given rise to conflicting empirical results.

Classical employment theory yields a negative relationship between employment and real wages whereas the Keynesian predictions are ambiguous. A number of empirical studies have shown a procyclical or acyclical behaviour of real wages in the United States[8] as well as in other countries.[9] These results are, however, not accepted without criticism. For example, Geary and Kennan deflate labour compensation by the wholesale price index instead of producer prices and fail to take into account the productivity slowdown after 1973. In an important paper, *Sargent* (1978) has derived a classical labour demand function from an intertemporal maximisation framework, and has obtained a statistically significant lagged response of employment to real consumption wage changes (instead of product wages) for the United States.

Layard et al. (1982) have estimated labour demand in manufacturing as functions of the product wage, the real price of materials and time (to capture productivity growth) for five countries. They obtain several interesting results. Product wage growth does have a negative effect on employment with long lags as suggested by Sargent. When the price of materials is dropped the real wage elasticity also declines significantly, providing another explanation for the independence results obtained by Geary and Kennan. The estimated real wage elasticity is around 1.4 which suggests that the underlying technology has substitution elasticities below unity.

Bruno (1982) distinguishes supply-determined and demand-determined employment. In the first case he regresses employment on real consumption wages, the price of imports relative to the consumer price index, time as a proxy for technical progress and capital accumulation, and employment one period lagged. In the second case, he regresses employment growth on output growth, the variability of output growth and wages deflated by import prices. In pooled cross-section time series regressions for 1961 - 80 and including up to 10 OECD countries, the wage costs variables are highly significant and have negative coefficients.

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[8] *Dunlop* (1938), *Tarshis* (1939).
[9] *Geary* and *Kennan* (1982).

Sachs (1983) uses a wage gap measure (equation (7a) in Section 2 with $\sigma = 1$) computed from data of the manufacturing sector of six countries and estimates unemployment as a function of time, the wage gap (or the product wage), the lagged dependent variable and real money balances. Except for the United States he finds a significant positive relationship between the wage gap (or the product wage) and unemployment. He suggests that the unemployment wage gap relationship may be acyclical in the United States but not so in other countries.

Few researchers have related employment and distributive shares. The purpose of the empirical work presented below is not to provide a full explanation of variations in employment. More modestly the objective is to test the null-hypothesis that variations in distributive shares and in employment growth are unrelated.

4.2 The regression equations

Econometric results depend obviously on the definitions of employment and of distributive shares, and on the chosen functional form for the regression equations. We have extensively experimented with alternative definitions and functional forms. We first discuss the definitions of the variables.

For the employment variable, public sector employment is subtracted from total employment to approximate private sector employment. It is this latter variable that is expected to be sensitive to changes in income distribution.

Regressions were run both with net and gross labour shares. The qualitative results are not significantly different so that only those obtained whit gross shares are reported.

Demand is approximated by domestic GDP at constant prices, or alternatively by a proxy for world demand (world export volume) and domestic monetary policy (M_1 deflated by consumer prices).

For the interpretation of the results the following considerations have to be kept in mind. Employment data are sometimes of questionable reliability, particularly in Japan and Italy, where family aids represent important shares of the labour force. Furthermore, in some countries variations in the labour share have been very small so that measurement errors can become important.

In the present estimations, as in most empirical work based on alternative measures of labour costs, the costs of adjusting the labour force are neglected. This is a serious shortcoming and is likely to bias the coefficient of the labour cost variable. Particularly in Europe, firms incur very high lay-off costs. This implies that wage cost reductions that are perceived as temporary will not stimulate hirings as much as wage cost reductions expected to be maintained. Our results are therefore likely to be underestimates of the employment effects of long-run labour cost, or labour share, variations.

The growth rate of value-added $\hat{Y}$ can be decomposed into the contributions of the growth of primary production factors, capital (K), and labour (E) and the growth of factor productivity:

$$\hat{Y} = \alpha_t + \alpha_K \hat{K} + (1 - \alpha_K) \hat{E} \ , \tag{13}$$

where α_t is the growth of factor productivity and α_K the share of capital in value-added (GDP). Substitution of (13) into equation (5a) then yields:

$$\hat{E}_t = a_0 + a_1 \hat{s}_t + a_2 \hat{K}_t + \varepsilon_t \ , \tag{14}$$

where $a_0 = \alpha_t/\alpha_K$, $a_1 = - \sigma/[(1 - \sigma) \alpha_K]$, $a_2 = 1$, and ε_t is a stochastic error term with the usual properties assumed.

If the capital stock grew at a constant rate (14) could be written as:

$$\hat{E} = \beta_0 + \beta_1 \hat{s} + \varepsilon_t \ , \tag{15}$$

where $\beta_0 = a_0 + a_2 \hat{K}$, $\beta_1 = a_1$.

Equations such as (15) can be estimated with all variables expressed in growth rates or, alternatively, in logarithms.

The log-transformation is mathematically identical to (15) but presents different statistical characteristics. In the Appendix the regression results for both the equations in growth rates and in logarithms are given.

Estimation of equation (15) poses a number of problems. First, investment is not a constant and is, in fact, highly volatile. Its omission from the equation is therefore likely to generate autocorrelated error terms ε_t. In addition, investment depends through a complicated dynamic relationship on $\hat{s}$. The estimated coefficient of the labour share reflects therefore a direct and indirect (via reduced investment) effect on employment.

Second, being derived from an equilibrium condition, equation (15) does not hold along the adjustment path and theory does not suggest definite dynamic constraints. In view of the limited degrees of freedom available with annual gata, and the fact that our interest is solely to test whether employment and distributive shares are related in a statistically significant sense, we have not experimented extensively with dynamic models. We adopted two dynamic specifications. In the first one, all explanatory variables are lagged one period. This assumes that firms face either an information or implementation lag not exceeding one year.

In the second specification longer lags are introduced parsimoniously through the following stock adjustment model:

(16) $$E_t/E_{t-1} = (E_t{}^*/E_{t-1})^{\lambda} \, ,$$

where $E_t{}^*$ is the desired level of employment at time t and $0 \leqslant \lambda \leqslant 1$ measures the speed of convergence of actual to desired employment. Logarithmic differentiation of (16) yields:

(17) $$\hat{E}_t = \lambda\, \hat{E}_t{}^* + (1 - \lambda)\hat{E}_{t-1}$$

and after substitution of (15) for $E_t{}^*$ we obtain:[10]

(18) $$\hat{E}_t = a_0 + a_1\, \hat{E}_{t-1} + a_2\, \hat{s}_{t-1} + {}^{\mu}t$$

with $a_0 = \lambda\, \beta_0$, $a_1 = 1 - \lambda$, $a_2 = \lambda\, \beta_1$, $\mu_t = \lambda\, \varepsilon_t$.

Use of (15) for $E_t{}^*$ implies, of course, that in this equation, as in all others, the change in the labour share is expected to be permanent. This is certainly an implausible restriction imposed on expectations.

We have, however, tested leaded values of the explanatory variables on the hypothesis that firms base their employment decision on expected values of demand and distributive share and that their expectations are correct. Leaded values were consistently insignificant allowing us to reject this joint hypothesis. This test gives some support to our *a priori* notion of causality, namely that changes in distributive shares cause changes in employment and not the other way round.

If output is constrained by demand conditions, the following labour demand function can be derived:

(19) $$\hat{E} = a_0 + a_1\, \hat{s} + a_2\, \hat{Y} + \varepsilon\, t \, ,$$

where $a_0 = 0$ if γ and δ are constants, $a_1 = -\sigma/(1 - \sigma)$, and $a_2 = 1$. Since demand for domestic products is not truly exogenous but depends on employment and on the labour share, the OLS assumptions will be violated. To avoid this problem Y is replaced by exogenous demand

[10] Regression (18) with the distributive share unlagged yielded much inferior results. Furthermore, since regression (18) is tainted by substantial multicollinearity we imposed, *a priori*, various values for λ. The estimates of the labour share coefficient remained unchanged so that we can conclude that the labour share coefficient is not affected by the multicollinearity problem. The Appendix reproduces only the equations with unconstrained λ's.

variables: real world demand (Y^w) and domestic real monetary growth (M_1/P_c):

$$\hat{E} = a_0 + a_1 \hat{s} + a_2 \hat{Y}^w + a_3 (\hat{M}_1 - \hat{P}_c) + \varepsilon_t \ , \tag{20}$$

In Section 2 we argued that it may be justified to treat the real wage variable as exogenous. But productivity growth is to a large extent endogenous and responsive to factor price changes. (In the limiting case of $\sigma = 1$ the equilibrium productivity adjustment exactly offsets the real wage increase and leaves the labour share constant although employment declines). To take this problem into account, we redefine the proportional change of the labour share as $\hat{s} = \hat{w} - \hat{p}_F - \pi^*$, where π^* is full-employment productivity growth. We can then rewrite the growth of the labour share as $\hat{s} = (\hat{w} - \hat{p}_F - \hat{\pi}) + (\hat{\pi} - \hat{\pi}^*)$ where the first term is the actual labour share and the second term the deviation of actual productivity growth from its full employment value, i.e. the wage gap w^g. This way of rewriting $\hat{s}$ allows us to introduce s and w^g separately into the employment equation:

$$E = a_0 + a_1 \hat{s} + a_2 (\hat{\pi} - \hat{\pi}^*) + \text{(demand variables)} + \varepsilon_t \ . \tag{21}$$

We preferred not to restrict a_2 to equal a_1 because even the sign of a_2 is theoretically ambiguous. The coefficient of the wage gap is excpected to be negative when labour substitution dominates. But it could be positive during the adjustment process if, due to high adjustment costs, employment is reduced less than output after a real wage shock.

Full employment productivity growth $\hat{\pi}^*$ is approximated by trend productivity growth estimated with spline regressions. The decline in trend productivity growth after 1973 and again after 1979 is therefore taken into account.

To compare the results obtained with labour's share with those based on real wage costs, the following equation was estimated:

$$\hat{E} = a_0 + a_1 (\hat{W}_T - \hat{p}_F) + a_2 (\hat{p}_m - \hat{p}_F) + a_3 \text{(demand variables)} + \varepsilon_t \ , \tag{22}$$

where $(\hat{W}_T - \hat{p}_F)$ is the growth of the real product wage and $(\hat{p}_m - \hat{p}_F)$ approximates the growth of input costs relative to output prices. Addition of the input cost variable is shown to be important in *Bruno* (1982) and *Layard* et al. (1982).

4.3 Results

The regression results are reproduced in the Appendix. None of the equations dominates the others for all countries. The inadequacy of the dynamic specification is apparent is several ways. For one, in most equations the error term is autocorrelated so that we had to introduce first- and second-order autoregressive processes for the error terms. Moreover, in the logarithmic specification the coefficients of the income terms often have the wrong sign. This problem largely disappears, however, when the data are transformed into growth rates.

Remarkable is the fact that labour shares have the right sign and are statistically significant in virtually all countries either when estimated with the data transformed to growth rates or with logs, or in both estimations. The size of the labour share is relatively stable for each country across the various equations estimated.

For *Belgium*, the labour share is highly significant in all equations. Its coefficient is very stable in equations (1) to (3) but drops sharply when E_{t-1} is added to the explanatory variables. This suggests that the effects of an increase in the labour share on employment are distributed over several years.

Demand variables are significant in the equations based on growth rates but cost variables do not survive an F-test (regression 17).[11] By contrast labour's share passes the t-test when added to demand variables (regression 15).

In regression (12) the wage gap is significant suggesting that productivity growth accelerated through labour substitution.

For *Germany*, the labour share is highly significant in all regressions with a very stable coefficient size. The wage gap is weakly significant and has a negative coefficient in regression (12). Labour substitution, stimulating production growth but harming employment, thus may have occurred in Germany as well. Demand variables either have the wrong sign or are not significant in most regressions. Using the F-test criterion we conclude that the labour share cannot be eliminated from the regressions and that demand variables alone are insufficient and even less important than the labour share. This is clearly demonstrated by binary comparisons of regressions (1) and (2), (3) and (4), (5) and (6), (8) and (9), and (15) and (16).

Good, but somewhat less satisfactory results are also obtained when the labour share is replaced by cost variables. A rise in real wage costs is seen to have a strong negative effect on employment growth.

For *France*, the labour share is highly significant in the log-equations but not in the regressions based on growth rates. In the latter regres-

[11] To judge whether variables should be retained in the regression equation we use the F-test criterion (which becomes a t-test in case of one variable) suggested by *Mizon* and *Richard* (1983).

sions wage costs perform even worse. Comparison of regression (6) and (7) suggests that the labour share is to be preferred to the cost variables. However, domestic demand and world demand appear to be the most significant explanatory variables for France.

For *Italy*, neither the labour share, nor input costs, nor demand variables are consistently significant in all regressions. In regression (3) the labour share is significant, as is the wage gap. Regressions (11a) and (11b) also attribute significance to the labour shares.

For *the Netherlands*, the regressions results are also disappointing. Only input costs are significantly different from zero in all regressions, but not real wages, nor the labour share, nor demand variables. Regressions (5) to (10) are the ones with the highest explanatory power, theoretically expected sings of the coefficients, and a significant labour share.

In the regressions for the *United Kingdom*, the most consistently significant variable is domestic money supply. World demand, wage and input costs have low explanatory power. The labour share is significant in some regressions, but seems highly correlated with the money variable. Across regressions (1), (5), (6) and (11) the coefficient of the labour share is stable.

The labour share is the most significant variable across all regressions for the *United States*. Wage and input costs are hardly ever significantly different from zero. Inclusion of E_{t-1} among the explanatory variables does not improve the estimations, suggesting a more rapid adjustment process for the United States than for the European countries. Domestic demand terms ought, not surprisingly, to be more important than world demand. The best results are therefore obtained with regressions (1) and (11b).

Unlike *Sachs* (1983) we conclude that the United States are not atypical. Although the wage costs are not successful in the employment regressions, the labour share is very significant.

For *Japan*, demand variables are never sginificant. Neither wage and input costs nor labour shares are significant in the log-equations. Both are consistently significant when growth rates are used. But the explanatory power of the regressions remains very low so that no clear conclusions emerge.[12]

Since employment declined very strongly in 1982, representative regressions privileging, respectively, labour shares, demand conditions,

[12] Public sector employment data is not available for Japan. The dependent variable is total employment.

and wage and input costs were reestimated for the period 1960 - 81 and forecasts were made for 1982 - 83 (not reproduced). All coefficients ly inside of one standard deviation. around the coefficients estimated from the data for 1960 - 82. On this criterion the regressions are revealed as "structurally" stable. For most countries the smallest forecast errors are obtained with the regressions incorporating either the labour share or production costs.

4.4 Summary

From this empirical evidence the following conclusions can be drawn. For some countries (the Netherlands, Italy and Japan) no satisfactory explanation for the evolution of employment was found. For all countries the dynamic specification of the equations is wanting but the objective of the exercise was not to develop a fully satisfactory dynamic theory. The regression results provide, however, solid empirical support for the proposition that employment cannot be explained by demand conditions alone, and that increases in labour shares (or in product wages) slow down employment growth. The results justify therefore the attention being paid to labour shares in policy discussions and official documents and the claim that the increase in labour shares in several European countries has had a negative effect on employment.

5. Conclusions and Policy Implications

In the economies of the European Communities the labour share increased, in some countries substantially, during the sixties and seventies, with possible negative effects on employment and employment-creating investments. In this paper, the growth of the labour share was decomposed into contributing factors which are either under control of policymakers, such as tax rates; or partially and temporarily under their control, such as the terms of trade; and factors which are largely exogenous in the short run, such as economic structure, or even the growth of real consumption wages. Productivity growth is a special case since changes in employment, in the terms of trade, and in real wages all affect productivity. In several countries it is seen that taxation has contributed to the increase in real wage costs, suggesting therefore immediately policy actions. In countries like Belgium and the United Kingdom, governments have already shown awareness of the implications of this tax policy for distributive shares and the repercussions on investment and employment.

In some countries (Belgium, Italy) wages are indexed to consumer prices. In this case any exogenous impact on the labour share, such as a deterioration of the terms of trade, could only be offset by a reduction in taxation. However, as was seen before, fiscal pressure was sometimes increased at the time terms of trade deteriorated. If one takes taxation as not flexible enough to offset terms of trade fluctuations, and economic structure as evolving only slowly, then employment can only be protected by offsetting terms of trade fluctuations through appropriate adjustments of real wages. One way of achieving this flexibility automatically would consist in indexing wages not to consumer prices but to the GDP deflator. This proposal is discussed in *Steinherr* (1978).

The hypothesis that employment is independent of the evolution of real wages and of the labour share, and is largely determined by demand conditions, is rejected by the regression analysis in this paper. Demand conditions generally do matter, but as pervasive, and in some countries even more, is the importance of supply conditions, captured either by the labour share or wage and input costs. The policy conclusions for stimulation of employment growth are therefore clear. Most promising in Europe's current situation would be demand stimulation with a simultaneous control over real wage growth. Implementation of such a policy may, however, be difficult. In the past, expansionary demand policies have facilitated the growth of real wages and of the labour share. In such a case a difficult choice has to be made. Demand reflation without a corresponding incomes policy may fail to increase employment. Real wage reductions with unchanged demand policies will stimulate employment but less than with a simultaneous demand reflation. If real wages cannot be forced to grow at a rate below full employment productivity growth, then policy solutions other than demand stimulation must be sought. One feasible and promising policy alternative would be to subsidise employment creation. This policy is proposed and analysed in detail in *Chiarella* and *Steinherr* (1982) and *Steinherr* and *Van Haeperen* (1983).

Summary

This paper analyses the evolution of the labour share in major countries of the European Communities, the United States and Japan. The definition of the labour share is expanded to take into account the role of taxation, of economic structure, of wage push, of changes in the terms of trade, and of productivity growth. The contributions of these factors to changes in the labour share vary significantly among the countries of the Community, the United States and Japan. In all countries the largest variations are found in real consumption wages, terms of trade changes, and productivity growth. In some countries payroll taxes had a significant effect on the increase of the labour share, most so in Belgium.

When employment is regressed on cost and demand variables the growth of the labour share turns out to have a significant negative effect on em-

ployment in most countries. We conclude therefore that employment growth is not purley demand determined and that the very strong increase in labour costs which occurred during the 1970s in the Community, but not in the United States, has been a major reason for the stationary of employment in Europe as compared to historical record growth of employment in the United States during that period.

Zusammenfassung

Gegenstand der vorliegenden Untersuchung ist die Entwicklung der Arbeitnehmerquote am Sozialprodukt in den wichtigsten Ländern der Europäischen Gemeinschaft, den Vereinigten Staaten und Japan. Eine Erweiterung der Definition der Arbeitnehmerquote wird vorgenommen, um wichtigen exogenen Einflüssen Rechnung tragen zu können: steuerlichen Belastungen, Struktureffekten, terms of trade, Reallohndruck und Produktivitätswachstum. Die Beiträge dieser Faktoren zur Entwicklung der Arbeitnehmerquote fallen in den untersuchten Ländern sehr unterschiedlich aus. In allen Ländern ragen jedoch die Veränderungen der Reallöhne, der terms of trade und der Produktivität hervor. In einigen Ländern, vor allem in Belgien, lieferte die Erhöhung der Sozialabgaben und der indirekten Steuern einen wesentlichen Beitrag zum Wachstum der Arbeitnehmerquoten.

In der Regressionsanalyse zeigt sich, daß der Anstieg der Arbeitnehmerquoten einen statistisch abgesicherten, negativen und quantitativ großen Einfluß auf die Entwicklung des Beschäftigungsniveaus ausübt. Das seit zehn Jahren konstant verharrende Beschäftigungsniveau in Europa läßt sich daher eher von der Kosten- als von der Nachfrageseite erklären, genau so wie umgekehrt das rasche Beschäftigungswachstum in den Vereinigten Staaten.

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Appendix

I. List of Variables and Definition

P_M = Price deflator of *GDP* at market prices

P_F = Price deflator of *GDP* at factor cost

P_c = Consumer price index

P_x = Price index of exports of goods and services

P_m = Price index of imports of goods and services

W_T = Employment compensation per employee; total economy

W_C = Gross wages and salaries

E_T = Total employment

E_D = Dependent employment

$Y_G P_F$ = Gross domestic product at current factor cost

$Y_N P_F$ = Net domestic product at current factor cost

TC = Current taxes on income and wealth paid by non-financial corporate sector

TH = Income taxes paid by households

$S1$ = Social contributions by employees

$S2$ = Social contributions by self-employed

Z = $1 + TC\,(W_T\,E_T)$

T = $TH + S1 + S2$

S_G = Gross Labour share $(W_T\,E_T\,/\,P_F\,Y_G)$

S_N = Net Labour share $(W_T\,E_T\,/\,P_F\,Y_N)$

π_G = Gross productivity $(Y_G\,/\,E_T)$

π_N = Net productivity $(Y_N\,/\,E_T)$

Sources: SOEC (Statistical Office of the European Communities). — OECD (National Accounts). — OECD (Labour Force Statistics). — Estimates by Commission Staff.

II. Tables: Regression results (1960 - 1982) for

— Belgium
— Germany
— France
— Italy
— The Netherlands
— United Kingdom
— United States
— Japan

} Employment equations:

(1) All variables in logs
(2) All variables in growth rates

Belgium

	Const.	E_{t-1}	s_{t-1}	$(W_T/P_F)_{t-1}$	$(P_M/P_F)_{t-1}$	Y_{t-1}	YW_{t-1}	$(M_1/P_C)_{t-1}$	W^q_{t-1}	RHO 1	RHO 2	$\bar{R}^2$	DW
A. Employment equations (all variables in logs)													
1a.	4.9 (169)		− 0.50 (4.6)							1.03 (4.2)	− 0.31 (1.4)	0.82	1.63
1b.	7.7 (105)		− 0.47 (4.5)			0.05 (2.5)				2.75 (8.7)	− 2.4 (7.0)	0.72	2.79
2.	7.5 (83.9)		− 0.50 (6.3)				− 0.001 (0.7)	0.20 (5.3)		0.64 (4.9)		0.92	1.61
3.	7.5 (100)		− 0.52 (5.5)				− 0.001 (0.2)	0.19 (4.9)	− 0.04 (0.3)	0.66 (4.6)		0.92	1.66
4.	7.8 (119)						− 0.03 (2.0)	0.18 (3.7)	0.36 (4.1)	0.40 (1.8)		0.85	1.36
5.	1.0 (0.8)	0.87 (5.6)	− 0.18 (3.8)									0.81	1.74
6.	1.9 (1.2)	0.75 (3.7)	− 0.28 (2.5)			0.02 (1.0)						0.81	1.60
7.	3.75 (2.0)	0.64 (3.6)		− 0.14 (1.6)	− 0.14 (4.9)	0.09 (1.0)						0.91	2.39
8.	5.06 (3.6)	0.33 (1.8)	− 0.33 (4.1)				− 0.01 (1.1)	0.13 (3.7)				0.89	0.96
9.	1.42 (0.9)	0.82 (4.3)					− 0.03 (3.2)	0.10 (2.2)				0.79	1.33
10.	4.54 (3.1)	0.55 (3.5)		− 0.15 (2.5)	− 0.10 (2.7)		0.05 (1.4)	0.07 (1.3)				0.92	1.95

B. Employment equations (all variables in growth rates)

11.	– 0.0004		– 0.47									0.38	1.87
	(0.1)		(3.2)										
12.	– 0.01		– 0.36			0.26			– 0.28			0.45	2.25
	(2.0)		(2.3)			(2.5)			(1.9)				
13.	– 0.007	– 0.02	– 0.32			0.09						0.32	1.88
	(1.2)	(0.0)	(1.9)			(1.4)							
14.	– 0.008	– 0.14		– 0.28	– 0.12	0.20						0.59	2.20
	(1.6)	(0.6)		(2.0)	(3.4)	(3.3)							
15.	– 0.009	0.08	– 0.28				0.10	0.16				0.80	1.75
	(3.0)	(0.7)	(2.9)				(2.6)	(6.1)					
16.	– 0.02	0.08					0.15	0.16				0.72	2.07
	(5.0)	(0.6)					(3.9)	(5.0)					
17.	– 0.01	0.11		– 0.14	– 0.02		0.16	0.15				0.74	2.20
	(2.5)	(0.8)		(1.6)	(0.6)		(4.0)	(4.0)					

Germany

	Const.	E_{t-1}	s_{t-1}	$(W_T/P_F)_{t-1}$	$(P_M/P_F)_{t-1}$	Y_{t-1}	YW_{t-1}	$(M_1/P_C)_{t-1}$	W^q_{t-1}	RHO 1	RHO 2	$\bar{R}^2$	DW
A. Employment equations (all variables in logs)													
1a.	9.8 (262)		– 0.69 (3.9)							1.64 (4.6)	– 0.78 (3.7)	0.91	2.24
1b.	10.1 (94.9)		– 0.60 (2.6)			– 0.14 (5.6)				1.06 (5.18)	– 4.54 (3.7)	0.93	1.00
2.	10.2 (77.4)		– 0.69 (3.2)				– 0.1 (3.7)	0.05 (1.2)		1.18 (6.5)	– 0.59 (3.3)	0.93	1.55
3.	9.92 (93.5)		– 0.57 (2.0)				– 0.001 (3.3)	0.05 (1.1)	0.14 (0.5)	1.16 (6.7)	– 0.63 (3.6)	0.94	1.94
4.	10.6 (73.7)						– 0.15 (4.1)	0.11 (2.0)	0.48 (2.0)	1.05 (5.0)	– 0.52 (2.5)	0.92	1.48
5.	1.0 (1.5)	0.88 (12.3)	– 0.62 (4.1)									0.92	1.27
6.	2.26 (1.8)	0.76 (6.3)	– 0.54 (3.3)									0.92	1.24
7.	9.9 (9.5)	0.24 (2.9)		– 0.61 (7.5)	– 0.10 (5.6)	– 0.03 (1.2)							1.36
8.	1.81 (1.6)	0.84 (7.8)	– 0.49 (3.5)			0.49 (6.2)	– 0.11 (3.5)	0.17 (3.3)				0.95	1.14
9.	2.7 (1.9)	0.79 (5.7)					– 0.14 (3.6)	0.19 (2.9)				0.92	1.38
10.	5.8 (4.6)	0.65 (5.4)		– 0.57 (4.4)	– 0.03 (0.8)		0.16 (2.2)	0.19 (3.7)				0.96	1.86

B. Employment equations (all variables in growth rates)

11.	− 0.005 (1.2)		− 0.62 (3.5)									0.43	1.89
12.	− 0.02 (3.6)		− 0.70 (3.1)			0.39 (3.1)			− 0.42 (1.8)			0.43	1.62
13.	0.006 (0.7)	0.37 (1.1)	− 0.63 (2.6)			0.09 (0.5)						0.37	1.95
14.	− 0.001 (0.8)	− 0.11 (0.5)		− 0.62 (3.0)	− 0.09 (2.4)	0.63 (3.3)						0.52	2.25
15.	− 0.006 (1.2)	0.58 (3.7)	− 0.65 (4.0)				− 0.03 (0.6)	0.15 (4.2)				0.68	2.25
16.	− 0.01 (2.5)	0.33 (1.7)					0.06 (0.8)	0.17 (3.5)				0.40	1.83
17.	− 0.005 (0.6)	0.46 (2.3)		− 0.40 (2.0)	− 0.03 (0.6)		0.14 (1.8)	0.16 (2.7)				0.47	2.37

France

	Const.	E_{t-1}	s_{t-1}	$(W_T/P_F)_{t-1}$	$(P_M/P_F)_{t-1}$	Y_{t-1}	YW_{t-1}	$(M_1/P_C)_{t-1}$	W^q_{t-1}	RHO 1	RHO 2	$\bar{R}^2$	DW
A. Employment equations (all variables in logs)													
1.	9.55 (424)		− 0.16 (3.1)			0.08 (10.7)	0.04 (3.3)			0.3 (1.3)		0.92	1.76
2.	9.5 (267)		− 0.18 (2.4)				0.04 (4.4)			0.30 (1.3)		0.92	1.72
3.	9.6 (325)		− 0.22 (3.2)				0.03 (2.4)	0.02 (0.6)	− 0.20 (1.2)			0.91	1.41
4.	9.5 (461)							0.04 (2.5)	− 0.14 (0.8)	0.49 (2.4)		0.90	1.61
5.	0.8 (1,3)	0.91 (13.8)	− 0.07 (1.1)					0.03 (0.8)				0.90	2.07
6.	7.6 (3.1)	0.21 (0.8)	− 0.17 (2.7)			0.06 (2.8)						0.93	1.64
7.	2.6 (0.94)	0.71 (2.7)		0.06 (0.8)	− 0.09 (4.0)	− 0.06 (0.7)						0.96	1.76
8.	7.5 (2.9)	0.21 (0.7)	− 0.15 (2.2)				0.03 (1.8)	0.02 (0.8)				0.92	1.61
9.	4.4 (1.8)	0.55 (2.2)					0.01 (0.4)	0.03 (1.6)				0.91	1.61
10.	4.6 (1.8)	0.52 (2.1)		0.01 (0.1)	− 0.08 (3.7)		0.01 (0.2)	− 0.01 (0.3)				0.95	1.61

B. Employment equations (all variables in growth rates)

11.	0.003 (1.9)		− 0.18 (1.8)									0.10	2.07
12.	0.00 (0.7)		− 0.05 (0.3)			0.13 (1.3)			− 0.02 (0.1)			0.04	2.46
13.	− 0.01 (1.8)	− 0.60 (2.0)	− 0.04 (0.3)			0.24 (2.5)						0.23	2.28
14.	− 0.004 (1.0)	0.04 (0.1)		0.05 (0.4)	− 0.06 (3.1)	0.08 (0.6)						0.50	2.19
15.	− 0.007 2.0)	− 0.65 (2.4)	− 0.06 (0.5)				0.16 (3.3)	− 0.007 (0.3)				0.34	2.34
16.	− 0.007 (2.6)	− 0.63 (2.4)					0.17 (3.7)	− 0.004 (0.2)				0.37	2.42
17.	− 0.007 (2.1)	− 0.25 (1.2)		0.07 (0.8)	− 0.02 (0.9)		0.11 (3.0)	− 0.06 (4.1)				0.66	2.22

Italy

	Const.	E_{t-1}	s_{t-1}	$(W_T/P_F)_{t-1}$	$(P_M/P_F)_{t-1}$	Y_{t-1}	YW_{t-1}	$(M_1/P_C)_{t-1}$	W^q_{t-1}	RHO 1	RHO 2	$\bar{R}^2$	DW
					A. Employment equations (all variables in logs)								
1.	9.7 (472.2)		− 0.07 (0.73)							0.73 (10.7)		0.90	2.09
2.	9.5 (73.7)		− 0.10 (1.1)				0.05 (1.5)	− 0.21 (0.2)		0.79 (22.6)		0.84	2.18
3.	10.4 (119)		− 0.58 (3.6)				0.002 (6.7)	− 0.15 (7.7)	− 0.49 (3.8)			0.81	1.66
4.	9.5 (84.5)						0.02 (0.5)	0.02 (0.5)	0.19 (1.9)	0.77 (23.3)		0.86	2.31
5.	2.0 (2.9)	0.80 (11.4)	0.04 (0.5)									0.86	1.64
6.	0.76 (0.7)	0.91 (8.9)	− 0.03 (0.3)			0.02 (1.4)						0.87	1.96
7.	2.8 (1.8)	0.67 (3.9)		− 0.13 (1.1)	0.04 (1.5)	0.13 (1.2)						0.87	2.28
8.	1.03 (0.9)	0.90 (8.2)	− 0.07 (0.7)				0.04 (1.1)	− 0.02 (0.7)				0.87	2.02
9.	1.2 (1.2)	0.87 (8.4)					0.02 (0.9)	− 0.01 (0.5)				0.87	1.97
10.	4.4 (2.6)	0.57 (3.6)		− 0.21 (2.2)	0.02 (1.0)		0.15 (2.1)	− 0.02 (0.8)				0.89	2.40

B. Employment equations (all variables in growth rates)

11a.	− 0.0004 (0.14)		− 0.17 (1.9)							0.24 (1.3)		0.20	1.99
11b.	− 0.003 (0.8)		− 0.17 (2.0)			0.11 (1.5)				0.35 (2.0)		0.25	2.03
12.	0.00 (0.6)		− 0.16 (0.9)			− 0.17 (1.1)			0.13 (0.7)			0.00	1.38
13.	0.004 (0.6)	0.39 (1.8)	− 0.21 (1.3)			− 0.001 (1.0)						0.06	2.09
14.	0.003 (0.6)	0.15 (0.5)		− 0.22 (1.4)	0.006 (0.2)	0.0007 (0.7)						0.02	2.18
15.	− 0.006 (0.1)	0.32 (1.4)	− 0.11 (0.8)				0.004 (0.0)	− 0.02 (0.5)				0.01	2.00
16.	− 0.003 (0.5)	0.33 (1.4)					0.03 (0.4)	− 0.02 (0.4)				0.01	1.94
17.	− 0.002 (0.4)	0.22 (0.8)		− 0.19 (1.3)	0.002 (0.0)		0.06 (0.7)	− 0.008 (0.2)				0.01	2.22

The Netherlands

	Const.	E_{t-1}	s_{t-1}	$(W_T/P_F)_{t-1}$	$(P_M/P_F)_{t-1}$	Y_{t-1}	YW_{t-1}	$(M_1/P_C)_{t-1}$	W^g_{t-1}	DUM*	RHO 1	RHO 2	$\bar{R}^2$	DW
A. Employment equations (all variables in logs)														
1.	8.3 (252.7)		0.17 (1.7)			0.04 (2.0)					0.89 (4.1)	– 0.41 (2.3)	0.75	1.45
2.	(8.2) (66.9)		0.16 (1.4)				0.02 (1.0)	0.01 (0.2)			0.91 (4.3)	– 0.42 (2.4)	0.74	1.41
3.	8.4 (146)		0.17 (1.3)				– 0.0 (0.2)	0.04 (0.8)	0.22 (1.5)		0.76 (3.4)	– 0.23 (1.4)	0.74	1.44
4.	8.4) (60.6)						– 0.01 (0.6)	0.05 (1.0)	0.20 (1.6)		0.68 (10.3)		0.82	1.34
5.	0.96 (1.4)	0.88 (11.4)	– 0.16 (2.2)							– 0.02 (4.5)			0.94	1.67
6.	1.16 (1.2)	0.86 (7.5)	– 0.15 (2.1)	– 0.18 (2.8)		0.00 (0.3)				– 0.02 (4.2)			0.93	1.67
7.	4.28 (5.0)	0.60 (6.3)			– 0.07 (2.7)	0.15 (2.56)		– 0.01 (0.5)		– 0.02 (3.1)			0.95	1.54
8.	1.17 (1.2)	0.86 (7.5)	– 0.17 (2.2)					– 0.00 (0.1)	0.03 (0.6)	– 0.02 (3.4)			0.93	1.63
9.	2.32 (2.6)	0.72 (6.8)						0.08 (1.8)	0.01 (0.1)	– 0.02 (2.5)			0.91	1.32
10.	3.87 (4.3)	0.61 (5.7)		– 0.17 (2.0)	– 0.06 (2.2)				0.02 (0.4)	– 0.02 (2.4)			0.94	1.25

B. Employment equations (all variables in growth rates)

11.	− 0.01 (0.9)		− 0.17 (1.9)			0.31 (4.6)				− 0.02 (3.4)			0.57	2.22
12.	− 0.01 (1.5)		− 0.28 (1.6)			0.36 (2.3)			− 0.52 (2.3)	− 0.02 (1.7)			0.44	1.45
13.	− 0.01 (1.3)	0.69 (2.7)	− 0.21 (1.5)	− 0.18 (1.5)	− 0.05 (1.9)	− 0.12 (1.0)				− 0.3 (2.8)			0.50	2.00
14.	− 0.01 (1.0)	0.52 (2.7)				0.07 (0.8)				− 0.02 (2.0)			0.57	2.18
15.	− 0.01 (0.2)	0.46 (2.0)	− 0.09 (0.8)				0.05 (0.8)	0.03 (0.5)		− 0.02 (1.5)			0.46	1.77
16.	− 0.01 (0.5)	0.40 (2.0)					0.07 (1.1)	0.07 (0.5)		− 0.01 (1.4)			0.47	1.64
17.	− 0.01 (0.5)	0.50 (2.7)		− 0.20 (1.7)	− 0.06 (1.5)		0.09 (1.4)	0.02 (0.4)		− 0.02 (1.8)			0.58	1.99

* The variable DUM takes a value of on in 1961, 1981, and 1982, and zero otherwise.

United Kingdom

	Const.	E_{t-1}	s_{t-1}	$(W_T/P_F)_{t-1}$	$(P_M/P_F)_{t-1}$	Y_{t-1}	YW_{t-1}	$(M_1/P_C)_{t-1}$	W^g_{t-1}		RHO 1	RHO 2	$\bar{R}^2$	DW
A. Employment equations (all variables in logs)														
1.	9.6 (68.1)		− 0.44 (2.5)							0.97 (44.0)			0.22	1.57
2.	9.5 (24.5)		− 0,04 (0.2)				− 0.06 (4.9)	0.13 (1.8)		2.8 (11.5)		− 2.5 (9.4)	0.84	1.43
3.	8.8 (20.2)		− 0.47 (1.6)				− 0.001 (3.0)	0.19 (2.2)	− 0.31 (1.0)	0.57 (2.9)			0.82	1.56
4.	9.6 (25.7)						− 0.06 (5.5)	0.11 (1.6)	− 0.05 (0.1)	4.2 (18.2)		− 3.9 (14.3)	0.84	1.59
5.	− 0.55 (0.4)	1.04 (7.8)	− 0.49 (2.5)										0.83	1.54
6.	0.18 (0.1)	0.97 (5.9)	− 0.44 (2.1)			− 0.03 (0.8) 0.34 (1.6)							0.82	1.45
7.	4.8 (1.6)	0.66 (2.7)		0.41 (1.9)	0.03 (0.6)								0.81	1.52
8.	0.86 (0.6)	0.81 (5.4)	− 0.18 (0.9)				− 0.02 (1.9)	0.20 (2.9)					0.88	1.36
9.	0.87 (0.6)	0.81 (5.3)					− 0.02 (2.6)	0.22 (3,7)					0.88	1.38
10.	1.9 (1.1)	0.72 (4.7)		− 0.13 (0.6)	0.06 (1.8)		0.02 (0.2)	0.24 (3.9)					0.89	1.79

B. Employment equations (all variables in growth rates)

11a.	− 0.0045 (1.2)		− 0.44 (2.5)										0.22	1.57
11b.	− 0.014 (3.2)		− 0.33 (2.2)			0.41 (3.1)							0.47	2.39
12.	− 0.01 (3.0)		− 0.24 (1.0)			0.43 (2.6)			− 0.15 (0.6)				0.31	2.49
13.	− 0.01 (1.9)	0.07 (0.2)	− 0.19 (0.8)			3.5 (1.6)							0.30	2.40
14.	− 0.01 (1.9)	− 0.08 (0.3)	− 0.14 (0.7)	− 0.28 (1.2)	− 0.03 (0.6)	5.7 (3.1)							0.31	2.00
15.	− 0.01 (1.3)	0.33 (1.6)					0.10 (1.0)	0.15 (2.5)					0.42	2.44
16.	− 0.01 (1.9)	0.30 (1.5)					0.12 (1.5)	0.17 (3.1)					0.44	1.88
17.	− 0.01 (1.4)	0.30 (1.5)		− 0.12 (0.6)	− 0.02 (0.5)		0.15 (1.6)	0.16 (2.8)					0.38	1.78

United States

	Const.	E_{t-1}	s_{t-1}	$(W_T/P_F)_{t-1}$	$(P_M/P_F)_{t-1}$	Y_{t-1}	YW_{t-1}	$(M_1/P_C)_{t-1}$	W^g_{t-1}	RHO 1	RHO 2	R^2	DW
A. Employment equations (all variables in logs)													
1.	9.34 (67)		− 0.55 (2.9)			0.69 (15.7)				0.86 (4.5)		0.99	1.44
2.	9.4 (37.4)		− 1.36 (3.6)				0.30 (9.9)	0.05 (0.5)		0.68 (5.5)		0.98	1.89
3.	10.5 (31.8)		− 1.04 (1.6)				0.003 (9.1)	0.14 (1.2)	0.05 (0.1)	0.62 (3.4)		0.98	1.99
4.	10.2 (44.4)						0.25 (7.0)	− 0.02 (0.2)	0.80 (2.4)			0.98	1.78
5.	− 0.56 (1.2)	1.03 (28.2)	− 0.66 (2.5)		0.006 (0.2)							0.98	1.56
6.	4.08 (2.8)	0.56 (3.8)	− 0.59 (2.8)			0.26 (3.3)						0.99	1.63
7.	12.9 (4.3)	− 0.05 (0.2)		− 0.74 (2.8)		0.88 (4.0)						0.99	1.62
8.	3.2 (2.3)	0.64 (4.6)	− 0.98 (4.2)				0.11 (2.8)	0.01 (0.2)				0.99	1.83
9.	1.89 (1.0)	0.81 (4.4)					0.05 (0.9)	0.03 (0.5)				0.97	1.42
10.	− 2.32 (0.5)	0.95 (4.2)		0.78 (1.1)	0.06 (0.9)		− 0.16 (0.8)	− 0.01 (0.1)				0.97	1.43

B. Employment equations (all variables in growth rates)

11a.	0.02 (5.3)		– 0.79 (3.0)									0.28	1.52
11b.	0.004 (0.2)		– 0.55 (2.9)			0.52 (4.8)				0.51 (2.8)		0.66	1.71
12.	0.00 (0.7)		– 0.44 (0.9)			0.38 (2.0)			0.11 (0.3)			0.37	1.93
13.	0.004 (0.6)	– 0.17 (0.6)	– 0.42 (1.0)			0.33 (2.0)						0.37	1.78
14.	0.555 (0.7)	– 0.46 (1.5)		– 0.53 (1.1)	– 0.04 (0.8)	0.54 (2.5)						0.36	1.84
15.	0.02 (3.1)	0.30 (1.6)	– 0.44 (1.3)				– 0.14 (1.3)	0.38 (3.4)				0.53	1.83
16.	0.03 (4.2)	0.31 (1.7)					– 0.21 (2.3)	0.46 (4.7)				0.51	1.79
17.	0.03 (3.5)	0.33 (1.4)		0.09 (0.1)	– 0.02 (0.5)		– 0.22 (1.4)	0.40 (2.7)				0.46	1.71

Japan

	Const.	E_{t-1}	s_{t-1}	$(W_T/P_F)_{t-1}$	$(P_M/P_F)_{t-1}$	Y_{t-1}	YW_{t-1}	$(M_1/P_C)_{t-1}$	W^g_{t-1}	RHO 1	RHO 2	R^2	DW
A. Employment equations (all variables in logs)													
1.	11.3 (155.9)		− 0.07 (1.23)							0.97 (189.2)		0.98	1.72
2.	10.3 (79.6)		− 0.008 (0.1)				0.13 (3.4)	0.01 (0.4)	0.05 (2.7)	0.71 (4.1)		0.97	1.68
3.	10.5 (139)		− 0.25 (5.0)				0.000 (1.1)	− 0.21 (4.9)	− 0.11 (2.3)			0.99	1.52
4.	10.4 (128.9)						0.06 (1.4)	0.04 (1.2)		0.57 (2.9)		0.98	1.75
5.	0.42 (1.2)	0.96 (29.3)	0.04 (1.3)									0.98	1.85
6.	2.69 (1.5)	0.74 (4.2)	0.06 (1.7)			0.03 (1.3)						0.98	1.63
7.	1.8 (1.0)	0.80 (4.1)		0.06 (1.3)	0.0 (0.0)	− 0.03 (0.7)						0.98	1.63
8.	3.00 (1.1)	0.71 (2.8)	0.03 (0.6)				0.04 (0.7)	− 0.01 (0.2)				0.98	1.72
9.	3.90 (1.8)	0.63 (2.9)					0.07 (1.6)	− 0.02 (1.1)				0.98	1.75
10.	2.9 (1.1)	0.68 (2.9)		0.08 (0.8)	− 0.01 (0.3)		− 0.003 (0.0)	− 0.03 (0.8)				0.98	1.58

B. Employment equations (all variables in growth rates)

11a.	0.02 (3.2)		− 0.20 (2.3)			− 0.10 (1.6)						0.15	2.03
11b.	0.01 (3.0)		− 0.25 (2.3)			− 0.05 (0.9)						0.17	2.03
12.	0.02 (3.1)		− 0.2 (2.1)			− 0.10 (1.5)			− 0.00 (0.1)			0.10	2.04
13.	0.02 (3.4)	− 0.20 (1.0)	− 0.24 (2.6)			− 0.11 (1.7)						0.16	1.88
14.	0.02 (4.2)	− 0.57 (2.5)		− 0.27 (3.3)	− 0.03 (2.3)	− 0.09 (1.18)						0.31	1.84
15.	0.01 (3.5)	− 0.10 (0.5)	− 0.13 (2.0)				− 0.08 (1.6)	0.02 (0.8)				0.10	1.43
16.	0.01 (2.7)	0.11 (0.5)					− 0.07 (1.2)	0.03 (1.2)				0.01	1.93
17.	0.02 (3.6)	− 0.29 (1.1)		− 0.20 (2.1)	− 0.02 (1.0)		− 0.01 (0.2)	0.03 (0.9)				0.13	2.07