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THE ALLOCATION OF LABOUR
AND WAGE-INCOME POLICIES

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An important part of the discussions in the literature about wage-income policies has been concerned with the relation between the general level of wages, the aggregate price level and unemployment. Since Phillips wrote his article on the relation between unemployment and the rate of change in money wages (6) various explanations for and estimates of the "Phillips curve" for various countries were developed (*).

Much less attention has been paid in the literature to the mechanism which govern the distribution of the country's labour force over the various industrial sectors and their effects on aggregate growth and income distribution.

Contrasting with (as is very often the case) the theoretical discussions, the "practitioners" of economic policy have to deal and do deal with the matter of sectorial allocation of labour. E.g. the recent agreements in Belgium between trade-union, the "union of industrials" and the Government do provide for a policy of sectorial allocation of the country's labour force in view of achieving economic growth and a more equal distribution of income (at least among workers themselves).

More specific the new policy 1. aims to distribute the country's labour force among industrial sectors by means of bargaining between the collusion of trade unions and of capitalists and 2. allows for kind of a "tax-mechanism" to reduce sectorial wage-income differentials.

(*) For discussions of this part of the literature, the reader is referred to R.G. LIPSEY (5). An excellent discussion of theoretical as empirical problems related to the Phillips curve is in R. BOELAERT (3).

In our opinion, two basic propositions about the anatomy of the economy are underlying such policy:

1. the recognition of the unbalanced nature of growth;
2. the proposition that relative wages are sufficient signals for allocating the country's labour force.

On the unbalanced nature of growth and its effects an enlightening macro-model was developed in the literature by W. BAUMOL (2) (*). The structure of the wage-income policy recently adopted in Belgium can be conceived in terms of a Baumol-type unbalanced growth model. This is the subject of this paper. The justification for the development of such model resides merely in its explanatory power.

W.J. Baumol argued that inherent in the technological structures of some sectors of the economy, forces are working almost unavoidably for progressive increases in real costs in supplying the outputs. Therefore, "efforts to offset these costs increase; while they may succeed temporarily, in the long run are merely palliatives which can have no significant effect in the underlying trends".

Baumol makes his point by means of a fairly simple model. The basic premise underlying this model is that economic activities can be grouped into two types viz.

1. "technologically progressive activities in which innovations, capital accumulation, and economies of large scale all make for a cumulative rise in output per man hour";
2. "activities, by their very nature, permit only sporadic increases in productivity".

(*) A number of explanatory models such as Odd Aukrust's PRIM model - with the purpose of explaining inflation in open economies - can be considered as an elaborated version of a Baumol-type unbalanced model. See Odd Aukrust (1).

It is clear that in reality there will be an almost continuous degree of differentiation between productivity growth, but for the rate of simplicity of the argument, only two sectors which outputs at time t are say, Y_{1t} and Y_{2t} are considered.

For the constant productivity sector (CPS) the output is given by

$$Y_{1t} = aL_{1t} \quad \underline{/1/} \quad (a=\text{constant}).$$

For the sector in which productivity is growing cumulatively (GPS) at a constant rate (r) the path of output is given by

$$Y_{2t} = bL_{2t}e^{rt} \quad \underline{/2/}$$

where L_{2t} stands for labour employed in period t and b is a constant.

Baumol assumes a particular wage transmission mechanism such that 1. wages in both sectors are equalized and 2. wages are fixed on the basis of the growth of productivity in the GPS. Hence

$$W_t = W_0e^{rt} \quad \underline{/3/}$$

where W_0 is a constant.

Baumol's assertion on the wage transmission mechanism is most likely a fairly good picture of what in fact happened (at least in the long run) in wage determination in Belgium. Undoubtedly a certain lag between the adjustment of wages in the constant productivity sector (CPS) to those of the growing productivity sector (GPS) can be observed. However, once the difference between wage levels in the two sectors exceeds a certain magnitude, the wage level in the CPS seems to be adjusted to that of the

GPS (*). Incorporation of such lags would merely complicate the model and is not required for the purpose at hand.

From such a system some propositions about its development can be derived. The first proposition is that the cost per unit of output of the CPS will rise without limit, while the cost of the output of the GPS will remain constant.

This proposition is easily proven as the average costs of the CP and GP are

$$C_1 = \frac{W_t L_{1t}}{Y_{1t}} = \frac{W_o e^{rt} L_{1t}}{a L_{1t}} = \frac{W_o}{a} \cdot e^{rt}$$

and

$$C_2 = \frac{W_t L_{2t}}{Y_{2t}} = \frac{W_o e^{rt} L_{2t}}{a L_{2t} e^{rt}} = \frac{W_o}{b}$$

A second proposition is that in this system the outputs of the CP sector, whose demands are not highly inelastic, tend to decline and will, in the end, vanish. If one assumes, for example, that the price elasticities for the two sectors were unitary. If prices are proportionate to costs, the relative expenditure on both commodities would remain constant throughout time, viz.

$$\frac{P_1 Y_1}{P_2 Y_2} = \frac{C_1 Y_1}{C_2 Y_2} = \frac{W_o e^{rt} L_{1t}}{W_o e^{rt} L_{2t}} = \frac{L_{1t}}{L_{2t}} = A$$

(*) A rather unique example of this lagged sudden adjustment procedure is the "Revaluation of Public Offices" ("herwaarder-
ring van het Openbaar Ambt") of 1971. The wage levels of the public sector (a CPS) were adjusted to those of the private (manufacturing) sector (a GPS).

Hence, the ratio of outputs would be

$$\frac{Y_1}{Y_2} = \frac{aL_{1t}}{be^{rt}L_{2t}} = \left(\frac{aA}{b}\right)e^{-rt}$$

So that, in the long run, the outputs of the CP sector tend to vanish (*).

If demand for CP-products is price inelastic or income elastic or if through government aid or intervention the relative output ratios are kept constant, a third proposition can be derived viz. that more and more of the country's labour force is taken up by the CP sector.

Say that $Y_1/Y_2 = K$

either because of price elasticity for the commodities of the CP-sector or as a result of government policy.

Hence
$$\frac{Y_1}{Y_2} = \frac{aL_{1t}}{bL_{2t}e^{rt}}$$

The following definition holds

$$L_{1t} + L_{2t} = L$$

where L is the country's total labour force.

(*) Baumol's proposition is supported by empirical evidence, in several fields of the economy. E.g. constant productivity sectors such as "performing arts" are vanishing, if not supported through governmental aid, etc.

From the above equations it can be derived that

$$L_{1t} = \frac{L}{(1 + (\frac{a}{bK})e^{-rt})}$$

and

$$L_{2t} = \frac{L}{(1 + (\frac{Kb}{a})e^{rt})}$$

Labour in the CP sector follows a logistic growth path and in the end will take up the total labour force while in the GP sector employment is reduced over time.

If in such an economy, where the relative output ratios are held constant, one attempts to achieve balanced growth, the aggregate growth rate will decline relative to the rate of growth in the labour force. This is a growth proposition.

Say that I is an index of aggregate output. If B_1 and B_2 are weights then

$$I = B_1 Y_{1t} + B_2 Y_{2t} = B_1 a L_{1t} + B_2 b L_{2t} e^{rt}$$

Substituting the growth paths of the labour force in both sectors the aggregate index of production equals

$$I = C e^{rt} / (1 + \frac{bK}{a} e^{rt})$$

$$\text{with } C = L(B_1 bK + B_2 b)$$

$$\text{Hence } \frac{dI/dt}{I} = \frac{r}{(1 + \frac{bK}{a} e^{rt})}$$

which tends to zero in the long run.

One can easily add a fifth proposition with regards to time path of the aggregate price level.

If A_1 and A_2 are weights then the aggregate price level is defined as

$$P_t = A_1 P_{1t} + A_2 P_{2t}$$

If prices are more or less proportionate to costs, substituting the results of the first proposition into the price index equation leads to

$$P_t = A_1 \frac{W_0}{a} e^{rt} + A_2 \frac{W_0}{b}$$

Consequently, the growth rate of the price index follows a logistic pattern as

$$\frac{dP_t/d_t}{q} = \frac{r}{1 + \frac{A_2 a}{A_1 b} e^{-rt}}$$

so that inflationary tendencies are unavoidable.

The explanatory power of this fairly simple model is enormous. Wagner's law of increasing expansion of public expenditures (8), the financial crisis of the cities, the problems in CP-sectors such as "performing arts", etc. can be explained in terms of Baumol's model. Extending this model would lead to an explanatory model for inflation (*).

The major mechanism governing the behavior of an unbalanced growth model is the particular wage formation and transmission mechanism. A change in wage formation and transmission mechanism would lead to different expansions of the unbalanced productivity growth economy.

(*) See e.g. Aukrust (1).

Let us now concentrate on the idealised version of "Belgian-type income-wage policy" (BIW) and see what happens if adopted in an unbalanced productivity growth economy.

The first principle is that wages are the result of bargaining in each sector between trade-unions and capitalists. Although in the short-run the outcome of these bargaining situation is not predictable, this situation can be conceived as a bilateral monopoly (*). Assuming that powers, of "trade-union collusion" and "capitalists" are outweighing each other, it can be said that in the long run the outcome of this bargaining would approach the competitive market solution. Consequently wages are in proposition with their marginal productivities or

$$W_{1t} = W_0$$

and

$$W_{2t} = W_0 e^{rt}$$

The second principle states that, in order to secure an equitable distribution of income, a particular wage-income transmission mechanism by which part of the wages bargained in the GP sector are not passed on to the workers in that sector but are put in a "pool of funds" from which workers in the CP sector are paid in addition to their wages.

The end result on relative income distribution among workers of this wage-income policy is similar to that of simple equalisation of wages, but it has different implications on the allocation of labour, production growth, costs etc.

(*) See Henderson & Quandt (4).

In an unbalanced growth model where a BIW policy is adopted relative costs of the outputs of CP and GP sectors are constant. This first proposition is easily proven.

$$\frac{C_{1t}}{C_{2t}} = \frac{W_{1t}L_{1t}/Y_{1t}}{W_{2t}L_{2t}/Y_{2t}} = \frac{W_o L_{1t}/aL_{1t}}{W_o e^{rt} L_{2t}/bL_{2t} e^{rt}} = \frac{b}{a}$$

The second proposition states that in a model of unbalanced productivity growth, even if outputs for the CP sectors are price elastic, the output ratio of CP and GP sectors tends to be constant.

Suppose, for example, that price elasticities are unitary so that relative expenditures are constant. Then

$$\frac{C_{1t}Y_{1t}}{C_{2t}Y_{2t}} = A.$$

As the ratio of costs is constant, from the above it is derived that

$$\frac{Y_{1t}}{Y_{2t}} = \frac{a}{b} A$$

which is constant.

If the ratio between outputs is held constant, the allocation of labour over the sectors can be determined.

It is derived that

$$L_{1t} = \frac{A e^{rt} L}{1 + A e^{rt}}$$

and

$$L_{2t} = \frac{La}{1 + A e^{rt}}$$

Hence, the same proposition as in the Baumol-type model holds viz. in unbalanced productivity growth model, if the ratio of the outputs of both sectors is held constant, more and more of the country's labour force will be transferred to the CP sector.

A growth proposition can be stated about the workers income. Say Z_t is the workers income. It holds that

$$Z_t = \frac{W_{1t}L_{1t} + W_{2t}L_{2t}}{L}$$

where L is the total labour force. Hence, by substitution of wages and labour allocation, this leads to

$$Z_t = \frac{W_0 (1 + 1/A)}{1 + 1/A \cdot e^{-rt}}$$

Proposition four states that in an unbalanced growth model where output ratios are held constant and a BIW-policy is adopted, the workers income grows at a declining growth rate and tends asymptotically to a particular limit.

The fifth proposition concerning this model is the same as Baumol's fourth viz. that an attempt to achieve balance growth in a world of unbalanced productivity must lead to a declining growth rate relative to the growth of the labour force.

Whereas the Baumol's mechanism leads to cost-inflation, as the aggregate price index $P_t = W_1C_{1t} + W_2C_{2t}$ is increasing at the logistic rate of growth, a BIW-policy results in constant prices. The costs of both outputs are constant. Comparison of both models leads to the following conclusion. In the Baumol-type of wage formation-transmission intervention of government is required in order to secure that some CP outputs are still produced. On the other hand a BIW-policy does not require such government intervention in order to secure output from the CP

sectors. Even if those outputs are price elastic, the relative production is constant. In both models, more of the labour force will be allocated to the CP sector and the aggregate growth of the economy (relative to labour growth) will decline and asymptotically tend toward zero.

It can be concluded that the BIW has some fairly desirable properties as it is equitable, non-inflationary and is not compulsory with regards to government intervention.

SUMMARY

In this paper we analysed the differences between two different types of wage-income policies in a world of unbalanced growth. The first wage-income mechanism is the one adopted by Baumol (3) in which wages are equalised and fixed to the wage level in sectors with growing productivity. The second wage-income mechanism is an idealised version of the Belgian wage-income policy in which wages are more or less in relation to marginal productivity but incomes equalised through a tax-redistribution mechanism. The major differences are that, whereas under the Baumol-type mechanism the outputs of the constant productivity sectors vanish in the long run and inflationary tendencies are unavoidable, with the second type of wage-income policy government intervention to secure output of constant productivity sectors is not required while prices remain constant.

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