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SOME REFLECTIONS ON PRICE INDEXES, WELFARE INDEXES, AND WAGE ADJUSTMENTS

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IN some countries retail price indexes are used in the adjustment of wages. Generally, as in Denmark, they provide a mechanism for adjusting wages during the intervals between collective wage bargains.[1] In this paper I shall discuss the basis of the theory of price indexes and whether, for this purpose of automatic wage adjustment, it would be possible to replace the retail price index by another index, i.e. by what I have called the 'welfare index'.

The retail price index in Denmark is calculated on the basis of a consumer expenditure survey for 1948. It measures how much the 1948 household budget[2] would cost in later years, after taking into account price changes. To permit comparisons with years before 1948 the new calculations are then linked with previous calculations. Thus the retail price index reflects the cost of a specified annual consumption on the assumption that the quantities consumed are unchanged. To avoid giving the impression that this calculated annual expenditure is the actual expenditure of the 'price index family' we have stopped giving the absolute amounts and now give only index numbers, as is the practice in other countries. It is a peculiarity of the Danish retail price index that it includes personal taxes.[3] I shall revert to this special problem later.

If prices rise consumers will probably respond by buying more of those goods of which the prices have risen least. That is to say, consumers will adjust their consumption to achieve the maximum utility level, although what is considered maximum utility depends on which member of the family determines the purchases: beer or babies' underwear, for example, cigarettes or

[1] Between October 1945 and summer 1949 the automatic wage adjustment seems to have accounted for 20–25 per cent of the total wage increase. With the subsequent steep rise in the price index its share rose to 40–50 per cent.

[2] We have a new budget for 1955 which we hope will be available for the adjustment of wages. The old budget is completely obsolete.

[3] A commission has been set up to inquire into the problem of the inclusion of taxes (direct or indirect) in the retail price index.

woollen pants. In theory – but probably in theory only – instead of employing the usual index calculated according to Laspeyres's formula, we may try to ascertain what may be termed the 'true' price change, by taking account of adjustments in the pattern of consumption in response to changes in relative prices. It is well known that, when prices are rising, the rise in the Laspeyres index will generally be greater than the 'true' price index. If, as in Denmark, a Laspeyres index is used for wage adjustments, the consequence may be that with rising prices the tendency will be to pitch wage changes too high.[1] This may be remedied by changing weights frequently.

The structure of the price index is such that more general changes in the productivity, or in the quantity of goods available, will have no direct effect on the price index – nor should they have such an effect except in so far as they produce changes in prices. The Danish price index, then, reflects changes in the prices of the goods and services consumed in 1948 by a representative number of households of wage and salary earners. It does not take into account the causes of the increase in the price index. Both rising export prices and rising import prices, for example, will generally lead to an increase in the price index, so that two widely different developments in the terms of trade may affect the price index in precisely the same way, notwithstanding the fact that they have different welfare implications.

The inclusion of taxes in the price index on which wage adjustments are based may counteract the effects of a given fiscal policy. If indirect taxes are increased to reduce consumption, for example, the effect may be counteracted by a corresponding upward adjustment of wages. Fiscal policy is consequently weakened.

Similarly, if a comprehensive old-age pension scheme is financed by an increase of taxes, the population groups whose wages are adjusted on the basis of the price index will be compensated for the tax increase. Or, to take another example, if the tension between East and West is so far eased that defence expenditure – and consequently taxes – could be reduced, it would seem absurd if wages were then reduced because the reduction of taxes depressed the price index.

While most countries do not include personal taxes in their price indexes, they do include indirect taxes. Surely it is equally

[1] See the Appendix.

absurd to include indirect taxes and personal taxes in the price index. The fiscal policy effect is the same whether taxes are indirect or direct, and both types of taxes finance the social transfers. Moreover, if only indirect taxes are included in the price index the State will by manipulating the relation between the amounts of indirect and personal taxes levied, be able to influence the price index, and through it wages, thereby directly relating fiscal policy and wage policy.

While the problem of including taxes has attracted some interest in Denmark, there has been no similar interest in the relation between the terms of trade and the price index. On the other hand, the problem of how to measure quality changes has been the subject of discussion during and after the war, and the conclusion was that there are no reliable methods of calculating these changes. The problem of making seasonal adjustments, e.g. for prices of vegetables, is also difficult to solve – at any rate in practice. Similar considerations apply to rent, particularly for owner-occupiers, and various theories have been advanced for the correct calculation of rent.

I shall now discuss the principal aspects of the problem of constructing a 'welfare index'. It is evident that different purposes call for different welfare indexes. It used to be common, for example, to use national wealth (at constant prices) per inhabitant as a measure of welfare. Now, changes in welfare are generally expressed by a flow concept, and it would therefore seem natural to use the national product at constant prices per inhabitant, or per person employed. This, however, cannot replace the price index, since national product at constant prices reflects only changes in the productivity and does not take price changes into account. In an adjustment of wages it is necessary to consider both criteria. If adjustments can be made for changes in productivity also, the wage agreements will more effectively reflect the relative bargaining position of the parties concerned. However, the national product (at constant prices) must first be adjusted for changes in the terms of trade and for changes in the annual crop compared with the normal crop, and gifts from abroad (such as Marshall Aid) will have to be taken into account.

Since for purposes of the welfare index it is desirable to adjust for changes in the terms of trade, the expression proposed by Geary may be used. Depending on whether there is an export

surplus or an import surplus, this expression will take the following form:

$$T' = M\left(\frac{1}{p_m} - \frac{1}{p_e}\right)$$

$$T' = E\left(\frac{1}{p_m} - \frac{1}{p_e}\right)$$

in which M and E are imports and exports, respectively, at current prices, and p_m and p_e the prices of imports and exports.

In addition it may be appropriate to make allowance for changes in the crop, for example, since a large crop will increase the national product in agriculture while a poor crop will reduce it. If no adjustment is made, the welfare will increase with a good crop and decrease with a poor one. It is not reasonable to take annual crop changes, due to weather conditions, into account in the construction of the welfare index. On the other hand, the general, and steep, increase which has taken place in the crop yield, and which must have influenced welfare, should not be eliminated. This may be justified by the argument that since the annual fluctuations in the crop yield do not reflect any change in productivity, the resulting gains or losses should be attributable to the farmers. Moreover, these fluctuations in the crop cancel out over a period. The general increase in crop yield, on the other hand, reflects an increase in productivity, from which the whole society, including the wage-earners, should benefit, since it is part of a general technological progress.

Finally, gifts from abroad should be included, since they increase either consumption or investment without any rise in our indebtedness to the rest of the world.

Thus, instead of adjusting the price index by means of a welfare index (national product at constant prices), we might *replace* the price index by another figure, namely net national product at current prices, which, of course, is a function of quantity as well as of price changes.

It will be seen, however, from what has just been said, that the national product at current prices itself requires adjustment for crop fluctuations and gifts from abroad. No adjustment is required for changes in the terms of trade, since the national product measures the value of output less raw and auxiliary materials consumed. If we assume, to take an example from agriculture, that selling prices of agriculture are falling, while

raw material prices are unchanged, this would *ceteris paribus* lead to a decline in agriculture's contribution to the national product at current prices; which is exactly what should be reflected, because this price change has reduced welfare. Adjustment for this by means of Geary's formula, given above, will involve duplication. Since national product is calculated on the basis of output prices, changes in productivity will be duly taken into account.

It might be interesting, with the background of the biennial wage negotiations in mind, to split up the adjusted national product for the current year into the following components:

(1) The part that corresponds to real product from the input side, i.e. the input of the factors of production at constant prices.
(2) The part that is due to changes in productivity produced by changes in the production process.
(3) The part that is due to productivity changes resulting from shifts between industries with different productivity.
(4) The part attributable to changes in the terms of trade.
(5) And finally, the part that is due to other price changes.

Such a breakdown should throw light on the reasons for wage adjustments.

For this purpose we require net national product at factor cost, i.e. excluding indirect taxes. The national product should be adjusted for changes in the size of the population, probably by relating it to numbers employed, so that wages per person employed will constitute a constant share of the average national product within the period covered by the collective agreement. On the other hand, the national product should not be related to the active population (employed plus unemployed), for an increase in the number of unemployed could lead to an unchanged national product per person employed – and unchanged wages; to include the unemployed in the denominator would lead to a reduction of wages. If more children are born, or if there is an increase in the number of old people, this should not influence the welfare index, either. The labour force (i.e. the employees) is the relevant factor of production, and should be paid in proportion to changes in employment and in the national product.

Net figures should, of course, be used for this purpose because depreciation reflects unavoidable costs which must be defrayed

in advance in the same way as the expenditure on raw and auxiliary materials, to give the product available for distribution to factors of production.

To show how different price changes have influenced some major Danish industries Table I gives price indices derived by dividing national product at current prices by national product at constant prices. The result is a unit value which illustrates the price trends relevant to the 'welfare indices' of the individual industries.

TABLE I

Price Trends in Certain Danish Industries

	Agriculture	Manufacturing	Building and construction	Shipping
1947	87	93	86	117
1948	98	96	94	112
1949	100	100	100	100
1950	101	110	107	116
1951	108	114	122	167
1952	117	117	131	156
1953	110	123	132	124
1954	109	123	137	121
1955	112	125	140	138
1956	119	129	146	161
1957	106	136	152	165

It will be seen that the terms of trade have been relatively unfavourable to agriculture and particularly favourable to shipping; the relative terms of trade have also been less favourable to manufacturing industries than to building and construction and shipping, for example.

The welfare index also covers changes in productivity. To give a rough measure of this, the national product at constant prices per worker employed has been shown for agriculture and manufacturing in Table II. These figures show that the relatively unfavourable trend in the terms of trade for agriculture has been largely outweighed by a great increase in productivity.

Some economists have considered that welfare indexes for the individual industries should be preferred to one general welfare index. To this it may be objected that the relative trends in the profitability of the individual sectors, caused, for example, by different trends in the terms of trade within the periods covered by wage agreements, should be borne by the individual

TABLE II

Factor Incomes in Danish Agriculture and Manufacturing

	Gross factor income in 1949 prices in agriculture (million kr.)	Number of man-years worked in agriculture	Gross factor income in 1949 prices per worker employed in agriculture (kr.)	1947 = 100	Gross factor income in 1949 prices in manufacturing (million kr.)	Number of employees in manufacturing	Gross factor income in 1949 prices per employee in manufacturing (kr.)	1947 = 100
1947	3,080	404,900	7,607	100	3,154	253,487	12,442	100
1948	3,042	399,750	7,610	100	3,542	266,617	13,285	107
1949	3,479	399,450	8,709	114	3,561	279,270	12,751	102
1950	4,112	393,300	10,455	137	3,827	301,905	12,676	102
1951	4,055	384,500	10,546	139	3,908	305,059	12,811	103
1952	4,239	375,800	11,280	148	3,735	293,511	12,725	102
1953	4,676	367,900	12,710	167	3,874	301,206	12,862	103
1954	4,335	358,950	12,077	159	4,221	313,338	13,471	108
1955	4,350	345,850	12,578	165	4,250	310,289	13,697	110
1956	4,515	334,100	13,514	178	4,309	308,316	13,976	112
1957	4,930	326,800	15,086	198	4,580	316,645	14,464	116

industries themselves. What can be taken into account are changes in the terms of trade which affect the Danish society as a whole – and this is achieved by using one welfare index. Permanent changes in the profitability of industries could not be taken specifically into account in wage fixing, as the workers' representatives will not attach importance to the special development of a single industry. If the terms of trade develop unfavourably to agriculture, it will not be possible to keep down wages in that industry when they are rising in the other industries. The result will then be – as we have seen over the last twenty years – that workers will migrate to the towns, and agriculture will intensify its rate of mechanization as agricultural wages rise.

It might be asked, should the wage adjustment be carried out *ex ante* or *ex post*? The problem is fundamental, and in my opinion it seems obvious that the adjustment should be made *ex ante*. In practice, this will mean that the Government will have to determine the size of the domestic product so as to meet specific requirements. This measure of domestic product should then be used in the adjustment of wages. It is to be expected that the Government would try to achieve an economic equilibrium, both wages and employers' incomes should be adjusted so as to allow for the expected output of goods and services. It must also be expected that the Government will try to realize the goal laid down in the national planning budget.

If the *ex post* domestic product should differ from the *ex ante* domestic product, as will normally be the case, it may be necessary, in countries of Western European type, to make an *ex post* adjustment, but such an adjustment would to some extent render the *ex ante* adjustment illusory. If it is desired to restrain tendencies of inflationary character the *ex ante* valuation should determine the domestic product in such a way that the inflationary tendencies will be counteracted. Naturally, it is only possible to carry out such a policy when the domestic product is determined *ex ante* and not *ex post*. By an *ex ante* adjustment it will thus be possible to make wage policy an integral part of economic policy.

An *ex ante* adjustment of wages will naturally be easier to carry out in a centralized economy, where the Government has direct responsibility for wage policy. Where, on the other hand, the adjustment of wages is left to employers and wage-earners,

it will be much more difficult to combine wage policy and general economic policy.

By using an *ex ante* valuation for the adjustment of wages it will be possible to alleviate the effects of an adverse change in the terms of trade. In the *ex ante* valuation of the domestic product allowance will be made for the change in the terms of trade, and this will influence wage adjustments. In this way it will be possible to alleviate the effects of a price rise in the rest of the world. Finally, it may be claimed that an adjustment of wages by means of the domestic product is rational from a productivity point of view also.