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# COMMENTAIRES

## Wage Comparisons and Productivity

E.F. BEACH

In these days of rising prices and wages, the use of guide lines is inevitable. They may be imposed by governments or they may be used to test relative progress. In either case it is important to know what can and what cannot be expected of the data available. Official series on wages and salaries paid, for example, are weighted averages, and have all the weaknesses of such averages.

It is well known that a weighted average can change because of a change in weights, without any change in the elements weighted. Demographers have learned to stabilize weights so as to measure net reproduction rates. Students of index numbers have long wrestled with the problem, and have found no simple solution. Professor Marion <sup>(1)</sup> has made an interesting contribution in the field of wage comparisons, but in not pursuing the analysis far enough, he leaves some misimpressions.

Consider a group of labourers, all doing the same kind of work, and all getting the same rate of pay. Each rate is then identical with the average. As new men are added, and old men retired, the members of the group change, but this has not effect on the wage rates. They all rise or fall together.

Consider now, a second group, such as Professor Marion pictures, in which there is a regular progression toward the top jobs. The total number of employees, and the relative numbers in the sub-groups, remain unchanged. The retirement of one person is offset by a new hiring plus a number of shiftings up the ladder. It may be noted that each employee appears to enjoy an increase in salary greater than the average, which is unchanged. The retired worker is no longer counted in the group of employees, and no account is taken of pension payments. Of course, the salaries could include all fringe benefits.

Statistical theory teaches us that it is impossible for all members of a group to be greater than the average of that group, <sup>(2)</sup> and a little reflection

<sup>(1)</sup> Gerald MARION, « Relations entre les augmentations statutaires et les redressements généraux de salaires ». *Relations Industrielles* Vol. 23 (1968) No. I, pp. 109-122.

<sup>(2)</sup> But see below for a discussion of weighted averages. This rule applies to un-weighted averages, and to averages with fixed weights.

shows that there are indeed two different distributions. The average wage is constant from one period to the next because the numbers are the same at the two dates. But in considering changes for individuals, the proper distribution is the group of all changes that have occurred between the two dates, including the new hirings and the retirements. Those who have retired have had a total loss of employment income, and their losses offset the gains of all the others. This is a negatively skewed distribution, with a few large losses offset by many more gains of smaller amounts. In this special case the average of the changes is zero, <sup>(3)</sup> and so also is the change in the average ; but they are two different things.

In any actual group of employees, a comparison of two dates will show some new hirings, some retirements, some promotions, perhaps some shifting to different jobs, and the rest unchanged in their jobs. Some jobs will have their rates changed, and others, perhaps not. To measure the general average change under these circumstances is a statistical problem of considerable magnitude. Some people feel that no general comparisons are possible. The real problem is that many comparisons are possible, some of which are ridiculous, absurd, or misleading, and others which may be quite good indeed.

The purpose of the comparison should be defined. If the situation is one at a bargaining table, and the question to be settled in the first instance is the amount or rate of increase there has been in the group, the problem then is to find a suitable measure of the change in the average. Two sets of weights could be used to compute two kinds of weighted average, one using the weights as of the beginning, and the other with the weights as at the end of the period. These will, in general, result in two limits within which an agreement may be hoped for by some method of averaging the two averages. Or it may be agreed that certain key groups are to be used as a basis for the comparison.

A different kind of purpose is to show « what happened » over an extended period. Several series could then be computed under different assumptions, and their implications analyzed. The weights should be examined — that is, the numbers in the various categories. If there has been no appreciable change in these weights, good answers may be obtained, at least for a part of the whole period. In order to test the effect of changes in weights that have taken place, various computations could be made. If data on the weights are inadequate, inferences may be drawn from related data. In general it can be expected that there will be a gradual shift in the weights from the lower paid occupations to the higher paid occupations, in broad industrial groups, over longer periods. <sup>(4)</sup> This shift implies that the

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<sup>(3)</sup> The average used here is, of course, the arithmetic. A geometric mean of relative changes, need not be zero.

<sup>(4)</sup> There can be strange perverse movements within firms and industries in short periods.

actual weighted average series will tend to increase more than the individual wage rates themselves.

There seems to be no simple way of measuring general wage changes when the wage rates of the sub-groups as well as their relative sizes are changing, although under favourable circumstances some good approximations may be made. It may not be possible, then, with any precision, to separate the individual changes from the general changes in income. When it is possible, it may be noted that these elements are simply additive in dollar terms. It is only in relative terms that there appears another term which Professor Marion suggests might be analogous to the « reaction » term in the analysis of variance. In support of Professor Marion's method it should be pointed out that many changes are expressed in relative terms. However, the « reaction » term may be interpreted as merely a hint of difficulties that can arise when changes are measured in relative terms.

So much for the statistical questions. Professor Marion introduces some economic theory into the interpretation, and makes a serious error. He suggests that in using an index of productivity as a guide for wage changes, a downward adjustment be made to account for promotions and shiftings of labourers from job to job. His suggestion implies that there is no real contribution to productivity in these job changes. This is surely contrary to fact. When a new management takes over an enterprise to increase its productivity, one of the first things it does is to shift the personnel around, taking labourers off of less productive jobs and putting them on more productive jobs. Less remunerative lines of production are discontinued in favour of more remunerative lines and workers are shifted accordingly.

Similarly in the economy as a whole, when a labourer leaves a farm for a factory he is recognizing that society is valuing his productivity at the factory in higher real terms than his contribution on the farm. One may quarrel with the valuations which society puts on these things, but the calculations of the G.N.P. take things as they are.

When a man is promoted to a new job, the presumption is that he is selected because of his abilities to fulfill this more demanding job, with its greater responsibilities, need for more training or experience, etc. The man will presumably be more productive in this new job and is paid more in recognition of the fact.

It is true that some promotions and increases in salaries are given for other reasons. In top positions this can be a form of distributing company profits. In lesser positions it may be a recognition of long service and loyalty. However, insofar as competitive pressures prevail, the most successful enterprises will be those who select for promotion on the basis of ability, and pay the market rates. Under such circumstances, there should be no adjustment such as Professor Marion suggests.

In personnel administration, job evaluation has long been practised to assure that wages are in fair relation to the requirements of the job, and personnel evaluation to fit men into appropriate jobs. <sup>(5)</sup>

Situations can arise where the rigidities of systems of evaluation must give way to outside market forces. <sup>(6)</sup> In the long run the fundamental question is whether there are people to perform the job. The rules of supply and demand are the fundamental determinants, so long as people are free to move <sup>(7)</sup> and questions of equity enter in two subsidiary ways: (1) In judging whether the supply of workers will be adequate, one must evaluate the work and the conditions. But the equity that counts is the valuations by the workers themselves as to whether or not they will do that work for that wage. (2) The laws of supply and demand sometimes work slowly, and workers with very specific training and commitments are slow to move. The economic laws can be very cruel to those caught unprepared and through no fault of their own. Society must be prepared to assist when industry cannot do what is needed. This implies early pensions, re-training plans, moving allowances, etc.

An interesting illustration is the case of the airline pilots who have built into their contracts some adjustment factors based on the speed of the planes, etc. Thus, when scientists and engineers build faster planes, and managers see that they are used properly, the pilots benefit even if the cabins are better ventilated and more comfortable and electronic devices make the controlling problems easier.

Such indexes are, in a sense, at two removes from fundamental principles. If the speed of the plane is directly related to the difficulty of the work and the responsibility of the pilot so that his real work increases in proportion, then it has a strong claim for recognition. But even if this is true, the next question remains: Are there enough people wanting to do this job for this amount of pay? If there are too many, then the pilots are creating a monopoly arrangement. On the other hand, if the skills required are so rare and the training needed is increasing so much that there is great difficulty in getting adequate numbers of recruits, perhaps the pay should be increased even more rapidly. Alternatively, or in addition, more money might be put into recruitment and training. The fundamental question is then one of supply and demand. Questions of equity are related, but in a subsidiary position, from the point of view of the efficient use of resources in the economy. Of course, from the total view of society, reasons of equity are very important — indeed so important that there are times when we should give up a little efficiency for a little more equity. We should realize when we are making this trade-off.

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<sup>(5)</sup> See, for example, Paul Pigors and Charles A. Myers, *Personnel Administration* McGraw Hill.

<sup>(6)</sup> *Op. Cit.*, 5th ed, 1965, p. 487.

<sup>(7)</sup> There are various kinds of restrictions on such movement, some of them justified for reasons of professional qualifications, etc., but many imposed mostly for monopolistic protection purposes.