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THE BEHAVIOR OF INCOME SHARES

Selected Theoretical and Empirical Issues

Introduction

CHARLES L. SCHULTZE AND LOUIS WEINER

THE Conference on the Behavior of Income Shares held in New York in April 1961 covered a wide range of issues and approaches. The first three papers by Scitovsky, Lebergott, and Solow are devoted to a general consideration of the determinants of factor shares in the long run. The first paper is primarily a survey of current theory; the latter two include considerable empirical material as well. The paper by Schultze is also a theoretical and empirical paper, but it deals with short-run movements in shares and emphasizes the impact of cyclical changes in shares on the movement of output. In the fifth paper, Simon Goldberg provides a comprehensive study of long-run income shares for the Canadian economy, and a supplement by Frank Leacy analyzes the short-run fluctuations. The final two papers take up special problems: Michael Gort is concerned with the conceptual and measurement problems of factor shares by industry and George Borts copes with the difficult issues involved in estimating income produced on a state and regional basis. A number of positive contributions were made by the discussants, many of whom went beyond a critique of the main papers, introducing new approaches and in some cases new data. In summary, the conference made much progress in particular areas, but many basic problems of theory, of concept, and of data adequacy remain unresolved.

In the opening paper of the Conference, Scitovsky surveys the major competing theories of income distribution. As he points out, there are four possible subjects that theories of income distribution could deal with: the distribution of income by occupations, by size, by factor shares, and by the income categories of the official personal income accounts. It is with the third classification, functional distribution, that Scitovsky is mainly concerned. Two different streams of theory can be distinguished in the literature dealing with functional income distribution. The first concentrates on the individual decision processes of business firms and factor suppliers. It is consequently microeconomic in orientation, and usually, although not universally, oriented towards a marginal productivity approach. The second major stream of theory, currently represented by

NOTE: We wish to acknowledge here the substantial contribution made by Stephen P. Taylor.

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the work of Phelps-Brown and Kaldor, is macroeconomic in character, and is based upon an aggregate, Keynesian-type framework.

Scitovsky further subdivides income distribution theories into those which treat the short-run change in factor shares and those which attempt to explain the (alleged) long-run constancy of shares. After examining the various reasons given in the literature for the countercyclical movement of labor's share in national income, Scitovsky devotes his major attention to the theories which attempt to deal with the relative constancy of shares in the long run.

The first of these is the marginal productivity theory. The chief feature of this approach is its reliance upon factor substitution and downward sloping demand curves as an explanation of relative stability of shares. Since prices and quantities are assumed to move in opposite directions, some stability in shares is guaranteed. Indeed Bronfenbrenner has shown that constant elasticities of substitution substantially different from one are consistent with relatively moderate changes in shares. Further, the direct impact of relative prices on factor substitution is reinforced, indirectly, in the goods market; as relative factor prices change, the relative prices of goods change, inducing substitution towards those goods employing relatively more of the cheapened factor. The mutual interaction of relative prices and factor quantities may be expected to operate in the assumed manner, however, only in periods of full utilization of resources. Scitovsky further points out that the occurrence of technological progress of a nonneutral character can result in changing factor shares, even if all the other assumptions of the marginal productivity theory are met.

The basic characteristic of macroeconomic theories is that they utilize the identity, $P/O = (P/K) \cdot (K/O)$ (where $P =$ property income, $K =$ capital stock, and $O =$ output) to explain the stability of factor shares. If any two of these ratios can be shown to be constant, the remaining one is, by necessity, constant. The theories of Kaldor, and Phelps-Brown and Weber, each of whom uses some variant of this approach, are examined in turn. The chief problem of course is the determination of which ratios are fundamental, and which derived. Further, it is indeed possible that one or more of the above ratios may be more appropriately explained by the combined effect of factor substitution and technological change, as in the microeconomic theories.

In commenting on Scitovsky's paper, Edward Denison raises the point that the venerable "constants" so often cited in the literature, P/O, P/K, and K/O must refer to the same conceptual framework. Each time one of the above numbers appears in the ratios, it must be the same number. However, the first two ratios are customarily in current dollar terms, whereas the final ratio, the capital-output ratio, is usually cited in constant dollar terms. To preserve consistency, a fourth ratio—the price of capital goods divided by the price of national product—must therefore be introduced. Denison then goes on to point out that there is no set of definitions of the various numbers, which uniformly applied, will allow all three ratios to show long-term stability in the United States. Hence, says Denison, these arguments which purport to explain long-run constancy of the various ratios, are attempting to explain a nonexistent phenomenon.

As if in reply to Denison, Modigliani opens his comment on Scitovsky's paper with the observation that "the task of explaining the stability [of factor shares] is such a fascinating and challenging game that it is hard to resist, even if the stability is after all a figment of somebody's imagination." Modigliani calls on his own theory of saving, as a major aid in the explanation of long-run share stability. As he points out, any explanation of factor shares must involve capital-output relationships, which in turn cannot be explained in the absence of a theory of saving. The Modigliani-Brumberg saving hypothesis embodies a relationship between the saving rate and the ratio of wealth to income. This relationship is such that a constant exponential growth rate of income and a constant interest rate produces a rate of wealth accumulation equal to the rate of growth in income; i.e., K/O, looked at from the supply of capital side, will be constant. Similarly, on the demand side of the market for capital, if technological progress is neutral and occurs at a relatively constant rate, then a stable interest rate implies a constant K/O ratio, and a constant exponential rate of growth in income. But with the market cleared at a constant capital-output ratio and a constant rate of return to capital, factor shares will also be constant. This is indeed a fascinating explanation of what both Denison asserts and the data in Kuznets' *Capital Formation* show to be a "figment of somebody's imagination."

Stanley Lebergott's paper on "Factor Shares in the Long Term" approaches the problem of the constancy of shares from a com-

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pletely different viewpoint. The share of national income flowing to wages or against capital is a function of the quantity and price ratios of the two factors. But, says Lebergott, the quantity ratios are themselves a function of price ratios in an earlier period. Lebergott then proceeds to cite the reasons why the price of capital service must "bear a constant long-term proportionality to that of labor."

In a competitive economy, long-run changes in wage rates will be approximately equal in both capital goods producing and capital goods using industries. Moreover, historical experience suggests that productivity gains in the two groups of industries have not been so different as to make their wage costs diverge significantly. Hence the capital service prices and unit wage costs have maintained a more or less unchanged relationship. This is the chief reason, says Lebergott, to expect that share ratios should not have changed drastically.

Unit labor costs, however, as Jack Alterman points out in his discussion of Lebergott's paper are not the "price of labor"; hence the constancy of the relationship between capital goods prices and unit labor costs does not reflect a constant relationship between the prices of the two factors. Waiving this point, proportional movements in the price of capital goods and unit labor costs will not result in constancy of labor shares unless the capital-output ratio and the rate of return on capital remain unchanged (or change in opposite directions by proportionately equal amounts). But given continuing changes in production functions and steady increases in the capital-labor ratio, what factors explain constancy of the capital output ratio and the marginal product of capital? These questions drive us back once again to consideration of "neutrality" of innovations, the elasticity of substitution, and shifts in product mix—precisely the kinds of considerations which Lebergott set out to avoid in his approach to the problems of factor shares.

In the second and empirical part of his paper Lebergott carefully examines the nature of the factor share data during the period prior to 1919, and concludes that we have little evidence on which to base any firm conclusion about the constancy of shares during that period. Many of the techniques used to construct income data during these early years almost guarantee stability in shares. Moreover the frequently cited conclusion,

based on studies of Simon Kuznets and Gale Johnson, that the labor share has increased since these earlier years is found by Lebergott to be without substantial foundation. Most of the rise comes in the single year between 1919 and 1920, and Lebergott points out that the particular assumptions used in constructing entrepreneurial income—whose decline explains most of the change—appear to be unreasonable. Using alternative techniques, Lebergott produces a series which shows little change in share between the two years. Since 1919 is used as a link year between earlier and later time series, this revision largely eliminates the long-run increase in labor shares.

Lebergott concludes that the problem of factor shares is almost hopelessly complicated by the problem of disentangling the labor and capital components of entrepreneurial income. Neither of the two commonly used techniques for making this split provides realistic answers. We can neither assume that the rate of return on capital in the unincorporated sector is equal to that in the corporate sector, nor that the return to entrepreneurial labor is equal to that of employees. Hence, analyses of factor shares might be more appropriately confined to those sectors, like manufacturing and public utilities, where the unincorporated business component is small.

One promising step in this direction is taken by Alterman who develops an analysis of factor shares for the corporate sector of the economy. Here the problem of allocating entrepreneurial income does not arise. After adjusting corporate profits for the effect of accelerated amortization and changing methods of depreciation, Alterman finds that factor shares on net corporate income were almost exactly the same in 1922–29 as in the period 1947–59. If adjustments were made to place depreciation on a replacement cost basis, however, the property share would presumably have fallen.

Further refinement of data for the corporate sector, including the development of longer-term historical series on corporate capital stocks, output, and labor productivity, may furnish insights into the determinants of factor shares which cannot be gained by working with aggregate national income data, complicated as the latter are by the problem of allocating entrepreneurial income.

With Robert Solow's paper "Capital, Labor and Income in Manufacturing," the focus shifts from statistical description of

income distribution to an attempt to measure the long-run under-
pinnings of factor shares as stated in production functions. His
emphasis is on substitutability among factors in production; if
factors are paid according to their marginal productivities, long-
run distribution of total income hinges on the degree to which
one type of input can be substituted for another to equalize
marginal gains. As Solow points out, production functions do
not determine income distribution by themselves, since structure
of demand acts on the other side of the market to influence
product mix and hence the mix of production functions actually
used. Nonetheless, he chooses to look at production functions
alone. The paper is an extension of his earlier work with Arrow,
Chenery, and Minhas on a form of production function more gen-
eral than the Cobb-Douglas form. Both forms assume constant
elasticity of substitution among factors, but Solow's allows that
elasticity to be of any value, whereas Cobb-Douglas implies that it
be always unity; the Cobb-Douglas form is, in the algebra, a spe-
cial case of the broader function used by Solow.

Using both cross-sectional data for U.S. regions and time-series
information, Solow undertakes to measure all of the parameters
of his model for manufacturing industries, basing the calculation
on a sequence of assumptions concisely listed by Eisner in his
comment on the Solow paper. The results of the calculation are
far from conclusive, however, since the regional material yields
a wide scatter of estimates of substitution elasticities that tends
well above others found in international comparisons. Eisner's
comment is itself a real contribution in its discussion of the
reasons why Solow's estimates of elasticity should be expected
to be biased upward to the extent that short-run disturbances
are reflected in the figures. Terleckyj points out that Solow's
assumption of constant elasticity of substitution across time is
not an essential ingredient of the calculation and that the proce-
dure can in fact be used to estimate movements or trends in
substitution elasticity.

In another comment, Kendrick offers an alternative set of
estimates for elasticity of substitution in manufacturing. Using
two points in time—1953 and 1957—rather than cross-sectional
data, he produces a set of figures that are in general well below
Solow's and more consistent with one another.

Charles L. Schultze's paper on "Short-Run Movements of

Income Shares," like the Solow one, is very much in the contemporary econometric fashion. Throughout the paper the underlying concern is with the short-term stabilizing effects of cyclical shifts in corporate profits and corporate saving, so that attention is directed mainly to corporate profits, defined as before tax and inclusive of depreciation allowances. Schultze "attempts to provide a set of functional relationships which illuminate the factors affecting cyclical shifts in income distribution. The orientation, however, is not mainly towards an explanation of short-run shifts in the distribution of income for its own sake. Rather it concentrates on those aspects of the income distribution process which themselves affect the level and rate of change in income and output."

The share of retained profits in private nonfarm GNP is viewed as equal to the product of three independent ratios: (1) gross retained profits to gross profits; (2) gross profits to profits originating in corporations; and (3) gross product originating in corporations to private nonfarm product.

Basically, Schultze accepts the Lintner hypothesis on retained profits relative to total profits; i.e., dividends are essentially a function of a weighted moving average of past profits, with the current profits term receiving only a small weight.

With respect to gross profits as a share of corporate gross product, Schultze's hypothesis is that it is composed of a trend (time) component and a "cyclical component, which responds to deviations in corporate product from its full capacity 'norm.' This component has zero value when corporate product is at its normal full capacity level." Conceptually, Schultze views "normal full capacity" as the point of minimum average unit costs. In practice he necessarily settles for something different. An equation incorporating a time trend and deviations from "normal full capacity" was fitted to data for the years 1922–41 and, on a quarterly basis, for relevant subperiods from 1948–59.

On the corporate share of total private nonfarm product, Schultze tests the hypothesis that "as output falls below capacity (estimated similarly to corporate capacity) the proportion of output originating in the corporate sector tends to decline; the opposite occurs as output rises relative to capacity." Here, in contrast to the coefficients for the relationship between the corporate profits share and deviations from normal full capacity,

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which was fairly stable among cycles, "the coefficient seems to be smaller, the larger the amplitude of cyclical fluctuation," suggesting to Schultze the probability that the true relationship is nonlinear.

With this basic approach, Schultze comes up with a great variety of correlation coefficients, slopes, and elasticities and a wealth of comment on his various hypotheses and their relevance for short-run changes in output and incomes.

Bert G. Hickman, in a penetrating and constructive discussion, raises some questions about the basic Schultze hypothesis that the profits share is positively related to the level of capacity utilization. Thus, why should the profit share fall below normal for output deviations on either side of normal capacity, since normal capacity has been defined as that level of output for which average unit cost is a minimum. Hickman discusses the conceptual issues and reviews a variety of possible explanations for the high positive correlations which Schultze actually obtained. A number of cogent comments are made on the empirical measurement of capacity and its effects on numerical estimates of the marginal response of profit to output.

The paper by S. A. Goldberg on "Long-Run Changes in the Distribution of Income by Factor Shares in Canada" represents the first comprehensive study of factor shares for Canada. The paper is distinguished by the meticulous care with which the available data are handled and by the careful manner in which the main conclusions are formulated. The main long-term comparison is between the average of the years 1926–30 and 1954–58, but data are presented for all intervening years. In addition, new data on domestic income and wages have been compiled and are presented for the period 1919–25.

The main emphasis is on the wage share. The wage share of domestic income increased from 56.7 per cent of domestic income in 1926–30 to 66.2 per cent in 1954–58, a rise of 17 per cent—mostly since 1953. The shift was largely at the expense of unincorporated income, a fact which raises the difficult question of the labor share of such income. The stability of the investment share reflects a rise in corporate profits and a decline in other investment income.

A more detailed analysis is made of factor shares, particularly the wage share, in private business product. Here, the impor-

tant finding is that the rise in the wage share is greatly reduced when allowance is made (1) for interindustry shifts (of which the declining importance of agriculture is the most important); and (2) for the shift from the unincorporated to the incorporated form of business organization. According to Goldberg, "the most reasonable conclusion perhaps is that the rise in the standardized (i.e., adjusted for interindustry shifts) wage ratio in the corporate portion of the economy from 1926–30 to 1954–58 was positive but considerably smaller than the 8.7 per cent (from 61.2 to 66.5 per cent) of the total nonfarm private business product." Analysis of the new data for 1919–25 provides "further doubt that trend significance can be attached to the increase in the wage ratio from 1926–30 to 1954–58 after removal of the effect of the changing relative importance of constituent industries." This finding is quite similar to that of Lebergott in his discussion of the U.S. data for the same period.

F. H. Leacy contributes a "Supplement on Short-Term Fluctuations" to the Goldberg paper. On the whole, both annual and quarterly data (for the postwar period) indicate that wages and salaries show less cyclical variation in percentage terms than does total product, while corporate profits after I.V.A. vary more. In general, but subject to differences among industries and to differences among cycles, the wage share tends to move opposite to the cyclical movement of total product.

M. C. Urquhart in his discussion of the Goldberg paper stresses that "while there is some presumption that the share of labor income in the economy as a whole may have risen very moderately in the last forty years, it is not yet clearly evident that this is so." In part, this conclusion is based on an interpretation of the evidence Goldberg has presented. In addition, Urquhart raises questions about the possible importance of the fact that prices were falling in 1926–30 and rising in 1954–58 and about reliability of the estimates of capital consumption allowances. E. C. Budd's discussion provides an extended comparison of Goldberg's conclusions for Canada with comparable data for the United States. He finds a very close correspondence between the two countries in the rise in the wage share since 1926, but important differences in behavior of the other shares. Budd extends his comparative analysis to make allowances for interindustry shifts and to the shift from noncorporate to corporate.

He concludes that for both countries "a substantial part of the rise in the wage share was due to the relative decline in agriculture"; he attributes relatively minor influence to other output shifts or to the shift from the noncorporate to the corporate form of business organization.

Michael Gort's paper takes up the problems of measuring factor shares from production in individual manufacturing industries. After reviewing the main conceptual ambiguities he considers the ubiquitous problem of multiple-product lines within single establishments and the extent to which these might blur the estimates for the primary products of each industry. On the basis of simple but plausible assumptions he is able to indicate the possibility of sizable influences of secondary products on the over-all distribution of industry income. Isolation of earnings associated with separate products significantly broadens the variation of calculated capital returns among products.

Robert Williams points out two problems in Gort's form of calculation. First, Gort's results require an explanation of why manufacturers earning high returns on primary products would be engaging in lower-yield secondary products at all. Second, perhaps part of the explanation of the first, is that the wide variation among firms in earning power within industries probably occurs in secondary as well as primary product lines, leading to the conclusion that over-all returns for an industry may be more indicative for primary products than Gort's adjusted yields.

George H. Borts' paper on "The Estimation of Produced Income by State and Region" represents a pioneer study, and, as such, it deserves and receives praise from Daniel Creamer, Robert E. Graham, Jr., and Werner Z. Hirsch who discuss it. However, as is often true of pioneer studies, heroic assumptions are involved in piecing together the results, and a number of these assumptions are criticized.

Borts creates, for the first time, state estimates of income produced, as distinct from income received, for nine major industry divisions. (State estimates of income received are regularly compiled by the National Income Division of the Department of Commerce.) His estimates are made for two years, 1929 and 1953. The major problem in measuring "produced" income on a state basis is to estimate the returns to capital and entrepreneurs; available estimates of compensation of employees, which con-

stitutes the remaining (roughly 70 per cent) income, are taken as appropriate for his income concept.

Creamer, Graham, and Hirsch are all critical of the methods used to estimate what Borts calls net entrepreneurial income (N.E.I.). Borts himself, of course, acknowledges the data limitations for such an effort and suggests some changes in current methods of data collection in order to provide current estimates of produced income on a state and regional basis.

Creamer makes a rather devasting criticism of the methods used to estimate N.E.I. in manufacturing industries by states, revealing an apparent flaw in Borts' use of *Statistics of Income* (Internal Revenue Service) data to adjust Census value added data. Since Borts states that his estimates for manufacturing are among his most reliable, the reliability of his estimates for other industry sectors is clearly brought into question.

Graham raises some rather cogent questions about the measurement of N.E.I. "produced" on a regional basis: do profits originate where a company's capital equipment is located, where its sales are made, or where entrepreneurial decisions are formulated? Graham comments that "much thinking along definitional lines remains to be done in order to formulate a satisfactory set of concepts before we get into the measurement phase of the geographic distribution of income produced."

Borts finds that produced N.E.I. is distributed more equally and far differently than received N.E.I., and he shows that extraordinary shifts in the relationship of produced to received N.E.I. took place between 1929 and 1953. Hirsch properly complains that Borts provides few answers as to the reason for the differences in the ratios in either year and for the shifts between 1929 and 1953. Hirsch in fact questions whether certain of these differences can be accepted in the light of what appear to him to be reasonable hypotheses.

Altogether, Borts' contributions to the subject is indeed impressive, both in terms of its evidence of painstaking labor in evolving his estimates and in suggesting some of the imaginative analytical uses to which such estimates could be put. Clearly, however, much needs to be done, along both conceptual and statistical lines, to promote reliable regional estimates of income produced.

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