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pendent variables, but in most cases there was no additional explanation of the dependent variable after allowing for the loss of one more degree of freedom. In general, it may be said that part of what we here call income elasticity may reflect increased urbanization.

CHANGES IN PRODUCTIVITY

In Table 6 we saw that given the assumptions stated earlier, little or none of the shift of employment in services could be explained by differential rates of growth of output. It follows, therefore, as a matter of accounting, that most or all of it must be associated with differential rates of change of output per man. Table 7 shows these differentials under both assumptions about real output.

It should be noted that the simple arithmetical partition of changes in employment into changes in output and output per man has certain limitations. There are causal relations between changes in output and changes in output per man; they cannot, therefore, be treated as completely independent factors. Relative gains in output per man may result in changes in relative prices. This will affect output shares because the quantity demanded is not likely to be completely inelastic with respect to price. On the other hand, relative shifts in output can affect output per man through economies of scale and the stimulus to technological change. The large difference between the differentials for these two variables, however, suggests that additional information about possible interactions between them would not alter the major conclusions.

That output per man grew much faster in goods than in services is clear beyond doubt, and that this differential largely or entirely accounts for the differential change in employment is also clear. Perhaps the most interesting implication of Table 7 comes from the last column, which shows that there was a very substantial difference in sector rates of growth of output per man even when we use a measure of real output that assumes output per unit of total factor input to have grown at about the same rate in both sectors.[12] The large differential in output per man that remains under this assumption must be explained by factors other than "productivity" (defined as efficiency in the use of all resources).

TABLE 7

SECTOR DIFFERENTIALS IN RATES OF GROWTH OF EMPLOYMENT AND REAL OUTPUT PER MAN, 1929–63

(Per Cent per Annum)

Sector Differential	Employment ($E_s - E_g$)	Output per Man Assumption I ($A_s - A_g$)	Output per Man Assumption II ($A_s - A_g$)
Service minus goods...	1.7	−1.8	−1.3
Service minus goods*..	1.0	−1.3	−0.9
Service* minus goods..	1.4	−1.7	−1.0
Service* minus goods*.	0.7	−1.3	−0 6

Notes and source: Same as Table 6. A = average annual rate of change of real output per man.

These other factors include differential changes in hours per man, in the quality of labor, and in capital intensity. In 1929, workers in the service sector tended to work longer hours than those in the goods industries. By 1963 this difference had disappeared. Assuming that the extra hours made some contribution to output, this change must account for part of the differential trend in output per man.

There is considerable evidence that after 1929 the ratio of capital to labor and the average quality of labor rose faster in the goods sector than in the

[12] See p. 9.

service sector.[13] What we do not know is whether this was the result of sector differences in the pace and character of technological change or a response to changes in relative factor prices.

CHANGES IN RELATIVE FACTOR PRICES

Two major long-term changes in relative factor prices in the United States should be considered. One is the rise in the price of labor relative to the price of capital; the other is the rise in the price of unskilled labor relative to skilled labor. All industries would be expected to react to these changes by substituting the less expensive for the more expensive factor, but there is no guarantee that the ability to substitute (i.e., the elasticity of substitution) is the same in all industries. It may be that the goods industries found it easier to substitute capital for labor and skilled labor for unskilled labor. To the extent that this was true, the goods sector's share of total employment would tend to decline.

The question is further complicated by the fact that, even if the elasticities were the same in both sectors, and no technological change is assumed, there remains an a priori case for believing that changes in relative factor prices would alter employment shares. This is because the distribution of factors was not the same in the two sectors.

On average, it may be said that inputs of unskilled labor and physical capital were relatively more important in goods-producing industries and skilled labor was relatively more important in services. Of the three factors, the price of unskilled labor has probably risen the most, the price of physical capital the least. Given certain assumptions concerning the elasticities of substitution between factors in both sectors, it can be shown that the service sector's share of total employment would tend to rise as a result of the changes in relative factor prices and the uneven distribution of factors in the base period.[14]

Thus far I have considered only changes in relative factor prices that were experienced equally by both sectors. But what if factor prices did not change at the same rate in both sectors? What if the price of labor, and especially of unskilled labor, grew more rapidly in the goods sector than in the service sector? The result would probably be a greater substitution of physical capital and skilled labor in the former and, therefore, a shift of employment shares to the service sector.

Two important changes in the economy since 1929 suggest that this differential change in relative factor prices actually occurred. The first is the growth of unions in goods but not in service industries. Between 1929 and 1960, the degree of unionization in the goods sector rose from 11 per cent to 48 per cent. Change in the service sector was from 1 per cent to 7 per cent.[15]

The newly organized industrial unions in automobile production, steelmaking, coal mining, and so on worked to raise wages in those industries, and in particular tended to concentrate on raising wages for unskilled and semiskilled labor. The unorganized service industries did not face the same bargaining pattern.

A second development, working in the

[13] See Fuchs, *Productivity Trends*, pp. 23–30, 35, 36.

[14] It is assumed that the constant Allen partial elasticities of substitution are the same between each pair of factors and the same in both sectors. I am grateful to Richard Auster of the Massachusetts Institute of Technology for the mathematical proof of this theorem.

[15] Calculated from data in H. G. Lewis, *Unionism and Relative Wages in the United States* (Chicago: University of Chicago Press, 1963), p. 250.