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WAGES AND LABOR INCOME IN HISTORY: A SURVEY•

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Abstract

Income distribution has been a main topic in economics since the days of Gregory King and William Petty. In this paper some empirical issues in the study of labor income are surveyed in the light of economic history, including the hypothesis of the stability of factor shares across time and space and the relative importance of raw labor and human capital in labor income.

Key words:Wages, Labor Income,, Factor Shares.

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Income distribution has been a main topic in economics since the days of Gregory King and William Petty. For the classical economists, as Irving B. Kravis (1962) noted, the distribution of income among the suppliers of labor, land, and capital was the most efficient indicator of the relative welfare of different social groups. Thus wages, profits and rents represented the income of workers, entrepreneurs, and proprietors respectively. Such a direct identification of social groups with particular types of income cannot, however, be made so readily for the recent past. The remuneration of production factors is today central to the various kinds of studies. As Alan B. Krueger (1997) pointed out, factor shares can be used to (1) describe the functional distribution of income, (2) estimate the factor shares in the aggregate production function, and (3) infer the division of rents between workers and firms.

The largest share of national income is the labor's share, and within labor income the most important component is wages, though labor income includes other kinds of labor remunerations in addition to wages. In the following sections some empirical issues in the study of labor income are surveyed in the light of economic history, including the hypothesis of the stability of factor shares across time and space and the relative importance of raw labor and human capital in labor income.

The historical study of labor income

How the income of owners and the self-employed should be treated in the labor-capital dichotomy has provoked a great deal of controversy over time. Jean-Baptiste Say and Richard Cantillon held that the remuneration of owners and the self-employed was a return for the risk of their activities. However, classical economists considered that the remuneration of business people was simply a return for capital previously invested. Hence for physiocrats and classical economists the remuneration of owners should not be

considered in labor's share but in capital's share. In a sharp contrast, Alfred Marshall was the first economist to point out that a part of the income earned by self-employed workers and owners is a compensation for their work, while another part represents a return on investment and risk or simply economic profit from their entrepreneurial activities. Marshall's argument is widely accepted today in the standard analysis of income shares. Its implication is that, in the functional distribution of income, labor's share should include not only the compensation of employees but also the opportunity costs of the work of proprietors, unpaid family workers, and the self-employed.

According to theUnited Nations' publication *System of National Accounts* (1995), the compensation of workers includes wages, piece payments, salaries (cash and in-kind), tips, bonuses, fringe benefits, commissions, and employer contributions to social security programs, pension schemes, health plans, and other benefit packages. Lack of evidence often prevents historians from measuring labor income correctly, though some historical studies that succeeded in quantifying the main components of labor income can be cited. A good example is provided by Robin C.O. Matthews, Charles H. Feinstein and John C. Odling-Smee's study of Britain, in which they estimated four main components in labor's share: wages, salaries, the part of self-employed income that rewards labor, and employers' contributions to public and private insurance and pensions. In any case total compensation of workers should not be identified simply with wage rates as it is sometimes implicitly assumed in the historical literature.

To measure labor income correctly, it is important to establish which proportion of the income of proprietors, unpaid family workers, the self-employed, and retired workers represent returns to labor. It should be noted that self-employment, rather than wage employment, dominates in developing countries, as it did in most historical cases. In particular allocating agricultural value added to the different functional components of

income in societies of the past represents a major challenge for historians. In addition the empirical analysis of the functional distribution of income and in particular of labor's share is handicapped by the fact that data has not been determined by the requirements of economic analysis but rather by the legal and institutional arrangements of the society. Thus indirect methods have to be used to quantify these shares.

Alternative methods to estimate the income of proprietors and the self-employed accruing from their work have been designed. Colin Clark (1957) and Simon Kuznets (1966) favored the approach of attributing to entrepreneurs and self-employed workers a labor income per head equal to per worker compensation of employees, and most empirical studies have accepted it. An alternative proposed by Edward F. Denison (1967) was to assume the division between labor and property (capital and land) income to be the same in incorporated and non incorporated firms.

A more sophisticated alternative procedure has been applied by Dale W. Jorgenson (1990) and his collaborators and more recently by Alwyn Young (1995), according to the principle that the remuneration of the self-employed is equal to the opportunity cost of their work. To estimate labor income, hourly incomes of employees by industry, sex, age, and education must be constructed. Compensation data and hours of work by industry, sex, age, education, and class of worker are used to estimate the incomes of employees and the implicit labor incomes of employers, unpaid family workers, and the self-employed under the assumption that the last three earn an implicit wage equal to the hourly wage of employees with similar sex, age, educational, and industrial characteristics. However, while this approach is theoretically preferable, lack of data often impedes its historical application. However, as Kuznets argued, the underlying assumption that the labor service of the self-employed can be equal to wage employees "is far too crude to warrant the refinement in calculation" (1966, p. 178).

Recently, Douglas Gollin (2001) suggested a less data-demanding approach by making adjustments to the national income on the reported operating surplus of unincorporated enterprises since most of the self-employed fall into this category. Then either all the private surplus of private unincorporated enterprises is allocated to labor income or it is assumed to comprise the same mix of labor and capital income as the rest of the economy.

Are factor shares stable over time?

The perception that income distribution between capital and labor has been relatively stable over time goes back to the 1930s. "The stability of the proportion of the national dividend accruing to labor", J.M. Keynes wrote, was "one of the most surprising, yet best established, facts in the whole range of economic statistics, both for Great Britain and for the United States" (1939, pp. 48-49).

The validity of the stability hypothesis is supported by empirical evidence for the present, provided labor income (including employee compensation and the remuneration of the self-employed) is considered. The share of labor remains quite stable across countries, ranging, according to Gollin, from two-thirds to four-fifths of national income despite the fact that its distribution between wage employment and self-employment varies considerably. Gollin has noted that large differences in national rates of the self-employed are closely associated to *per capita* income levels. Differences in labor's share across countries reflect more disparities in the structure and scale of firms than in sectoral composition of output. Thus in the poor countries rates of self-employment are larger than in the rich countries because the share of larger firms is smaller. Consequently today's differences in employee shares across countries are basically explained by the relative sizes of the earnings obtained by the self-employed, unpaid family workers, and business owners.

Are these generalizations confirmed by historical evidence? Data for a number of countries confirms that the share of employee compensation has shown a tendency to grow over the last one and a half centuries, in particular between the mid-nineteenth century and the mid-twentieth century (see Table 1). Kravis and Kuznets pointed to historical explanations of the growing share of wages in total income. Kravis stressed structural change as a major reason behind the increase in wage ratios to GDP. The shift of labor away from agriculture and the increase in the size of firms implied that the proportion of the self-employed and small entrepreneurs declined. Hence the operating surplus (that is, entrepreneurial income) as a share of national income decreased over time as long-term employment reallocation simultaneously increased workers' compensation. Demographic changes and urbanization, Kuznets suggested, also mattered, as the rise of the age of entry in the labor market, the rise of the average age of retiring, and the incorporation of working women into wage labor contributed to explaining the rise in the wage ratio.

Evidence assembled in Table 2 tends to reject the idea of a stable labor's share in national income. Labor income, broadly defined to include nonwage employment, increased its share of GDP in all cases considered, except for Germany (whose data Walther G. Hoffmann (1965) computed in a different fashion) over the period 1850-1950, to stabilize (and even decline), thereafter. Explaining why historical evidence contradicts economists' empirical regularities represents a challenge for economic historians.

Total hours worked (both by the self-employed and by wage earners) have fallen with industrialization, while there was not a declining response but an increasing one of the labor's share of income. Why? Historical evidence shows that factor supplies increased at different rates. How was income distribution affected? Two offsetting forces were at play. On the one hand the supply of capital has been growing faster than the supply of labor, but on the other the productivity of labor has risen relative to the productivity of capital. The

extent to which these forces matched each other has been translated into the stability of factor shares. Kuznets's stress on the changes in the composition of the labor force, with a relative increase in skilled labor, could be suggested as an explanation. Thus increases in relative marginal productivity of labor translated into relatively higher returns to labor compared to capital, solving the paradox of an increasing labor's share in income while worked hours per capita tended to decline. Education, broadly defined to include on-the-job training, was suggested by Kuznets as the key explanatory factor, though he also pointed to gains from total factor productivity accruing to labor that could be the result from non-Hicks neutral technological advances. As Kuznets put it, "the share of labor in growing output has increased . . . because greater investment has been made in maintaining and increasing the quality of labor; also, a larger proportional share of the net gains, after the input of resources adjusted for quality has taken into account, has gone to labor" (1966, p. 185). Hence changes in the composition of labor income need to be explored.

What is in labor income?

Labor's share of national income is, broadly speaking, composed of returns to unskilled and skilled labor (human capital). Human capital compensation is the result of past investments in education (broadly defined), training, and experience. Raw labor remuneration is the zero-skilled, nonexperienced worker's compensation. Thus each worker's earnings consists of two additive components, raw labor and human capital.

In the early empirical literature on human capital, literacy and enrollment rates were employed as proxies for human capital. However, average years of schooling are not necessarily a good measure of human capital. Firstly, formal education is not the only source of human capital, since workers can acquire skills through training and experience. In historical terms this is particularly important. Formal education was not universal up to the twentieth century in many countries, and multiple forms of education

and training were previously available. Secondly, its rationale is that one year of schooling delivers the same returns always and everywhere, independently from the field of study or the quality of education. Thirdly it assumes that workers in each education category are perfect substitutes, even if they are occupied in different jobs and sectors. Fourthly, it considers that different levels of education explain all differences in productivity across workers.

There are two alternative ways to solve the problems of education-based measures of human capital and to separate raw labor from human capital. One is based on the direct estimate of labor income shares and another on regression analysis. Each has its advantages, but the former is less data demanding and has already been employed in economic history studies.

Casey B. Mulligan and Xavier Sala-i-Martin (1997) constructed a direct measure of the shares of human capital and raw labor. Starting from the intuition that a worker's quality would be related to the wage rate received in the marketplace, they defined wages as the sum of the returns on past investments in human capital and the value of raw labor. In other words, the wage of any person is equal to the sum of human capital's returns and the wage rate of the zero-skilled worker. Therefore their measure of human capital for a given economy is the weighted sum of all workers, where the weights are the ratio of their wages to the wage of the zero-skilled worker. This is equivalent to the aggregate wage bill divided by the wage of the zero-schooling worker.

This measure had a series of conceptual and practical advantages. It is consistent with variable elasticity of substitution across the different types of workers. Also it considers not only education but training and experience as measures of human capital, allowing for the existence of differences in productivity across different workers with the same education levels. Finally, it is consistent with changes in the relative

productivity of workers across countries and over time. However, it has also a series of shortcomings. Particularly relevant it is that it assumes that market prices reflect perfectly human capital and raw labor remuneration. In other words, this approach necessarily implies that the zero-schooling worker had always the same amount of skill and that he or she is a perfect substitute for all the others.

Jonas Ljundberg's (1998) historical study of human capital in Sweden resembles Mulligan and Sala-i-Martín's approach. Also, Joan R. Rosés' study of the Catalan cotton industry uses a similar approach and provides a measure of human capital and raw labor consistent and efficient in the presence of some labor market failures, such as sex discrimination and specific-sector findings. Rosés separated human capital shares into the returns of broad education, on-the-job training, and experience returns. Then he hypothesized that the remuneration of any worker could be divided into three parts, one owed to unskilled labor (equal to the minimum wage), another owed to education (equal to the minimum wage of the skilled worker minus the unskilled work remuneration), and the rest owed to experience and on-the-job training (the remaining remuneration). This worker-level measure of human capital can be transformed easily in an aggregate measure of the returns of raw labor, education, and training. Specifically the total payments of raw labor are equal to the minimum wage of each sector multiplied by the number of days (hours) worked in that sector. Similarly the total payments to education are equal to the minimum skilled wage in each sector, commonly the initial (entry) wage of skilled workers, multiplied by the number of days (hours) worked by skilled workers minus the remuneration of raw labor in these skilled workers. Finally, training is equal to the residual of the total labor's share. This method would be easily extended to eliminate discrimination from the calculations separating the estimation by sex, race, or any other category. It has a major shortcoming, however, since it does not allow for

the fact that accumulation of experience and on-the-job training could differ between unskilled and educated workers.

An alternative approach is to estimate raw labor and human capital based on regression analysis, as proposed by Krueger. Following Finis Welch's model of linear skill, Krueger derived the wage of raw labor from the following Mincerian earnings regressions:

$$\ln W_i = b_0 + b_1 S_i + b_2 X_i + b_2 X_i^2 + e_i,$$

where $\mathbf{lnW_i}$ is the natural log of worker **i**'s yearly earning, $\mathbf{S_i}$ equals years of schooling, $\mathbf{X_i}$ is potential experience (age minus education minus 6), $\mathbf{X_i^2}$ is potential experience squared, and $\mathbf{e_i}$ is error term. In this framework the average remuneration of each worker down to raw labor is approximately the exponential of the intercept plus half of the mean square error of the regression. Thus obviously the share of wages owing to raw labor is the sum of all raw labor remuneration divided by total labor remuneration, and the residual is the human capital remuneration.

An advantage of this method is its relative simplicity, but it also suffers from several major shortcomings. Particularly any monopoly return from labor, like unionisation, is reflected immediately in human capital share. Instead, minimum wage legislation tends to raise the intercept and to increase in turn raw labor share.

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Table 1

Wages and Salaries as a Percentage of National Income

	United Kingdom	Germany	Japan	France	United States	Netherlands
1856	50,4			36,0	40,0	45,5
1873	47,7				41,1	44,0
1913	48,5	47,0	42,5	45,0	47,0	37,9
1924	57,9	64,0	47,4	50,0	60,8	43,1
1937	56,7		46,0		65,1	41,7
1953	61,0	60,0	60,5	59,0	67,3	
1964	62,0		58,9			
1973	60,9		57,6			
1973/82	59,5	52,1	50,8	45,7	56,9	48,9
1992	57,4		56,4	52,5	60,4	53,3

Sources: United Kingdom, Matthews, Feinstein and Odling-Smee (1982: 164)
Germany, Kuznets (1966: 168-169), 1913, 1925/29, 1954/60
Japan, Ohkawa and Shinohara (1979: 379-381), non-agricultural wages and salaries share
France, Kuznets (1966: 168), 1853, 1913, 1920/29, 1954/60
United States, Budd (1960: 373), 1849/50-1859/60, 1869/70, 1909/10; Kravis (1968, 134), 1905/14, 1920/29, 1934/43, 1949/58
Netherlands, Smits et al. (2000: 173-174), 1856, 1873, 1913; den Bakker et al. (1990: 201), 1924, 1937.
1973/82, Maddison (1987: 659)
1992, Gollin (2001: 19), Table 2, employment compensation/output

Table 2

Labor Share as a Percentage of National Income

	United Kingdom	Germany	Japan	France	United States	Netherlands
1856	57,8	77,8		56,0	66,7	
1873	54,4	76,4			63,0	
1913	56,0	70,7	63,8	67,0	62,4	
1924	66,6	89,2	66,4	71,0	71,5	
1937	65,1	76,6	59,9		76,5	
1953	70,0	74,6	75,6	81,0	77,3	
1964	71,4		70,1			
1973	72,8		68,5			
1973/82	74,5	70,0	70,8	69,5	73,3	70,4
1992	71,9		72,5	68,1	66,4	68,0

Sources: United Kingdom, Matthews, Feinstein and Odling-Smee (1982: 164)
Germany, Hoffmann (1965: 503)
Japan, Ohkawa and Shinohara (1979: 379-381), non-agricultural labor share
France, Kuznets (1966: 168), 1853, 1913, 1920/29, 1954/60
United States, Budd (1960: 382), 1849/50-1859/60, 1869/70, 1909/10; Kravis (1968: 134), 1905/14, 1920/29, 1934/43, 1949/58
1973/82, Maddison (1987: 659)
1992, Gollin (2001: 19), Table 2, adjustment 3 (average employee compensation used to impute compensation for entire workforce)