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ABSTRACT

This paper considers conceptual and practical issues that arise in measuring labor's share of national income. Most importantly: How are workers defined? How is compensation defined? The current definition of labor compensation used the Bureau of Economic Analysis (BEA) includes the salary of business owners and payments to retired workers in labor compensation. An alternative series to the BEA's standard series is presented. In addition, a simple method for decomposing labor compensation into a component due to "raw labor" and a component due to human capital is presented. Raw labor's share of national income is estimated using Census and CPS data. The share of national income attributable to raw labor increased from 9.6 percent to 13 percent between 1939 and 1959, remained at 12-13 percent between 1959 and 1979, and fell to 5 percent by 1996.

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Labor's share of national income has been a topic of enduring interest to economists since the work of David Ricardo (1821) and other classical economists. Both neoclassical and Marxian theories of income distribution focus on labor's share. And the empirical determination of factor shares was the proximate cause for the founding of the National Bureau of Economic Research (Nahum Stone, 1945). This paper considers issues that arise in measuring the fraction of national income accruing to labor, and provides alternative concepts and data to the standard Bureau of Economic Analysis (BEA) series.

I. Conceptual Issues

An understanding of the analytical and practical uses of labor's share is necessary to assess the reliability of the National Income and Product Accounts (NIPA's). Data on factor shares are mainly used to: (1) describe the functional distribution of income, and test models of income distribution (e.g., Anthony Atkinson, 1983); (2) indirectly estimate parameters of an aggregate production function (e.g., Douglas Gollin, 1998); (3) infer the division of rents between workers and firms (e.g., Olivier Blanchard, 1997); and (4) forecast tax revenues.

Superficially, labor's share is straightforward to measure: divide total compensation of workers by national income. But this recipe glosses over several tricky issues. In particular, who is a worker? Should CEO's and business owners be included? What is included in compensation? Should the corporate officers' stock options count as labor earnings? Is the return to investment in human capital counted as labor or capital income? How should retired workers who receive continuing health insurance coverage be treated? The answers to these

questions differ depending on the intended use of factor shares. For example, to predict tax revenue CBO may want corporate officers' compensation included in labor income, while to assess the division of rents between workers and firms economists would probably prefer to exclude the compensation of corporate officers from labor income.

In practice, the BEA is often guided more by administrative convenience and necessity than economic rationale in measuring factor incomes. The main source of income data in the national accounts is employer-reported payroll data from the state Unemployment Insurance payroll systems, called ES-202 data. The ES-202 data typically define wage and salary broadly, including cash compensation, the realized value of stock options, and the value of taxable fringe benefits (such as the personal use of a company car). Employees are also defined broadly: anyone who draws a salary from a business is counted as an employee, from the owner of a corporation down to the janitor.

Many authors have noted that it is unclear how the income of proprietors (i.e., owners of unincorporated businesses) should be categorized in the labor-capital dichotomy, because some of the income earned by self-employed workers clearly represents labor income, while some represents a return on investment or economic profit. D. Gale Johnson (1954), Irving Kravis (1959), Joseph Phillips (1960) and others investigate the influence of the momentous shift of proprietors (especially family farmers) to wage employment in the U.S., and find that much of the increase in labor's share in the fist half of the 20th century can be attributed to this structural shift. A common convention since Johnson (1954) has been to allocate two-thirds of the income of proprietors to labor earnings, and one-third to capital income.

More generally, one could argue that the national accounts rely on arbitrary legal

definitions to classify income of business owners. If two doctors are partners in an unincorporated medical practice, for example, their income is counted as proprietors' income, but if the same doctors incorporate their business and draw a salary from their corporation (which is likely given the tax advantages), their income would be counted as employee compensation. Using Current Population Survey (CPS) data, we find that the ratio of incorporated to unincorporated self-employed workers and business owners increased from .28 in 1979 to .41 in 1997.[1] The effect on labor's share of the relative increase in incorporations has not been investigated.

The practices used to construct the national accounts have implications for labor's share. Because corporate officers control the firm's capital and in many cases include the owners of the firm, one could argue that much of their compensation should be classified as capital income. Attributing the income of many business owners to labor income contributes to the stability of labor's share. To take an example, if the owner of the Chicago Bulls, Jerry Reinsdorf, were to pay Michael Jordan an additional $20 million, and reduce his own salary by an equivalent amount, labor's share would be unchanged because both are counted as employees of the Bulls. Certainly, one could argue that the "function" of the corporate officers is different than the function of the other employees. A problem inherently arises because income is forced into two artificial categories, labor and non-labor income. But there are many types of labor. Below, a method is proposed for estimating *raw labor's share* of national income.

Another issue concerns payments to retired workers, such as retiree health benefits. The accounting concept used by BEA to calculate national income is accruals for wage and salary income and disbursements for other labor income. Although there may be some advantages of

counting employers' nonwage contributions when they occur, as opposed to when they are promised or earned, there are also disadvantages. For retiree benefits the difference between the time when money is earned and disbursed can be substantial. In 1994, 34% of retired workers received employer-provided health insurance (U.S. Department of Labor, 1995). The cost of providing retiree health benefits equalled 1% of total payroll in 1990, according to Employee Benefit Research Institute (1992; Table 2.8). Employer contributions to pensions are also counted in the national accounts when they are made, which could present problems for under- or over-funded defined benefit plans. Other wage series do not count retiree compensation as current income. Retiree benefits are likely to have a more important effect on the national accounts in the future, as the number of retirees relative to active workers is predicted to increase from .22 to .37 between 1995 and 2030 according to unpublished calculations of the Office of the Actuary, Social Security Administration (see Virginia Reno and Kathryn Olson, 1998).

II. Basic NIPA Data

Figure 1 displays various measures of labor's share of national income in the post-war period using NIPA data. The top two lines (i.e., the solid and dashed lines) adopt the convention of adding two-thirds of proprietor's income to labor income, and measure labor compensation by wages and salary, employer contributions for social insurance, and other labor income. The difference between these two measures of labor's share is that the dashed line pertains to domestic income, and the solid line pertains to all sources of national income. Because labor's share of domestic and national income show similar patterns, we concentrate on the more common national income concept. The line denoted by squares ascribes none of proprietor's

income to labor income. Finally, the line denoted by triangles depicts total wage and salary income as a fraction of national income.

Several well-known stylized facts are evident in Figure 1. First, labor's share of national income increased gradually from the end of World War II until the early 1970s. Second, the post-war increase in labor's share is sharper when none of proprietor's income is credited to labor income. Third, employer contributions for social insurance and fringe benefits increased more rapidly than wage and salary income in the three decades after World War II; since the early 1980s wage and nonwage benefits increased at about equal rates. The run up in nonwage compensation was due in roughly equal measure to required social insurance contributions and voluntary fringe benefits. Because labor probably bears the incidence of these payments, we have a preference for using the broader gauged total compensation to measure labor's share. Henceforth, we shall refer to total labor compensation plus two-thirds of proprietors' income relative to national income as labor's share. Fourth, labor's share tends to move counter-cyclically. The correlation between labor's share and the adult male unemployment rate is 0.34. Nonetheless, over the entire post-war period labor's share has fluctuated within a narrow band, between 75% and 80% of national income. Fifth, labor's share declined by almost 3 percentage points since reaching a plateau in the mid 1970s. The 2 point drop in labor's share since 1992 is in line with what one would predict from past relations between the unemployment rate and labor's share (see James Poterba, 1997).

III. Alternative Wage and Fringe Benefit Series

The divergent trends in the various wage series documented by Katharine Abraham, James

Spletzer and Jay Stewart (1999) is a cause of concern for measuring labor's share because the hourly wage series derived from the NIPA data shows significantly faster growth than all other available series. Moreover, they find that half the divergence between earnings from the CPS and NIPA data between 1973 and 1997 is due to differential hours growth, and half is due to differential growth in total payroll. If NIPA data overstate the growth in payroll, then labor's share is overstated as well.

Table 1 provides additional evidence by comparing trends in NIPA compensation data and data derived from the Bureau of Labor Statistics's (BLS's) Employment Cost Index (ECI) survey. The ECI is estimated from a quarterly survey of 23,000 jobs within 4,400 private sector firms. Although the ECI is a fixed-payroll-weighted compensation index, average Employer Costs for Employee Compensation (ECEC) data are calculated each year from the underlying ECI data using current employment weights. Anthony Barkume and Michael Lettau (1998) calculated an experimental ECEC wage series using current hours as weights. In principle, these data represent wage and salary per hour. Michael Lettau provided me with the underlying data series for total compensation per hour worked derived from the ECI data. In terms of breadth of compensation covered, this is probably the best alternative series to compare to the NIPA compensation per hour series. Both measures are calculated as compensation per hour (as opposed to the average wage for an employee or job). One possibly important difference between the two series, however, is that the ECI data exclude jobs in which employees have a significant role in setting their own wages. Additionally, the ECI data exclude compensation paid to retired workers.

The first column of Table 1 reports annual averages of unpublished quarterly data on compensation per hour derived from the ECI survey. The second column reports the annual

average of BLS's estimate of compensation per hour based on the NIPA data. Both series have been converted to real dollars using the CPI-U, and normalized so 1988 equals 100. Compensation per hour grew about 5% faster in the NIPA than ECI data over the last decade.[2]

In related work, Barkume and Lettau (1997) compare total ES-202 wage and salary data (which are used in the national accounts) to total wage and salary data derived from the ECI survey for a subset of two-digit industries with over 98% overlap in employment coverage. These industries represent about 80% of private, nonfarm employment. Their estimated ratio of total ECI payroll to ES-202 payroll is reported in column (3) of Table 1. The ECI data picked up 97% of the ES-202 payroll in 1988, but only 88% in 1995. These results suggest that either the NIPA wage and salary data have grown too quickly in the 1990s, or that aggregate wage and salary derived from the ECI has grown too slowly. It is unclear which series more accurately reflects the true trend in payroll, but it is worth noting that NIPA wage and salary data grew 4% faster than the Internal Revenue Service's payroll figures between 1984 and 1996 (see Thae Park, 1998).

Reasons for the discrepancy between the NIPA compensation series and other sources need to be explored further. Here we illustrate possible implications of using ECI data to calculate labor's share. At one extreme, suppose that the NIPA wage and salary data have grown too rapidly because ES-202 data increasingly double count some fringe benefits as wage and salary income. In this case, labor income and national income have grown too rapidly. In column (5) we use Barkume and Lettau's ratios to reduce both labor compensation and national income accordingly. Labor's share is seen to fall by 1.9 percentage points between 1988 and 1995, only slightly faster than the 0.6 percentage point fall in the unadjusted data (see column (4)). Now

suppose the ECI and NIPA data diverged because the NIPA data include some business owners' income in labor compensation. In this case, only the numerator of labor's share should be adjusted. Labor's share is recalculated under this assumption in column (6), and the results indicate a substantial 5.6 point fall in labor's share since 1988. It is apparent that the trend in labor's share depends critically on whether any possible error in total labor compensation carries over to national income as well.

IV. Raw Labor's Share

The share of national income earned by workers is affected by the amount of human capital workers possess. If labor's share is used to infer something about parameters of an aggregate production function, it is probably desirable to adjust labor compensation for human capital accumulation. To derive a rough approximation of "raw" labor's share, assume that each worker's earnings consists of two additive components, raw labor and human capital, as in Finis Welch's (1969) linear skill synthesis model. To derive the wage of raw labor, the following Mincerian earnings regression was estimated:

$$(1) \qquad \ln W_i = b_0 + b_1 S_i + b_2 X_i + b_3 X_i^2 + e_i,$$

where $\ln W_i$ is the natural log of worker i's annual earnings, S_i equals years of schooling, X_i is potential experience (age minus education minus six), X_i^2 is potential experience squared, and e_i is an equation error. The average value of each worker's earnings attributable to "raw" labor, denoted W_0, is approximated by $W_0 = \exp(b_0 + 0.5*\sigma^2)$, where σ^2 is the mean square error of the regression. (Raw labor might more appropriately be called "intercept labor".) The share of wages accruing to raw labor is approximated by $R = \Sigma W_0 / \Sigma W_i$. Equation (1) was estimated by

OLS using the 1940, 1960, 1980 and 1990 Censuses, and the March 1997 CPS.

Several caveats should be noted. First, the wage of raw labor is affected by institutional arrangements in the economy. For example, the minimum wage probably raises the intercept of the earnings equation. Second, pay above the raw-labor level is also influenced by institutional factors. If unionized workers capture some product market rents, it is misleading to call 1-R human capital's share of payroll, as is done below. Third, the linear skill formulation may be a poor approximation; for example, raw labor may be of less value to those with a high level of education. Fourth, earnings are top coded in Census and CPS data, and the top code varies over time. If we use total wage and salary based on NIPA data to calculate R, however, our estimates are qualitatively similar. Fifth, the 1990 Census and 1997 CPS record education within intervals; we assign mean years of schooling based on Jaeger (1997) to each education interval in these years. In light of these caveats, the estimates in Table 2 should be viewed as illustrative.

The results in the first column of Table 2 suggest that raw labor's share of wage and salary income increased between 1939 and 1959, remained fairly stable between 1959 and 1979, and then fell in the 1980s and 1990s. Column (2) reports the implied total value of raw labor in the U.S. economy.[3] In 1996, raw labor earned an estimated $300 billion in total compensation, with the residual human capital compensation equal to nearly $4.5 trillion.[4] Finally, column (4) reports raw labor's share of national income. Raw labor's share of national income declined since 1979, which is not surprising in view of the well documented rise in the return to education and experience in this period. A qualitatively similar picture emerges if, instead of equation (1), we estimate a specification that assumes years of education have no effect on earnings below the second percentile of the education distribution, and then have a log-linear

effect (as in Card and Krueger, 1992).

V. Conclusion

The presumed constancy of labor's share has been considered "a bit of a miracle" by John M. Keynes (1939) and a "mirage" by Robert Solow (1958). Unfortunately, our confidence in the recent trend in labor's share is hampered by measurement problems. Moreover, with the rise of employee stock ownership and pension funds, and the increase in compensation for top executives, labor and capital no longer divide so neatly into mutually exclusive categories. These considerations suggest that there would be value from improving the measurement of labor's share, and from devising alternative categories for functional shares. The increase in the number and variety of available wage sources in recent decades would facilitate this endeavor.

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Footnotes

1. The pre-1994 data from the CPS Outgoing Rotation Group files were adjusted to reflect the effect of the CPS redesign on incorporated and unincorporated self-employed workers using the multiplicative adjustment factors reported in Anne Polivka and Stephen Miller (1995; Table 8).

2. Barry Bosworth and George Perry (1994) report that the fix-weighted ECI has grown at about the same rate as NIPA compensation per hour data. But this finding does not necessarily lend support for the NIPA data because the job mix has changed. The fix-weighted ECI and the current-weighted ECEC have diverged. Michael Lettau, Mark Loewenstein and Aaron Cushner (1997) present alternative decompositions suggesting that at least one third of the divergence between the ECI and ECEC is due to job shifts within occupations and industries, and at least one third is due to shifts between industries and occupations.

3. To allocate proprietor's income, we assumed that two thirds of proprietor's income is labor income, and then assigned a proportion R of that income to raw labor. We also made the tenuous assumption that nonwage compensation is divided between raw labor and human capital in the same ratio as wages.

4. Changes in human capital's share can be decomposed into a component due to changes in education and experience and a component due to changes in the rewards to those characteristics.

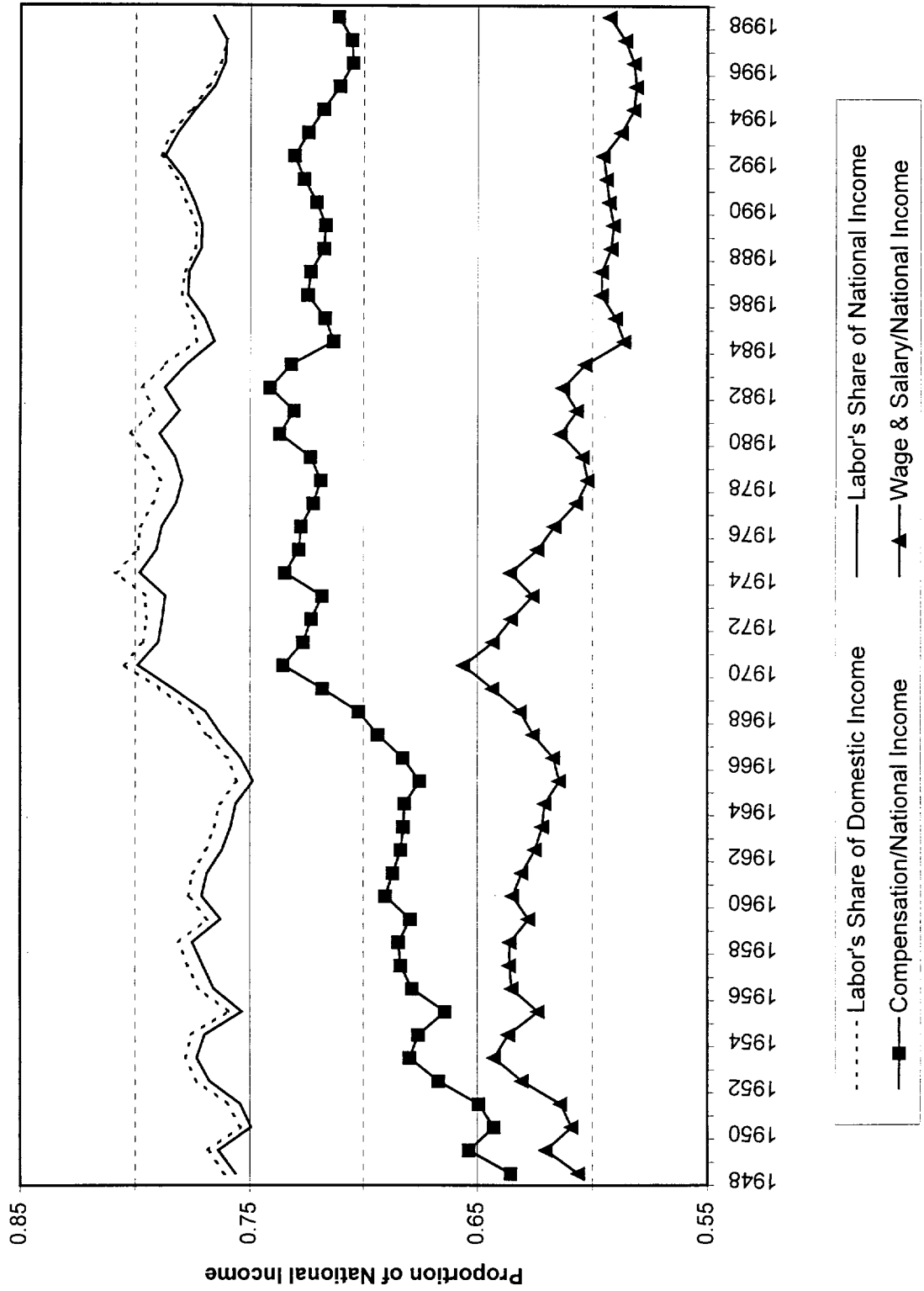Figure 1: Labor's Share of National Income, NIPA Data, 1948-98

Table 1: Alternative Measures of Compensation and Labor's Share

Year	Real compensation per hour (ECI data) (1)	Real compensation per hour (NIPA data) (2)	ECI Payroll Relative to ES-202 Payroll (3)	NIPA Labor's Share (4)	Adjusted Labor's Share (Numerator & Denominator) (5)	Adjusted Labor's Share (Numerator Only) (6)
1988	100.0	100.0	0.965	0.771	0.767	0.751
1989	99.3	98.0	0.966	0.771	0.766	0.751
1990	98.1	98.1	0.954	0.774	0.768	0.747
1991	97.5	98.7	0.942	0.779	0.771	0.744
1992	97.8	100.7	0.931	0.787	0.778	0.746
1993	98.8	100.0	0.931	0.781	0.772	0.741
1994	97.8	99.4	0.911	0.774	0.761	0.722
1995	96.3	99.0	0.879	0.765	0.748	0.695
1996	96.7	99.5	NA	0.761	NA	NA
1997	96.7	100.8	NA	0.761	NA	NA
1998	97.5	102.9	NA	0.766	NA	NA

Notes:

Data in column (1) are compensation per hour worked for nonfarm private sector employees derived from the ECI data as described by Lettau and Barkume (1998).

Data in column (2) are BLS's estimates of compensation per hour for the nonfarm business sector, based on NIPA compensation data.

Columns (1) and (2) are deflated by the CPI-U, and indexed so 1988 equals 100. Data for 1998 are averages for the first half of the year.

Data in column (3) are total wage and salary as calculated from the underlying ECI data relative to total wage and salary from the ES-202 data for comparable two-digit industries. These data are the inverse of the entries in column (3) of Table 2 of Barkume and Lettau (1997).

Data in column (4) are NIPA wage and salary plus supplements plus two-thirds proprietor's income, all divided by national income.

Data in column (5) were derived by multiplying the NIPA total wage and salary data by the factor in column (3), and recomputing the numerator and denominator (national income) of labor's share.

Data in column (6) were derived by adjusting wage and salary income by the factor in column (3) only for the numerator of labor's share.

Table 2: Dividing National Income into Raw Labor and Human Capital

Year	Proportion of Payroll due to Raw Labor	Raw Labor (Billions of 1996 Dollars)	Human Capital (Billions of 1996 Dollars)	Raw Labor's Share of National Income
	(1)	(2)	(3)	(4)
1939	0.125	$79.0	$553.1	0.096
1959	0.171	291.1	1411.1	0.130
1969	0.155	418.2	2279.9	0.121
1979	0.156	548.4	2966.9	0.122
1989	0.088	377.5	3911.9	0.068
1996	0.064	304.7	4456.1	0.049

Notes: 1996 data are estimated from March 1997 CPS. All other years are from the Decenial Censuses. See text for an explanation of the derivation of the proportion of payroll due to raw labor. We assume nonwage compensation is divided between raw labor and human capital in the same ratio as earnings. Two thirds of proprietors' income is assigned to labor income. The CPI-U was used to adjust nominal dollars. Standard errors for the estimates in column (1) are .001 or less.