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The alleged "constancy" over time of labor's share of aggregate national income in the US has been a subject of considerable controversy.[1] However, it does seem reasonably clear that, for the *manufacturing* sector, the ratio of labor income to value added was relatively stable over the first half of the twentieth century.[2] This does not imply, of course, that labor's share of value added was stable in any *particular* manufacturing industry. And just as changes in labor's aggregate share may affect economy-wide performance, industry-specific changes over time in labor's share may well have important consequences for individual industry performance.

In a recent survey of 17 OECD countries, Martin Paldam [9] found that, since 1950, there has been a general upward trend in economy-wide measures of labor's share. He suggested that, in a number of countries, capital's share has fallen to a level too low to sustain a long-run rate of growth necessary for the maintenance of full employment. In a similar vein, but at a much lower level of aggregation, Peter F. Drucker [2] has argued that in some individual US manufacturing industries increasing wages and benefits have pushed labor's share upward to the point where it now impedes capital formation, resulting in a loss of international competitiveness, decreases in employment, and, by implication, stagnation.

Our primary focus is on individual industries in the manufacturing sector. The purpose of this paper is to examine statistically the relationships among labor compensation rates, labor's share of value added, and industry growth for a large sample of US manufacturing industries over the period 1967–1979. Our principal conclusions are twofold: (1) Wage or compensation rate increases do not appear to have been a general cause of either increases in labor's share or industry stagnation; and (2) Industry stagnation, whatever its cause, may well result in an increase in labor's share of value added. These conclusions, while tentative, should be of considerable interest to those concerned with the role of labor costs in industrial decline.

LABOR'S SHARE OF VALUE ADDED

Labor's share of value added[3] can be measured in different ways, possibly with different results. Therefore, three alternative measures of labor's share of value added are employed in this study: 1) the ratio of total labor costs to value added; 2) the ratio of total employee compensation to value added; and 3) the ratio of total production worker wages to value added. All data are from the *Annual Survey of Manufactures* [12].

"Total labor costs" comprises all wages, salaries, and fringe benefits for all employees and best measures labor costs from the perspective of the employer. Total employee compensation is our name for a measure that deducts from total labor costs all government-mandated benefit programs — primarily social security, unemployment compensation, and workmen's compensation. Total employee compensation may be a better measure of what labor actually receives and what it bargains for. The third measure is the least complete, covering only wages, but it has the advantage of focusing on the group of workers most heavily involved in the collective bargaining process.

Table 1 presents aggregate data on our three measures of labor's share of value added for the entire manufacturing sector for various years from 1967 to 1979. These aggregate data reveal a decline in labor's share of value added over the period, in contrast to the historical pattern noted above. And the share of production worker wages was apparently already much lower in 1967 than it was during the first half of this century.[4]

Several points should be made about the data in Table 1. These data relate only to the manufacturing sector, which has been declining in relative importance in the US economy. Between 1950 and 1979, manufacturing employment as a share of total nonagricultural employment fell from 33.7 percent to 23.4 percent.[5] Also, a falling labor share in the manufacturing sector is, of course, perfectly consistent with a rising labor share in the economy as a whole.

It is also worth noting that the figures reported in Table 1 are quite a bit lower than those usually reported for the manufacturing sector. This is because our data show labor's share of "value added," as defined by the Bureau of the Census, while the data usually reported, from the Bureau of Economic Analysis,

Table 1

Labor's Share of Value Added in Manufacturing

Year	Total Labor Cost as a % of Value Added	Total Employee Compensation as a % of Value Added	Production Worker Wages as a % of Value Added
1967	52.9	50.4	31.1
1971	52.8	50.1	29.7
1975	51.1	48.0	27.4
1979	48.6	45.2	25.8

Source: Computed from data in Annual Survey of Manufactures [12].

show labor's share of "national income originating" in manufacturing [14]. "National income originating" is a more "net" concept of value added, excluding a number of costs, such as depreciation charges, indirect state and local taxes, allowance for bad debts, and purchased services, which are all included in the Census Bureau's measure of value added [13]. Unfortunately, the BEA data are not available for individual industries.

The BEA figures for the manufacturing sector show total labor costs fluctuating in the range from 75 to 84 percent of national income originating between 1967 and 1979, with no particular trend in evidence.[6] Thus, it is not clear that labor's share in manufacturing is actually declining, as indicated by the Census data. However, neither set of aggregate data suggests any general problem with a *growing* labor share in US manufacturing.[7]

In any case, our principal concern is with neither the economy-wide nor manufacturing sector aggregate labor share. Our focus is on the relationships among growth, compensation rates, and labor's share at the individual industry level.

THE SAMPLE AND MEASURES OF GROWTH AND CHANGES IN LABOR'S SHARE

We intend first to examine the relationship between industry growth and changes in labor's share of value added. The period 1967–1979 was selected for study because: 1) it coincides with an inflationary period during which labor costs were the subject of much public scrutiny and during which cost-of-living-adjustment clauses became common in labor contracts; 2) the years 1967 and 1979 were roughly similar in terms of the overall state of the economy, so that the impact of cyclical movements could be minimized;[8] and 3) the labor-cost data are unavailable for years prior to 1967.

The sample consists of 203 four-digit US manufacturing industries as defined by the Standard Industrial Classification System.[9] The sample industries accounted for 65 percent of total US manufacturing value added in 1979. Table 2 shows aggregate data on labor's share of value added for our 203-industry

Table 2

Labor's Share of Value Added in US Manufacturing, 203 Industry Sample 1967 and 1979

Year	Total Labor Cost as a % of Value Added	Total Employee Compensation as a % of Value Added	Production Worker Wages as a % of Value Added
1967	51.0	48.6	30.3
1979	47.3	44.1	25.4

Source: Computed from data in Annual Survey of Manufactures [12].

sample for 1967 and 1979. The figures are very close to those presented for the entire manufacturing sector in Table 1 and show the same downward movement in labor's share between 1967 and 1979.

For each industry in the sample, industry growth is measured using the variable RVA, which is the relative or percentage change in industry value added over the period 1967–1979. Much of the growth captured by RVA is inflation rather than real growth, but the relative positions of different industries should not be materially affected by a general inflation.[10]

For each industry three alternative measures of the change in labor's share of value added for the period 1967–1979 are used: 1) RTLCVA, the relative or percentage change in the ratio of total labor costs to value added; 2) RCOMPVA, the relative or percentage change in the ratio of total employee compensation (total labor costs minus government-mandated fringe benefits) to value added; and 3) RWAGVA, the relative or percentage change in the ratio of total production worker wages to value added.[11] Details on the calculation of all variables employed in this study can be found in the appendix.

At the individual industry level, 145 industries in our 203-industry sample experienced a decrease in labor's share from 1967 to 1979 (in terms of total labor costs), while only 58 industries experienced an increase. For the 203-industry sample, the unweighted mean value for RTLCVA is −0.055, for RCOMPVA, −0.076, and for RWAGVA, −0.133. Again, these results hardly suggest a general problem with a growing labor share.

The simple correlation coefficients between our measure of industry growth, RVA, and the three measures of the relative change in labor's share of value added, RTLCVA, RCOMPVA, and RWAGVA for the 203-industry sample are −0.43, −0.45, and −0.40, respectively. Thus, RVA is strongly and negatively correlated with changes in labor's share, as expected. This strong negative correlation between industry growth and changes in labor's share is consistent with the "Drucker hypothesis." However, to be convincing it must also be shown that the increases in labor's share occurring in slow-growth industries were associated with above-average increases in wage or compensation rates, since causation is presumed to flow from compensation rates to labor's share to stagnation.

There is an alternative hypothesis explaining a negative association between industry growth and changes in labor's share. Industries that grow faster should experience a higher average rate of return to capital over the period of growth, since the growth in demand tends to precede the supply response. Indeed, econometric studies in industrial organization typically include a growth variable in models designed to explain inter-industry profit rate differences, and such variables often perform well.[12] This suggests that faster growth may produce a faster decline (or slower rise) in labor's share.

Of course, the rapidly growing demand for labor in faster-growing industries may also cause wage rates in these industries to rise, partly nullifying the labor

share effect. But the spillover effects of pattern-setting wage settlements may result in little variation in the increases in compensation rates over time across industries in the manufacturing sector.[13] If fast- and slow-growth industries experience similar wage increases, then we should find a negative association between growth and labor's share. However, causation would be the reverse of that suggested by the "Drucker hypothesis." To resolve this issue it is necessary to look at what was happening to wage or compensation rates as industry growth rates varied across industries.

INDUSTRY GROWTH, WAGE RATES, AND LABOR'S SHARE

To examine the relationships among industry growth, compensation rates, and labor's share, three alternative measures of compensation-rate changes have been computed for each industry over the period 1967–1979: 1) RTLCEMP, the relative or percentage change in total labor costs per employee; 2) RCOMPEMP, the relative or percentage change in total compensation per employee; and 3) RWAGMH, the relative or percentage change in production worker wages per man-hour. In addition, since industry growth might have been affected by the beginning (1967) level of labor's share — the latter may have already been "too high" — three measures of the beginning labor share have also been computed for each industry: 1) TLCVA67, total labor costs as a percentage of value added; 2) COMPVA67, total employee compensation as a percentage of value added; and 3) WAGVA67, total production worker wages as a percentage of value added.

The 203-industry sample has been divided into three equal-sized groups based upon the value of RVA, the industry growth measure. Table 3 shows the mean values for the variables representing changes in labor's share, changes in the rate of labor compensation, and beginning labor share for each group. Table 4 presents z-values for testing the significance of the differences between the various means presented in Table 3.

For RTLCVA, RCOMPVA, and RWAGVA, the results show a consistent pattern. However measured, labor's share of value added fell between 1967 and 1979 for all three groups (except as indicated by RTLCVA in low-growth industries). It fell the most, on average, in high-growth industries, and fell the least, on average, in low-growth industries. Differences between group means are generally statistically significant (except for the low-medium difference for RWAGVA).

These results are apparently not due to differences in the rate of growth of labor compensation rates, however. Looking at RTLCEMP, RCOMPEMP, and RWAGMH, we again find a consistent pattern, but the fastest compensation growth took place in the high-growth industries, and the slowest compensation growth took place in the slow-growth industries. So the relatively large average decrease in labor's share of value added in high-growth industries cannot be attributed to slow compensation-rate growth, nor can the increase or

Table 3

Mean Values of Labor Compensation Variables for Low-, Medium-, and High-Growth Industries

Variable	Low[a]	Medium[b]	High[c]
Mean RTLCVA	0.0067	-0.0431	-0.1289
Mean RCOMPVA	-0.0162	-0.0628	-0.1508
Mean RWAGVA	-0.0730	-0.1199	-0.2075
Mean RTLCEMP	1.3965	1.4187	1.5024
Mean RCOMPEMP	1.3413	1.3822	1.4367
Mean RWAGMH	1.2654	1.2892	1.3796
Mean TLCVA67	0.5281	0.5026	0.5053
Mean COMPVA67	0.5010	0.4778	0.4797
Mean WAGVA67	0.3377	0.2993	0.3102

[a]For low-growth industries, the value of RVA ranged from -0.27 to 1.38, with a mean of 0.89.
[b]For medium-growth industries, the value of RVA ranged from 1.38 to 2.15, with a mean of 1.72.
[c]For high-growth industries, the value of ranged from 2.16 to 6.41, with a mean of 3.07.

Table 4

z-Values for Differences Between the Means of Labor Compensation Variables for Low-, Medium-, and High-Growth Industries

Variable	Low-Medium	Medium-High	Low-High
RTLCVA	2.12*	3.97**	6.00**
RCOMPVA	2.08*	4.46**	6.08**
RWAGVA	1.84	4.06**	-5.58**
RTLCEMP	-0.43	-1.57	-1.86
RCOMPEMP	-0.73	-1.01	-1.85
RWAGMH	-0.49	-1.95	-2.29*
TLCVA67	1.13	-0.12	1.09
COMPVA67	1.08	-0.09	1.07
WAGVA67	2.12*	-0.62	1.59

*Statistically significant at .05 level of confidence.
**Statistically significant at .01 level of confidence.

relatively small average decrease in labor's share in slow-growth industries be attributed to an unusual escalation in wage or compensation rates.

In fact, Table 4 reveals that the differences among low-, medium-, and high-growth industries in rates of increase in wage or compensation rates are not generally statistically significant at the .05 level. For the sample as a whole, the facts seem to be much more consistent with the alternative hypothesis than with the "Drucker hypothesis." Slow-growth industries experienced increases (or

slower decreases) in labor's share of value added in spite of slightly *below* average rates of increase in wage or compensation rates.

Looking at the figures for TLCVA67, COMPVA67, and WAGVA67, it appears that labor's share of value added was typically lower at the beginning of the period for high-growth as compared to low-growth industries. However, these differences are minor and not statistically significant. For manufacturing industries generally, it appears that neither the beginning level nor the rate of change in the level of labor's share of value added has had an appreciable causal impact on the rate of industry growth.

Drucker did not in fact claim that excess wage or compensation-rate growth was a general cause of sluggish industry performance. He suggested that the problem was primarily to be found in the steel and automobile industries [2, p. 98] Since these two industries are two of the three largest industries in our sample (by 1979 value added), it is worthwhile to take a closer look at their performance.

For the steel industry (SIC 3312), total labor costs per employee grew by 225 percent from 1967 to 1979, compared to the sample average of 144 percent. The ratio of total labor costs to value added rose from 0.58 to 0.67. Value added grew by only 36 percent, compared to a sample average of 89 percent. Thus, the steel industry does not fit the general pattern, and labor compensation may indeed be one source of its problems.

The case of automobiles (SIC 3711) is less clear. While total labor costs per employee grew by an above-average 212 percent, and the ratio of total labor costs to value added rose from 0.44 to 0.53, value added growth was 84 percent, only a bit below average. This may, however, be indicative of a period of transition. Given the auto industry's troubles in the early 1980s it seems plausible to conclude that "excess wages" are a problem. For these two industries, then, Drucker's position seems to have been substantially vindicated by our data.[14]

CONCLUDING REMARKS

In the manufacturing sector as a whole, our data indicate that labor's share of value added declined over the period 1967–1979. And while, across individual industries, changes in labor's share of value added are indeed inversely correlated with industry growth, slow-growth industries, on average, experienced approximately the same (or slightly lower) rates of increase in wage or compensation rates as faster-growing industries. Therefore, it does not appear that excess wage growth has been a general cause of either increases in labor's share of value added or of sluggish industry growth. It seems more likely that sluggish industry growth leads to increases in labor's share of value added, as slow-growth industries are faced with the apparent necessity of matching the wage or compensation rate increases of faster-growing industries. This is not to say that

excess wage growth may not be a serious problem in some specific industries, but such cases appear to be the exception rather than the rule.

APPENDIX

Variables Employed in the Study

All variables used in this study have been computed from data appearing in the *Annual Survey of Manufactures,* various years. In the description of each variable below, VA represents value added, TLC represents total labor costs, GMF represents government-mandated fringe benefits, COMP represents (TLC — GMF), WAG represents production worker wages, EMP represents the total number of employees, and MH represents production worker man-hours. The numbers 79 and 67 represent the years 1979 and 1967, respectively.

Variable	Computation
RVA	(VA79 — VA67)/VA67
RTLCVA	[(TLC79/VA79) — (TLC67/VA67)]/(TLC67/VA67)
RCOMPVA	[(COMP79/VA79) — (COMP67/VA67)]/(COMP67/VA67)
RWAGVA	[(WAG79/VA79) — (WAG67/VA67)]/(WAG67/VA67)
RTLCEMP	[(TLC79/EMP79) — (TLC67/EMP67)]/(TLC67/EMP67)
RCOMPEMP	[(COMP79/EMP79) — (COMP67/EMP67)]/(COMP67/EMP67)
RWAGMH	[(WAG79/MH79) — (WAG67/MH67)]/(WAG67/MH67)
TLCVA67	TLC67/VA67
COMPVA67	COMP67/VA67
WAGVA67	WAG67/VA67

NOTES

* We gratefully acknowledge the helpful comments of an anonymous referee. However, we remain responsible for any remaining errors.

1. For the issues in the debate, see Lebergott [6], Kravis [5], and Solow [11].

2. Lebergott [6, p. 85] presents the following figures on the ratio of manufacturing payroll to manufacturing value added: 1889–1899, 54.0 percent; 1919–1929, 51.5 percent; and 1947–1954, 53.9 percent.

3. Value added is a measure of manufacturing activity derived by subtracting the cost of materials, supplies, containers, fuel, purchased electricity, and contract work from the value of shipments, with several additional adjustments. For more details see the *Annual Survey of Manufactures* [12].

4. This share, reported at approximately 10-year intervals over the period 1899–1951, varied from a peak of 41 percent in 1899 to a low of 37 percent in 1929. It stood at 40 percent in 1951. [11, p. 627]

5. These figures were computed from the data in [4, Table B-37].

6. See the graphical presentation in Reynolds [10, p. 246].

7. Labor's share in manufacturing is a bit above the average for all sectors. The BEA data for the *economy as a whole* show labor's share rising from 65.2 to 71.2 percent between 1950 and 1967, with a further rise to 74.4 percent in 1979. The rapid growth of sectors with high labor intensity, especially government and services, appears to account for a good part of this increase. See [4, Tables B-21 and B-27; and 14 July 1979, Tables 6.3B and 6.5B].

8. Labor's share in the private economy appears to behave in a countercyclical manner. See [10, pp. 245–46]. The similarity of the years 1967 and 1979 can be seen

from the following: In 1967, real GNP grew by 2.7 percent, following growth of 6 percent in the previous year. In 1979, real GNP grew by 3.2 percent, following growt of 4.8 percent in the previous year. While the civilian unemployment rate was sul stantially higher in 1979 than in 1967 (5.8 percent to 3.8 percent), the percentage (the population employed was actually higher in 1979 (59.2 percent to 55.8 percent) See [4, Tables B-1 and B-21].

9. The sample consists of all four-digit industries for which comparable data wer available for the years 1967 and 1979, except: 1) those industries with a value of shi ments under $500 million in 1972; 2) those industries with "miscellaneous" or "nc elsewhere classified" in their titles; and 3) those industries, primarily military, fo which government is the major purchaser.

10. Of course; an industry for which price movements over the period differed sub stantially from the manufacturing-sector average may rank differently in the growth o real output compared to money value added, particularly if raw materials prices do no move in parallel with output prices.

11. Three measures of the absolute, rather than relative, change in labor's share o value added were also computed. However, results with these measures were not sig nificantly different from those for the measures of relative change and are not reporte below.

12. For an excellent recent example, see Martin [7].

13. Evidence seems to support the existence of this spillover effect, although the range of such an effect across industry classifications or geographical areas is uncertain. See Eckstein and Wilson [3], Mehra [8], and Christofides et al. [1].

14. It should be noted that steel and autos are usually considered to be among the "pattern-setting" industries in studies of possible spillover effects. If so, these industries can hardly be described as victims of wage patterns established elsewhere.

REFERENCES

1. L. N. Christofides, R. Swidinsky, and D. A. Wilton, "A Microeconometric Analysis of Spillovers within the Canadian Wage Determination Process," *Review of Economics and Statistics,* Vol. 62 (May 1980), pp. 213–21.

2. Peter F. Drucker, "The Danger of Excess Labor Income," *The Changing World of the Executive* (New York: Times Books, 1982), pp. 97–101.

3. Otto Eckstein and Thomas A. Wilson, "The Determination of Money Wages in American Industry," *Quarterly Journal of Economics,* Vol. 76 (August 1962), pp. 379–414.

4. *Economic Report of the President,* Washington, D.C.: US Government Printing Office, 1982.

5. Irving B. Kravis, "Income Distribution: Functional Share," *International Encyclopedia of the Social Sciences,* Vol. 7 (New York: Macmillan & the Free Press, 1968), pp. 132–45.

6. Stanley Lebergott, "Factor Shares in the Long Term: Some Theoretical and Statistical Aspects," in Conference on Research in Income and Wealth, *Studies in Income and Wealth,* Vol. 27 (Princeton, N.J.: Princeton University Press, 1964), pp. 53–86.

7. Stephen Martin, "Entry Barriers, Concentration, and Profits," *Southern Economic Journal,* Vol. 46 (October 1979), pp. 471–88.

8. Y. P. Mehra, "Spillovers in Wage Determination in U.S. Manufacturing Industries," *Review of Economics and Statistics,* Vol. 58 (August 1976), pp. 301–12.

9. Martin Paldam, "Towards the Wage-Earner State: A Comparative Study of Wage Shares 1948–75," *International Journal of Social Economics,* Vol. 6, No. 1 (1979), pp. 45–62.

10. Lloyd Reynolds, *Labor Economics and Labor Relations,* 8th ed. (Englewood Cliffs, N.J.: Prentice-Hall, 1982), ch. 11.

11. Robert M. Solow, "A Skeptical Note on the Constancy of Relative Shares," *American Economic Review,* Vol. 48 (September 1958), pp. 618–31.

12. US Bureau of the Census, *Annual Survey of Manufactures,* various years.

13. US Bureau of the Census, *Concentration Ratios in Manufacturing,* 1972, Appendix.

14. US Bureau of Economic Analysis, *Survey of Current Business,* July 1982, and other July issues.