Cyclical Movements of the Labor Input and Its Implicit Real Wage

by Finn E. Kydland and Edward C. Prescott

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Introduction

The standard measure of the labor input is the sum of market-sector employment hours over all individuals. Validity of this measure requires that the composition by skills and ability of those working at each point in time be approximately the same. Over the long term, the experience and educational achievements of the work force have changed markedly, and various methods have been devised to correct for this transformation in quality (Jorgenson, Gollop, and Fraumeni [1987]) or in composition (Dean, Kunze, and Rosenblum [1988]). From a secular point of view, these corrections are large, with the size of the correction being sensitive to the method employed. But from a cyclical accounting point of view, as we show in section IV, it makes little difference whether the standard measure or these alternative measures are used.

The question addressed here is whether, on a cyclical basis, aggregate hours is a good measure of the labor input. It could very well be an adequate cyclical measure despite being a poor secular measure. In particular, if the composition changes are slow relative to cyclical variations in the labor input, it would be a good yardstick from the point of view of cyclical accounting.

Prior to this study, the evidence on this question was mixed. Clark and Summers (1981) find considerable differences in cyclical employment variability across age and sex groups. Hansen (1986), using Current Population Survey data, aggregates the labor input by weighing the hours worked for different age and sex groups by their relative wages. He reports that his measure of the labor input is only slightly more stable than is aggregate hours. Thus, if differences in cyclical variability within such groups were small, as he implicitly assumes, then composition changes would not hinder evaluation of the cyclical variability of the labor input. Kydland (1984), however, maintains that there are in fact strong systematic differences for males (ages 30 and over) in the Panel Study of Income Dynamics (PSID). He states that for this group, the more-educated workers had higher average compensation per hour and less variability in annual hours. Furthermore, the empirical sensitivity of this group's hours with respect to the unemployment rate decreased with the level of education. Using Kydland's estimates, Prescott (1986b) finds that if one adjusts a group's average hours for quality by multiplying it by that group's average wage, quality-adjusted hours worked are only half as sensitive to the unemployment rate as are the quality-unadjusted hours.

In this paper, we systematically examine the issue for all individuals in the PSID sample. We treat each person's time as being a different type of labor input. The rental prices used to construct the sample's aggregate labor input for each of the 14 years from 1969 to 1982 are that person's total labor compensation divided by his total number of hours for the entire period. Because each person's human capital weight is constant over time, these weights are orthogonal to the cycle.

Our measurement procedure is in the national income and product accounting tradition of Kuznets (1946) and Stone (1947). With this approach, aggregate real time series are obtained by evaluating output in different periods using the same set of prices. This is precisely what we do with respect to the labor input.

We determine that, cyclically, our measure of the labor input varies by about one-third less than the measure obtained by the standard method for the PSID sample in the 1969–82 period. Such a large correction, if it held for the entire population, would dramatically change the business cycle facts. If the labor input accounts for a lesser share of the cyclical variation in output, then the residual (the Solow technology parameter) must account for more.

To see this point more clearly, suppose that output, y, is determined by a standard aggregate production function, $y = zk^{\alpha} n^{1-\alpha}$, where z is the level of technology, k and n are the capital and labor inputs, and α is a parameter whose value generally is determined from the respective income shares of GNP. To undertake growth accounting, as proposed by Solow (1957), one then proceeds to take logarithms of the production function and rewrite as follows:

$$\log z = \log y - \alpha \log k - (1 - \alpha) \log n.$$

With time series for y, k, and n, a time series for z is computed as a residual. More recently, this relation has been used with quarterly data as the basis for evaluating the statistical properties of cyclical technological change.[1]

Cyclical movements in the real wage have been the subject of numerous empirical investigations. In an early study, Dunlop (1938) examines British real-wage movements from 1860 to 1913. He finds that real wages tended to increase in most expansions and decline in contractions. Tarshis (1939) corroborates these findings for the U.S. economy in the 1932–38 period, also noting that changes in both the real wage and hours worked were slightly negatively correlated. Fischer (1988, p. 310) reviews these and subsequent studies and concludes "...the weight of the evidence by now is that the real wage is slightly procyclical." This is consistent with Lucas's (1981, p. 226) assessment that "...observed real wages are not constant over the cycle, but neither do they exhibit consistent pro- or countercyclical tendencies."

These findings are problematic for any business cycle theory that assigns an important role to real-wage movements. As Phelps (1970) points out, this is a concern for theories with nominal-wage rigidities because they imply countercyclical movements of the real wage. It is also a problem for theories in which technology shocks induce fluctuations. Unless leisure is highly intertemporally substitutable, as it is in the Hansen (1985) economy, the real wage is strongly procyclical for this class of theories. As emphasized by Christiano and Eichenbaum (1992), and implicitly also by McCallum (1988), the essentially zero correlation of cyclical hours and compensation per hour is especially bothersome for these theories.

Panel studies have examined the sensitivity of individuals' real compensation per hour to the aggregate unemployment rate, with Bils (1985) and Solon and Barsky (1989) finding very strong procyclical movements and Keane, Moffitt, and Runkle (1988) much weaker procyclical movements.[2] For some theoretical frameworks, this is an appropriate procedure for determining how the real wage moves cyclically, but for others it is not. This method assumes that the nature of the employment contract is such that the worker chooses hours and is compensated in proportion to the number of hours worked. This contractual arrangement is the exception rather than the rule, however. Because it is usually the employer who chooses hours given some explicit or implicit compensation schedule, we did not adopt the real-wage definition implicit in the cited panel studies and in the implied measurement procedure. Rather, we employed the approach used

■ 1 For more details, see Prescott (1986a).

■ 2 The samples used in these studies are much narrower than that used in this paper. Bils and Keane, Moffitt, and Runkle use the National Longitudinal Survey of Young Men (ages 14–24) as of the beginning of the sample period. In the section of the Solon and Barsky paper that uses PSID data, the sample is restricted to 357 men who worked in every year of the sample period.

by Kuznets for other series, with the real wage being defined implicitly as total labor compensation divided by the aggregate labor input using a fixed set of wages to value the many different types of labor inputs.

Our finding of strongly procyclical labor-input compensation contrasts sharply with most previous findings. The reason for the difference does not appear to be the special nature of the PSID sample. For this sample in this period, real compensation per hour is weakly procyclical and, cyclically, real compensation per hour and hours are only weakly correlated, as they are for U.S. aggregate data. The disparity arises because we use an alternate definition of the labor input.

I. Measuring the Labor Input and Its Rental Price

The standard measure of the labor input is simply aggregate hours. Let h_{it} be individual-i hours of work in year t. Aggregate hours per person is

$$H_t = \sum_i h_{it} / N_t ,$$

where N_t is the number of individuals in the population in year t. The real rental price in period t is

$$W_t^H = \sum_i e_{it} / \sum_i h_{it} ,$$

where e_{it} is real earnings of individual i in period t.

Our measure of the labor input is

$$L_t = \sum_i \varphi_i h_{it} / N_t ,$$

where φ_i is the "normal" price of individual-i labor services. For the sample period, there was little long-term change in real compensation per hour. This led us simply to use as weights real compensation per hour for the entire period. Thus,

$$\varphi_i = \sum_t e_{it} / \sum_t h_{it} ,$$

where the summations are over years for which individual hours and earnings are available. Following standard procedures, the implicit real wage of labor services is

$$W_t^L = \sum_i e_{it} / \sum_i \varphi_i h_{it} ,$$

where, as before, the summation is over those in the sample at date t.

II. Data

The PSID data covered the years 1969–82. Included in the study were individuals in the Survey Research Center's representative national sample of families; those in the additional sample of low-income families drawn from the Survey of Economic Opportunity were not included. Family information was used to construct individual data for the head of the household (defined in the PSID as the male, if present) and, in the case of a married couple, for the wife as well. All people with at least four years of positive annual work hours were included, resulting in a sample of 4,863 individuals.

We obtained labor incomes for heads of household by summing reported income for regular labor, overtime, the labor portion of unincorporated family business, professional practice or trade, and farm activity. Annual hours worked is the sum of hours devoted to these activities. We did not include 1967 and 1968 in the sample because some of the income series went unreported in these years.

Dollar figures were posted for regular income in all years and for the other income categories after 1974. In the 1969–74 period, only an income bracket was reported for each of the other categories, so these observations were assigned income numbers based on the respective bracket. The rule we use for that assignment is specified in appendix 1. Typically, the head of the household reported his or her labor hours and various incomes in the interview. If this person was a married male, he also reported his wife's income and hours. These were the figures used for the married females.

In some cases, the interviewers made major assignments because of insufficient data; we treated these years as missing observations. For some people in some years, the reported annual hours are substantial. We treated figures larger than 365 x 12 = 4,380 hours per year as missing observations.

The tables in appendix 2 present aggregate statistics for the entire sample population as well as separately for males, married females,

TABLE 1

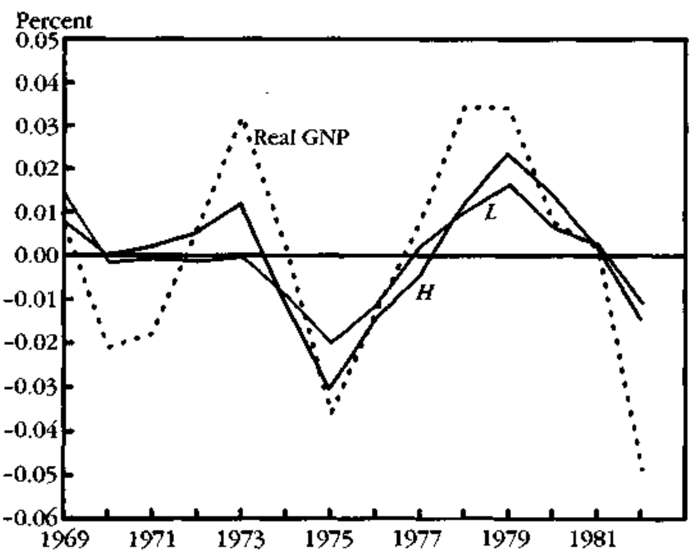
Cyclical Labor Input, Real Wage, and Real GNP: PSID Sample, 1969–82

	Percentage Standard Deviation	Correlations with		
		L	W^L	GNP
Labor input (L)	1.02	—	0.52	0.75
Real wage (W^L)	0.84	0.52	—	0.51
Real GNP	2.50	0.75	0.51	—
		H	W^H	GNP
Hours (H)	1.42	—	0.25	0.80
Compensation per hour (W^H)	0.51	0.25	—	0.12
Real GNP	2.50	0.80	0.12	—
		Empirical Elasticities with Respect to GNP[a]		
Labor input (L)		0.30 (0.08)		
Hours (H)		0.45 (0.10)		

a. Standard errors are in parentheses.
SOURCE: Authors' calculations.

FIGURE 1

Labor Input (L), Aggregate Hours (H), and Real GNP: Full Sample, 1969–82



SOURCE: Authors' calculations.

and single females. The marital status of some women changed over the sample period, so that they appear in the married female group in some years and in the unmarried female group in the other years. The men are not subdivided by marital status because of the small number of unmarried males in the sample.

III. Findings

For purposes of this study, the cyclical component of a time series is defined as the deviation from the time trend.[3] Because it is the percentage variation of each series that is of interest, the logarithms of the various aggregates are the time series whose properties are examined. Key statistics for the full sample are presented in table 1.

Cyclical Behavior of Aggregate Hours and Labor Input

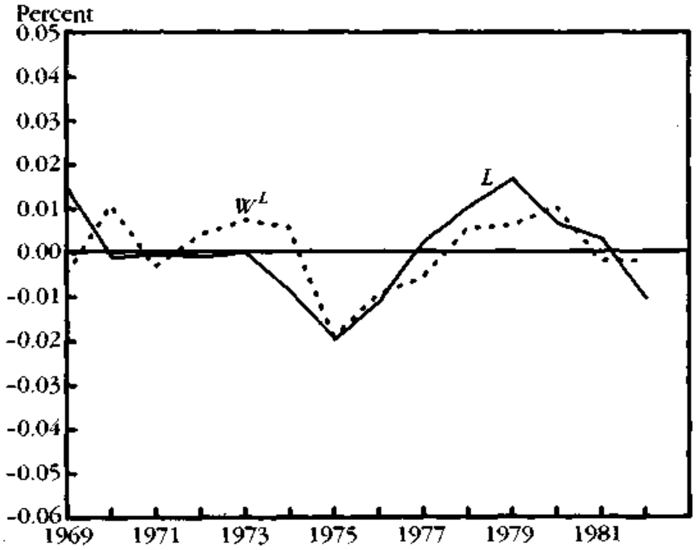
Figure 1 plots the cyclical component of aggregate hours, the aggregate labor input, and real GNP versus time. Clearly, both hours and the labor input vary with GNP, but the hours component varies much more. As shown in table 1, the percentage standard deviations are 1.42 for hours and 1.02 for the labor input, yielding a ratio of the two volatility figures of 1.39.

Insofar as the behavior of the PSID sample is similar to that of the entire population, the use of aggregate hours as a proxy for the labor input gives a highly distorted picture of the cyclical movement of the labor input and therefore of productivity as well. The empirical elasticity of hours with respect to GNP is 0.45, while the empirical elasticity of the labor input with respect to GNP is 0.30—only two-thirds as large.

3 Some view aggregate time series as the sum of a cyclical and a growth component. We do not (see Kydland and Prescott [1982]). One should think of these elements as well-defined statistics that adequately capture for this sample period what are commonly referred to as business cycle fluctuations.

FIGURE 2

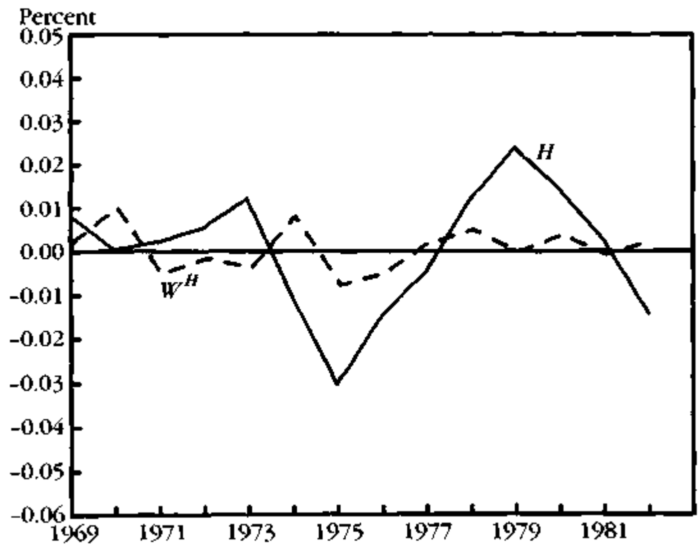
Labor Input (L) and Real Wage (W^L): Full Sample, 1969–82



SOURCE: Authors' calculations.

FIGURE 3

Aggregate Hours (H) and Real Compensation (W^H): Full Sample, 1969–82



SOURCE: Authors' calculations.

Cyclical Behavior of the Labor Input and Its Implicit Real Wage

Part of the conventional wisdom is that real wages and the labor input do not move together cyclically. This reflects the Tarshis (1939) findings for the 1930s and the Christiano–Eichenbaum (1992) results for the postwar period. For our sample in the 1969–82 period, aggregate hours and average compensation did not move together much: The correlation is only 0.25. Thus, the Tarshis findings hold for this period as well if the measure of the labor input is aggregate hours. But the labor input and its implicit real wage—that is, real aggregate compensation divided by the labor input —are strongly and positively associated, with a correlation of 0.52. Figure 2 plots the labor input and real wage versus time, which can be contrasted with aggregate hours and hourly compensation in figure 3.

Clearly, for the human-capital-weighted labor input, the Tarshis result does not hold. The real wage and the labor input move together cyclically. Both average compensation per hour, W^H, and the real wage, W^L, are positively associated with GNP. The correlation for the real wage is 0.51, but it is only 0.12 for average compensation per hour.

Behavior of Growth Rates

The more traditional (and, given current computational capabilities, we think inferior) method of deducing the cyclical behavior of real wages, hours, and employment is to examine relations between changes in variables. This is the methodology employed by Dunlop (1938) and Tarshis (1939) in their pioneering studies. A question that naturally arises is whether our disparate findings are due in part to the difference in methodology. To answer this question, the statistics calculated for cyclical components and reported in table 1 were also calculated for growth rates and are shown in table 2.

We find that growth rates of hours are much more variable than those of labor inputs, with the difference exceeding that for the cyclical components. Growth rates of the labor input and its real wage are positively correlated, while those of hours and compensation per hour are nearly uncorrelated. Similar relations hold for the empirical elasticities of growth rates of the labor input and hours with respect

TABLE 2

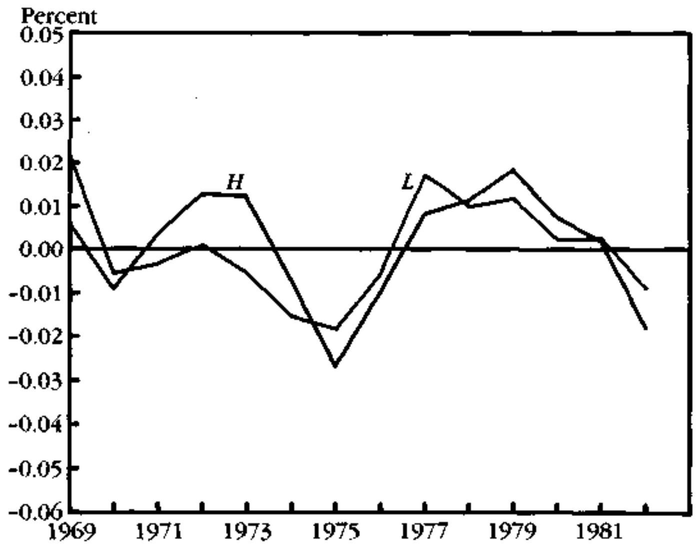
Growth Rates of Labor Input, Real Wage, and Real GNP: PSID Sample, 1969–82

	Percentage Standard Deviation	Correlations with		
		L	W^L	GNP
Labor input (L)	0.94	—	0.21	0.87
Real wage (W^L)	1.13	0.21	—	0.36
Real GNP	2.75	0.87	0.36	—
		H	W^H	GNP
Hours (H)	1.37	—	0.01	0.88
Compensation per hour (W^H)	0.83	0.01	—	0.02
Real GNP	2.75	0.88	0.02	—
		Empirical Elasticities with Respect to GNP[a]		
Labor input (L)		0.30 (0.05)		
Hours (H)		0.44 (0.07)		

a. Standard errors are in parentheses.
SOURCE: Authors' calculations.

FIGURE 4

Labor Input (L) and Aggregate Hours (H): Males, 1969–82



SOURCE: Authors' calculations.

to GNP. Thus, examining cyclical components versus growth rates does not account for the difference in our findings. The conclusions are the same independent of the method.

Robustness of the Findings

These results strongly support the view that, cyclically, the labor input varies significantly less than does aggregate hours and consequently that productivity fluctuates much more. There would be a problem if the human capital weights were systematically too low for individuals with the most cyclically variable hours of employment. We can think of no reason for such a pattern. On the contrary, a study by Kotlikoff and Gokhale (1992) suggests why the opposite may be the case. Measuring life-cycle compensation and productivity profiles, they find that for highly skilled workers, compensation is lower than productivity in the first half of the life cycle, usually until individuals reach their mid-forties. Especially in the early part of the life cycle, this difference is substantial. Because our sample period includes years in which the baby boomers had just entered the work force (the average age is under 40 in all years before 1980), our sample may include an unusually large number of such highly skilled workers whose measured quality weights understate their productivity.

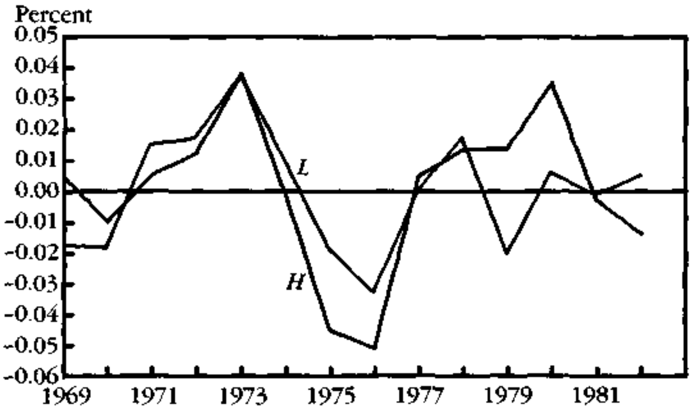
Neither do we believe that cyclical variations in human capital are a concern. The stock of human capital is several times larger than annual output. The variations in the human capital investment would have to be huge to induce significant cyclical variation in the human capital stocks. If they were, cyclical GNP would be a poor measure of cyclical output, for it would not include this large and highly volatile investment component. Other capital stocks are roughly orthogonal to cyclical output, and we can think of no plausible reason for the human capital stock to differ.[4]

We multiplied the weights by identically and independently distributed log-normal random variables with a mean of 1 and a standard deviation of 0.1. This did not affect any of the findings, which indicates that errors in measuring the weights that are not systematically related to the cyclical variability of individuals' hours are not a problem.

4 See Kydland and Prescott (1982).

FIGURE 5

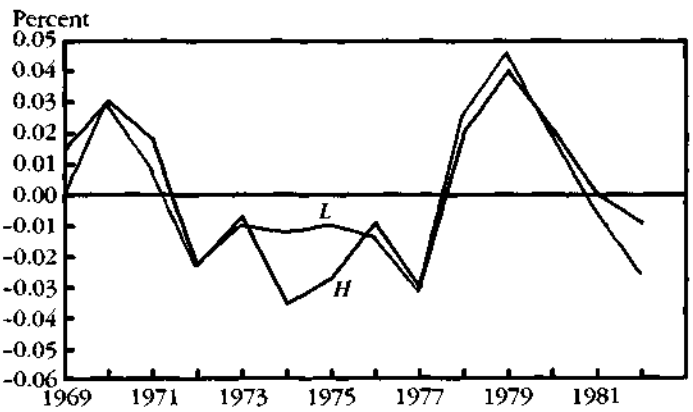
Labor Input (L) and Aggregate Hours (H): Single Females, 1969–82



SOURCE: Authors' calculations.

FIGURE 6

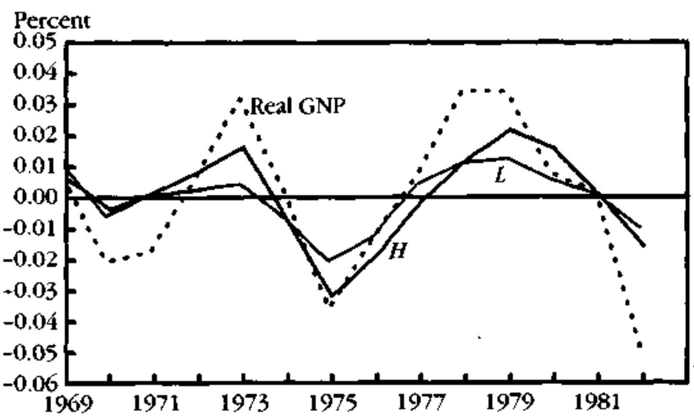
Labor Input (L) and Aggregate Hours (H): Married Females, 1969–82



SOURCE: Authors' calculations.

FIGURE 7

Labor Input (L), Aggregate Hours (H), and Real GNP: Weighted Sample, 1969–82



SOURCE: Authors' calculations.

Over time, people enter and exit the PSID sample and there are missing observations. The number of people in the sample varied smoothly over time and did not fluctuate with GNP. Consequently, our surprising findings do not appear to be the result of missing observations being systematically related to the business cycle.

Some wage observations are sufficiently extreme that they are almost certainly errors. To see how our measurements could be affected by such observations, we omitted year t for person i if e_{it}/h_{it} exceeded both three times φ_i and $15 in 1969 dollars. The findings were essentially the same with these extreme observations deleted.

Cyclical Behavior of Variables by Demographic Groups

The sample was subdivided into males, single females, and married females. Men were not classified separately by marital status because in half of the years, the number of single males in the sample was less than 200, which is far too small for our purposes. Men accounted for approximately two-thirds of the hours supplied by the total sample and for four-fifths of the labor input. Given this, it would be surprising if the aggregate statistics for males and those for the entire sample were dissimilar. Figures 1 and 4 show only a slight difference in the aggregate behavior of males and that of the entire sample.

An interesting finding is the disparity in the behavior of single and married women. Figures 5 and 6 present plots of their hours and labor input versus time. Given the small size of the samples (less than 600 single and 1,700 married women) and the fact that coefficients of variation are about 0.6 for singles and 0.8 for marrieds, random sampling variability is not small. The empirical elasticities of hours and the labor input with respect to GNP are reported in table 3 along with the standard errors. We find that the labor inputs for males and single females are much less responsive to real GNP than are their hours of work in the business sector. The estimated elasticities are largest for single women.

TABLE 3

Empirical Elasticity of Hours and Labor Input with Respect to Real GNP for Demographic Groups, 1969–82

	Empirical Elasticity with Respect to Real GNP[a]	
	Hours	Labor Input
All	0.45 (0.10)	0.30 (0.08)
Males	0.47 (0.06)	0.27 (0.11)
Single females	0.69 (0.21)	0.26 (0.21)
Married females	0.28 (0.27)	0.35 (0.24)

a. Standard errors are in parentheses.
SOURCE: Authors' calculations.

TABLE 4

Cyclical Labor Input, Real Wage, and Real GNP: Weighted Sample, 1969–82

	Percentage Standard Deviation	Correlations with		
		L	W^L	GNP
Labor input (L)	0.98	—	0.55	0.82
Real wage (W^L)	0.80	0.55	—	0.51
Real GNP	2.50	0.82	0.51	—
		H	W^H	GNP
Hours (H)	1.50	—	0.01	0.83
Compensation per hour (W^H)	0.43	0.01	—	−0.09
Real GNP	2.50	0.83	−0.09	—

	Empirical Elasticities with Respect to GNP[a]
Labor input (L)	0.32 (0.06)
Hours (H)	0.50 (0.10)

a. Standard errors are in parentheses.
SOURCE: Authors' calculations.

IV. Implications of the Findings

The results for the PSID sample indicate that, cyclically, workers' aggregate hours are not a good measure of their aggregate labor input. To make the PSID sample more representative of the U.S. population, we weighted the three demographic groups by their relative numbers in the U.S. population. Figure 7 plots both the weighted-sample hours and labor input along with real GNP. These hours move in closer conformity with GNP than do the unweighted figures. Table 4 presents some summary statistics, which are essentially the same as those for the unweighted sample as reported in table 1.

Bias of Measures of Relative Volatility

The statistics reported are nonlinear functions of sample moments. A question is how close they are to the statistics for the population from which the sample was drawn. For a random sample of a given size, there is generally a sampling distribution, which is a function of the distribution of characteristics in the sampled population. This sampling distribution is a continuous function of the distribution of population characteristics.

We used Monte Carlo techniques to determine the sampling distribution for the population for which the PSID sample is representative. If this distribution is close to the actual population distribution, continuity implies that the distribution of sampling errors for the actual population will be close to the computed one. Insofar as it is sufficiently close (which is true asymptotically), the sampling-error distribution for the ratio of the standard deviations of hours and the labor input has a negative bias of 0.13 and a standard deviation of 0.16. If the true value were 1.25, which is a large number from the point of view of business cycle accounting, in only one of the 100 random samples was the statistic as much as 0.28 above its true value. This, we think, indicates that the difference in volatilities is most likely greater than 25 percent for the actual population in this period.

Comparison with Other Measures of the Labor Input

The standard measure of the labor input is aggregate hours. When it is adjusted using the composition adjustment factor of Dean, Kunze, and Rosenblum (1988), the measure's cyclical variability is reduced from 2.34 to 2.07 percent, implying that hours are 13 percent more volatile than their adjusted hours in the 1969–82 period. Similarly, for the Jorgenson, Gollop, and Fraumeni (1987) adjustment, the variability of hours is 2.20, while it is 1.84 for their labor input in the 1969–79 period. Thus, hours are 19 percent more variable than is their labor input. Finally, comparing Darby's (1984) total hours and quality-adjusted hours for the same period, the cyclical variability of the former is 3.02 percent, while that of the latter is 3.06.

In all three studies, there is considerable aggregation within each group, and quality weights are computed on this basis. From a cyclical accounting point of view, these adjustments are somewhat significant, but are dwarfed by the adjustments suggested by our study. We, of course, use separate weights for each individual. The weighted-sample hours variability is 1.50 percent—a full 53 percent larger than the labor-input variability, which is only 0.98 percent.

Implications for Accounting for Cyclical Variations in Output

To the extent that the relative variabilities of hours and the labor input found for the weighted PSID sample hold for the entire U.S. population, our findings call for major revision of the traditional view of the nature of business cycles. Rather than productivity and the labor input being slightly negatively correlated, they become strongly positively associated. The importance of variations in the labor input in accounting for fluctuations in aggregate output is substantially reduced. Given that cyclical components of capital stocks and output are roughly orthogonal, variation in the Solow technology coefficient must account for much more of business cycle fluctuations in output. This factor, then, is nearly as important as are variations in the labor input.

APPENDIX 1

Figures Used for Bracketed Income Variables, 1969–74

Income Bracket (Annual Dollars)	Value Used
1–499	250
500–999	750
1,000–1,999	1,500
2,000–2,999	2,500
3,000–4,999	4,000
5,000–7,499	6,000
7,500–9,999	8,500
10,000 and over	14,000

SOURCE: Authors.

APPENDIX 2

Sample Averages: Full Sample and Males, 1969–82

	Full Sample						Males				
Year	*H*	*L*	*E*	Age	No.	Year	*H*	*L*	*E*	Age	No.
1969	1,657 (962)	1,754 (1,502)	5,981 (5,568)	38.8 (13.1)	2,710	1969	2,210 (659)	2,647 (1,427)	8,999 (5,745)	40.4 (13.1)	1,425
1970	1,634 (951)	1,704 (1,440)	5,979 (5,542)	38.6 (13.4)	2,914	1970	2,149 (699)	2,530 (1,387)	8,863 (5,782)	40.1 (13.5)	1,534
1971	1,628 (954)	1,681 (1,436)	5,900 (5,507)	38.5 (13.7)	3,161	1971	2,135 (715)	2,491 (1,403)	8,682 (5,814)	40.0 (13.9)	1,666
1972	1,623 (968)	1,657 (1,387)	5,939 (5,549)	38.3 (14.0)	3,374	1972	2,142 (733)	2,456 (1,314)	8,799 (5,793)	39.7 (14.2)	1,779
1973	1,625 (963)	1,637 (1,390)	5,965 (5,569)	38.4 (14.1)	3,596	1973	2,114 (767)	2,396 (1,366)	8,744 (5,892)	39.7 (14.4)	1,905
1974	1,580 (961)	1,600 (1,351)	5,901 (5,711)	38.6 (14.3)	3,757	1974	2,048 (796)	2,330 (1,322)	8,607 (6,200)	39.8 (14.5)	1,990
1975	1,540 (950)	1,561 (1,386)	5,694 (5,956)	38.4 (14.3)	3,889	1975	1,983 (819)	2,281 (1,432)	8,290 (6,803)	39.6 (14.6)	2,026
1976	1,555 (957)	1,553 (1,367)	5,798 (5,929)	38.9 (14.5)	4,037	1976	1,992 (843)	2,269 (1,414)	8,445 (6,714)	40.1 (14.8)	2,102
1977	1,562 (963)	1,553 (1,348)	5,899 (5,884)	39.2 (14.5)	4,149	1977	2,002 (843)	2,280 (1,374)	8,648 (6,549)	40.2 (14.8)	2,143
1978	1,578 (946)	1,544 (1,336)	6,012 (5,891)	39.4 (14.7)	4,287	1978	1,983 (846)	2,222 (1,392)	8,707 (6,570)	40.5 (14.9)	2,221
1979	1,588 (939)	1,532 (1,339)	6,053 (5,827)	39.7 (14.7)	4,474	1979	1,972 (852)	2,186 (1,422)	8,680 (6,483)	40.6 (14.9)	2,330
1980	1,564 (947)	1,496 (1,315)	6,019 (5,964)	40.7 (14.8)	4,401	1980	1,926 (875)	2,127 (1,406)	8,611 (6,724)	41.7 (15.1)	2,286
1981	1,537 (949)	1,470 (1,287)	5,922 (5,888)	41.8 (14.7)	4,376	1981	1,892 (881)	2,089 (1,361)	8,467 (6,631)	42.6 (14.9)	2,271
1982	1,502 (968)	1,431 (1,316)	5,841 (6,627)	42.7 (14.7)	4,309	1982	1,832 (928)	2,028 (1,439)	8,319 (7,872)	43.6 (14.9)	2,223

NOTES: *H* = annual hours of work; *L* = annual labor input; and *E* = annual real labor earnings in 1969 dollars. Standard deviations are in parentheses.
SOURCE: Authors' calculations based on PSID data.

APPENDIX 2 (CONT.)

Sample Averages: Single and Married Females, 1969–82

	Single Females						Married Females				
Year	*H*	*L*	*E*	Age	No.	Year	*H*	*L*	*E*	Age	No.
1969	1,527 (794)	1,174 (917)	4,068 (3,139)	41.7 (15.5)	263	1969	919 (844)	659 (726)	2,264 (2,495)	35.9 (11.7)	1,022
1970	1,482 (796)	1,142 (897)	4,037 (3,213)	41.2 (15.7)	290	1970	950 (845)	690 (743)	2,439 (2,663)	35.7 (12.0)	1,090
1971	1,483 (811)	1,150 (901)	4,106 (3,226)	42.3 (15.8)	306	1971	954 (845)	686 (732)	2,466 (2,664)	35.4 (12.2)	1,189
1972	1,472 (815)	1,122 (907)	3,943 (3,316)	42.1 (16.1)	333	1972	932 (842)	674 (739)	2,435 (2,694)	35.4 (12.4)	1,262
1973	1,488 (793)	1,115 (878)	4,009 (3,255)	42.4 (16.5)	358	1973	963 (841)	692 (738)	2,520 (2,693)	35.4 (12.4)	1,333
1974	1,409 (831)	1,056 (879)	3,813 (3,117)	42.6 (16.7)	388	1974	953 (831)	701 (755)	2,587 (2,804)	35.7 (12.5)	1,379
1975	1,329 (831)	999 (834)	3,738 (3,217)	42.0 (16.8)	429	1975	977 (829)	713 (745)	2,613 (2,749)	35.7 (12.6)	1,434
1976	1,302 (832)	958 (817)	3,657 (3,203)	42.7 (17.3)	454	1976	1,012 (831)	720 (723)	2,700 (2,785)	36.0 (12.6)	1,481
1977	1,357 (867)	964 (812)	3,626 (3,180)	42.9 (17.4)	478	1977	1,008 (833)	718 (731)	2,756 (2,931)	36.5 (12.7)	1,528
1978	1,348 (883)	955 (812)	3,645 (3,217)	43.3 (17.8)	493	1978	1,078 (830)	771 (750)	2,951 (2,996)	36.8 (12.6)	1,573
1979	1,329 (872)	895 (747)	3,547 (3,081)	43.0 (18.1)	527	1979	1,118 (833)	799 (761)	3,087 (3,083)	37.4 (12.7)	1,617
1980	1,338 (906)	895 (769)	3,527 (3,107)	44.4 (18.0)	533	1980	1,116 (840)	789 (743)	3,115 (3,182)	38.1 (12.6)	1,582
1981	1,269 (931)	865 (778)	3,477 (3,216)	45.5 (17.9)	552	1981	1,112 (838)	781 (757)	3,070 (3,157)	39.2 (12.7)	1,553
1982	1,237 (938)	848 (788)	3,414 (3,334)	46.7 (17.8)	551	1982	1,120 (861)	776 (756)	3,126 (3,345)	40.0 (12.6)	1,535

NOTES: H = annual hours of work; L = annual labor input; and E = annual real labor earnings in 1969 dollars. Standard deviations are in parentheses.
SOURCE: Authors' calculations based on PSID data.

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