Chicago Fed Letter

Trends in real wage growth

In popular discussions of economic policy it is often claimed that real wage levels in the U.S. are stagnant or even falling. This *Chicago Fed Letter* reviews the statistical basis for such claims and explains why they are misleading. Other commentary has claimed that average real wages are rising, but not as fast as productivity, a phenomenon argued to have left U.S. workers with a smaller share of the national economic pie. This article shows that there has been a divergence between some common measures of productivity and real wages. However, the divergence has little to do with shifts in the distribution of income between labor and capital. Instead it mainly reflects something more mundane—changes in the relative prices of consumer and nonconsumer goods. Moreover, arguably more appropriate measures of real wages continue to closely track productivity gains.[1]

Alternative real wage measures

The level of the average real wage, which is the amount of goods and services that can be bought with an hour of work, is one of the key determinants of the nation's living standard. When real wages rise, workers can consume more goods and services for the same amount of work time. Alternatively, they can consume the same goods and services, but work fewer hours and have more leisure time. Standard statistical measures of the real wage are derived by deflating a measure of nominal wages by a measure of consumer prices. Thus, the growth rate of the real wage is equal to the growth rate of nominal wages minus the growth rate of consumer prices. Because there are a number of measures of nominal wages as well as a number of measures of consumer prices, there are many possible measures of the real wage.
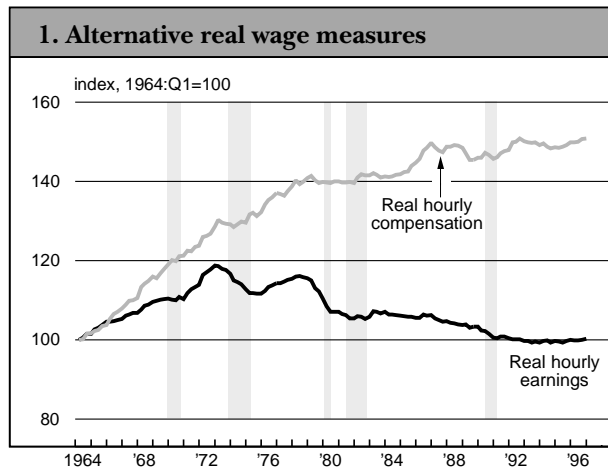
One measure of the real wage that has received substantial attention is the real hourly earnings series shown in figure 1. It is obtained by deflating the average hour earnings figure that the Bureau of Labor Statistics (BLS) obtains every month from its *Current Employment Survey* (CES) of establishments by the BLS's Consumer Price Index for Urban Consumers (CPIU). The CPIU, which is also released monthly, is the most widely followed measure of consumer prices.[2]

1. Alternative real wage measures

index, 1964:Q1=100

Real hourly compensation

Real hourly earnings

Note: Shaded areas indicate recessions.
Sources: U.S. Department of Labor, Bureau of Labor Statistics, *Current Employment Survey* and "Consumer Price Index," Internet at http://stats.bls.gov, various years; U.S. Department of Commerce, Bureau of Economic Analysis, *National Income and Product Accounts*, Internet at http://www.stats-usa.gov, various years.

If the pattern depicted in figure 1 accurately reflected trends in real wages, then living standards for U.S. workers may indeed have fallen. As the figure shows, real hourly earnings peaked in 1972 and are currently about 16% below their historical high. They are, moreover, not appreciably higher than in 1964. Not surprisingly, commentators arguing that the U.S. economy has fundamental problems often point to the real hourly earnings series for support.

There are, however, major methodological problems with using the average hourly earnings series to gauge long-term trends in wage rates. First, they cover only wage and salary compensation. Fringe benefits and contributions for social insurance programs, important parts of workers' total compensation, are left out. Because these components of compensation have been increasing more rapidly than wages and salaries over most of the period covered by figure 1, average hourly earnings understate compensation growth. The earnings data are also limited to production and

nonsupervisory workers. The nearly 20% of workers excluded from the average are more likely to be highly skilled and highly paid. Because such workers have experienced more rapid wage growth since the early 1970s, their exclusion imparts another downward bias to the measured rate of average wage growth.[3] Finally, though it covers a large fraction of employment, the CES is subject to substantial biases in sample selection; for example, it excludes workers at newly opened establishments.

The historical CPIU data series used to deflate average hourly earnings also has serious methodological problems. In particular, BLS methodology substantially overstated housing cost inflation in the high interest rate environment of the late 1970s and early 1980s. This methodology was corrected in 1983. However, the historical data for earlier periods were not revised. The BLS did, though, release a series, the CPIU-X1, that applies current methodology to the period before 1983. These data suggest that from 1967 to 1983, the CPIU overstated

2. Real wages and productivity

index, 1964:Q1=100
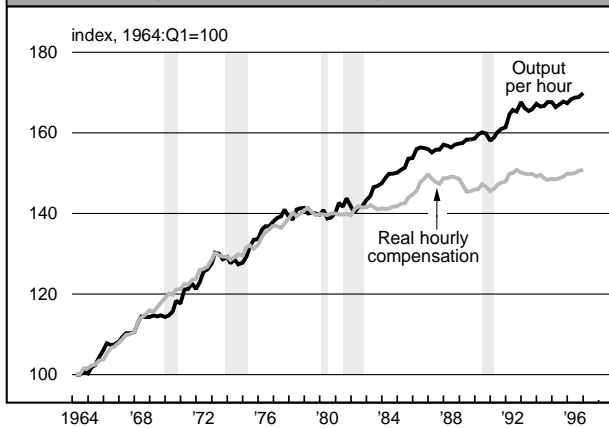
Note: Shaded areas indicate recessions.

overall inflation by a cumulative 9%. Moreover, many analysts have suggested that even current CPIU methodology substantially overstates inflation. For instance, the Boskin Commission report issued last year concluded that current methodology overstates increases in the cost of living by 1.1% per year.[4] If this finding is correct, then the downward bias in real wage growth due to inadequacies in the CPIU over the period covered by figure 1 is even greater than 9%.

The real hourly compensation series shown in figure 1 largely avoids the methodological problems with real hourly earnings. This series replaces average hourly earnings and the CPIU with more appropriate measures of nominal wages and prices. The nominal wage measure underlying real hourly compensation is derived from total business sector compensation figures from the *National Income and Product Accounts* (NIPA) and the BLS's series on hours worked by all persons in the business sector. The total compensation data are not limited to production and nonsupervisory workers and they cover wages and salaries paid to private workers as well as the cost of fringe benefits and contributions for social insurance. They are also based on much more complete data than the CES. The deflator for the real hourly compensation series shown in figure 1 is the CPIU-X1 which, as noted above, eliminates upward bias in the CPIU by

applying current methodology to the period before 1983.[5]

Clearly, these methodological corrections make a large difference to the measured trend in average real wages. Average real wages now appear to be 18% higher than in 1972, not 16% lower. They are 53% higher than in 1964, not the same. Moreover, if the findings of the Boskin Commission on the overstatement of inflation by the current CPIU methodology are correct, then real hourly compensation has grown even faster than shown in figure 1—approximately 57% since 1972 and 120% since 1964.

Given the great technological advances and investment in new physical capital over the last 25 years, the trend in real hourly compensation is much more in line with neoclassical economic expectations and should serve to dispel some of the most radical critiques of the economy's performance. However, the data do suggest that growth in average real wages has slowed significantly since the 1960s and 1970s. For instance, real hourly compensation grew only 3.5% in the first 19 quarters of the current expansion, compared with 4.5% in the comparable period of the 1980s expansion and 7.0% during the 1975–79 expansion.

Real wages and productivity

Most economists would expect slowing real wage growth to be attributable to a corresponding slowing in productivity growth. Some, however, have challenged that view with data such as that shown in figure 2, which plots the real hourly compensation measure discussed above along with the BLS's standard measure of business sector labor productivity. The pattern is striking. Average real wages closely track productivity growth until about 1982. Then the two series diverge, as growth in labor productivity outpaces growth in real wages by about 0.7% per year.

The data in figure 2 should not, however, be interpreted as a shift in the balance of power between capital and labor. As figure 3 shows, labor's share of business sector income has fluctuated significantly since 1982, but the long-term trend has been relatively flat. Rather than a shift in the distribution of income, the divergence shown in figure 2 reflects changes in the relative prices of consumer and nonconsumer goods.

How do relative price changes affect the relationship between real wage and productivity measures? Average labor productivity is the ratio of real business sector output to a corresponding measure of hours worked. Real output in this calculation is obtained by deflating the nominal value of business sector output by the implicit price deflator for the business sector. This is similar to the construction of real hourly compensation. The major differences between real hourly compensation and business sector productivity are that 1) real hourly compensation starts from the nominal value of wages and benefits paid to workers while the labor productivity measure starts from the nominal value of output, and 2) real hourly compensation uses the CPIU to deflate prices, while the labor productivity measure uses the implicit price deflator for business sector output. Because the labor share data shown in figure 3 have little trend, the difference between nominal compensation and nominal output cannot explain much of the divergence shown in figure 2. Rather, it is mainly the difference in the two price deflators that has caused the standard measures of real wages and productivity to diverge.

The price deflator for business sector output reflects the prices of all the goods and services produced by the business sector. This includes the prices of the goods and services consumers buy, which are measured by the CPIU, and the prices of investment goods and government purchases, which are not. Since 1982, consumer prices as measured by the CPIU have risen 0.6% more per year than those of all business sector outputs as measured by the implicit deflator for the business sector. Cumulatively, the CPIU grew by over 8% more than the

3. Labor's share in the business sector
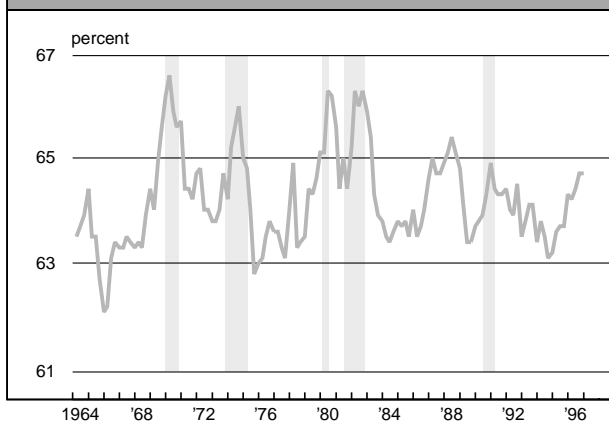
Note: Shaded areas indicate recessions.
Source: U.S. Department of Labor, Bureau of Labor Statistics, *Current Employment Survey*, Internet at http://stats.bls.gov, various years.

business sector deflator over this period. This difference is enough to explain almost all of the difference between the growth in real wages and productivity since 1982.
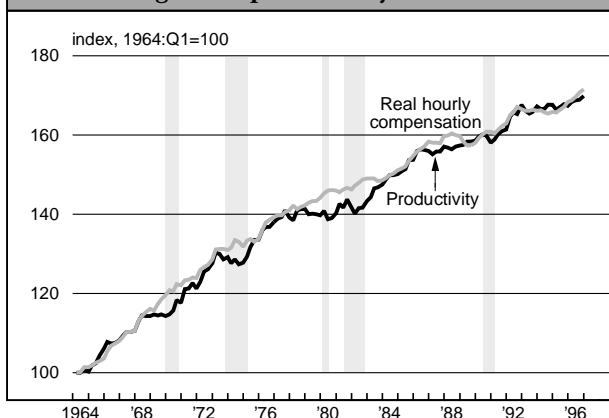
Some of the difference between the CPIU-X1 and the implicit deflator for the business sector may reflect methodological deficiencies in the CPIU-X1. For instance, the use of fixed consumption weights in the CPIU-X1 tends to overstate inflation when consumers substitute between goods as relative prices change, a bias that is much less significant in the chain-weighted price deflator. However, most of the difference between the price indices is probably genuine; the prices of the things consumers typically buy have, on average, increased more rapidly than the prices of the things they don't buy. For instance, spectacular productivity increases have caused quality-adjusted prices to fall for investment goods, such as computers and machine tools, while some items important to consumers, such as college educations, have increased in price especially rapidly.

Figure 4 shows more directly that the difference in deflators explains the divergence of wages and productivity by comparing labor productivity to a real wage measure obtained by deflating the NIPA-derived nominal wage series by the business sector price deflator. Because this measure, often referred to as the real product wage (as opposed to the real consumption wage discussed previously), reflects the prices of all the goods and services produced by the business sector, it is not surprising that it more closely tracks labor productivity. Indeed, it is the real product wage that profit maximization implies should be proportional to productivity.

As figure 4 shows, once proper account is taken of relative price change, there has been no major change in the relationship between real wages and productivity. Thus, the key to explaining the slowing real wage growth that is still evident in figure 4 really is understanding the nation's slowing productivity growth.

—Daniel Sullivan
Assistant vice president

[1]The points made in this article are known to many researchers. See, for example, Barry Bosworth and George L. Perry, "Productivity and real wages: Is there a puzzle?" and the discussion by Matthew D. Shapiro in *Brookings Papers on Economic Activity*, Vol. 1,

1994. However, they have not been completely absorbed by the popular press. See, for example, Allen R. Myerson, "In era of belt-tightening, modest gains for workers," *New York Times*, February 13, 1997, p. 1.

[2]To facilitate comparisons with other measures, the real hourly earnings series has been scaled to 100 in 1964. The shaded areas in this and subsequent figures represent recessions as defined by the National Bureau of Economic Research. The series the BLS refers to as real hourly earnings is actually deflated by the CPIW, the Consumer Price Index for Urban Wage Earners, but that series and the one shown in figure 1 are very similar.

[3]This article is concerned only with trends in *average* real wages. Since the early 1970s there has been a substantial increase in wage inequality. See, for example, Kevin Murphy and Finis Welch, "The structure of wages," *Quarterly Journal of Economics*, Vol. 107, No. 1, February 1992. As a result, the real wages of certain groups of less-skilled workers may have fallen even while average wages rose for the economy as a whole.

[4]See "Toward a more accurate measure of the cost of living," Final report to the Senate Finance Committee, Advisory Commission to study the Consumer Price Index, December 1996.

[5]The BLS only produced the CPIU-X1 series back to 1967. Growth rates in the standard CPIU were used to extend the CPIU-X1 series backward from 1967. Since interest rates were relatively stable in this period, this should create no problems.

4. Real wages and productivity II

Notes: Real hourly compensation is deflated by the implicit price deflator for the business sector. Shaded areas indicate recessions.
Sources: See figure 2.

Tracking Midwest manufacturing activity

Manufacturing output indexes (1992=100)

	Dec.	Month ago	Year ago
CFMMI	124.4	123.2	118.7
IP	119.3	118.1	113.8

Motor vehicle production (millions, seasonally adj. annual rate)

	Dec.	Month ago	Year ago
Cars	5.8	6.3	6.1
Light trucks	6.0	5.6	5.5

Purchasing managers' surveys: net % reporting production growth

	Jan.	Month ago	Year ago
MW	60.8	58.4	58.3
U.S.	58.0	58.4	45.1

Motor vehicle production (millions, seasonally adj. annual rate)
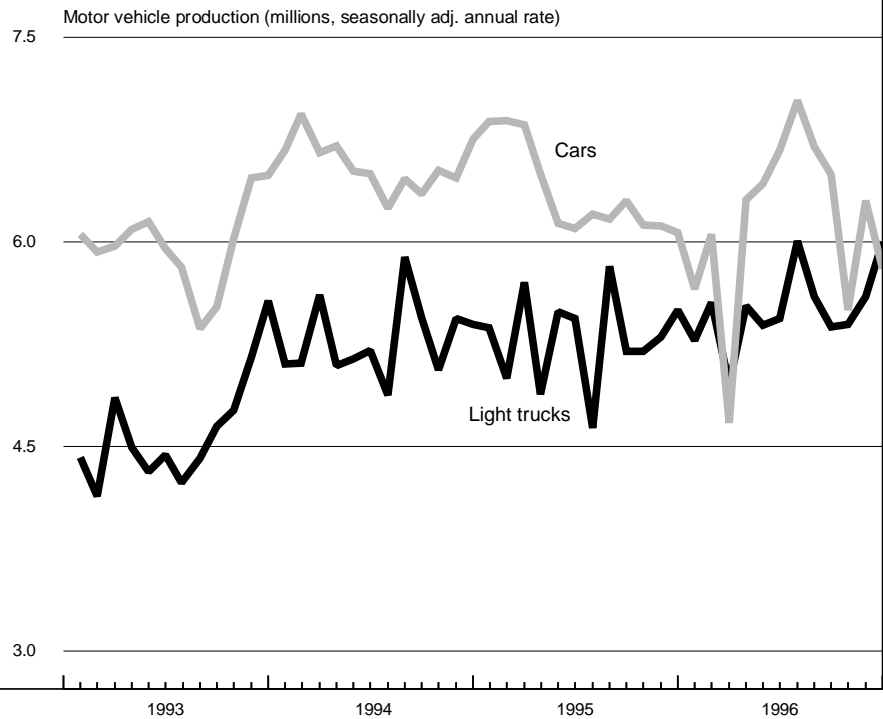
Midwest manufacturing activity ended 1996 on a strong note and appeared to carry some momentum into the new year. Following a strong rebound in November, motor vehicle production in December was little changed from November's pace at a seasonally adjusted rate of 11.8 million units. With support from the auto sector, total manufacturing output in the region, as measured by the CFMMI, rose 1.0% in December, its best showing since April of last year.

The new year appeared to be off to a good start, with the production component of the composite index from purchasing managers' surveys in the region continuing to be above its national counterpart. Indeed, while the national purchasing managers' index indicated a very modest slowing in the sector's pace of expansion, the Midwest index suggested a slight acceleration.