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Positive Economic Commentary

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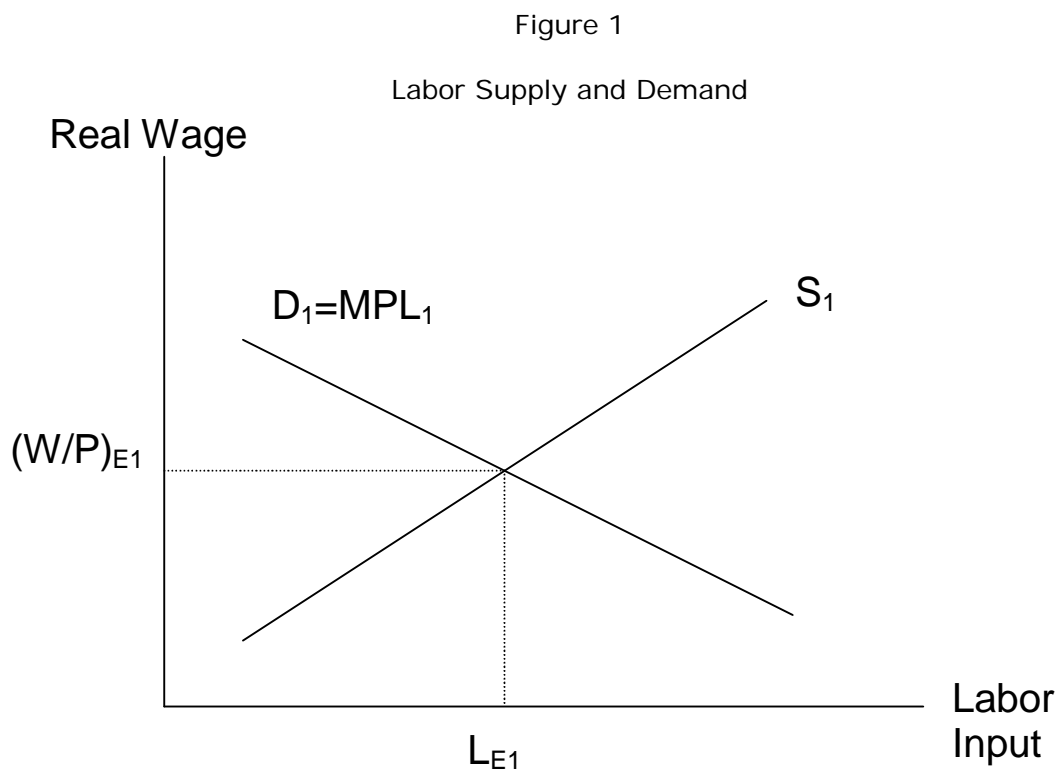
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Is Rising Productivity Resulting In Job Losses Or Vice Versa?

Productivity's evil twin once again allegedly has shown up. During the Roaring 'Nineties, Fed Chairman Alan Greenspan said that strong productivity growth was having the perverse effect of overheating the economy through the wealth effect. I attempted to refute this argument in a commentary entitled "Productivity – Greenspan's New Villain" (January 13, 2000). Greenspan's new complaint about productivity growth is that it is resulting in job layoffs. In this commentary, I again will attempt to refute Chairman Greenspan's argument. In a nutshell, I believe the facts and theory both support the notion that, rather than productivity growth resulting in job layoffs, just the opposite is at work here. To wit, **job layoffs are resulting in productivity growth**. The essence of my argument goes back to an Econ 101 lecture in which we learned (or should have) the difference between a *movement along* a demand or supply curve and a *shift* in a curve. If my interpretation of the facts is correct (there's always a first time), then the Fed's accommodative monetary policy is short-circuiting a necessary economic adjustment process and is destined to lead to a worsening trade-off between economic growth and inflation. Before launching (lurching?) into my argument, **I must pay a debt of gratitude to Rod McKnew, who professionally resides at Carr Futures, for refreshing my freshman memory that when a firm terminates its least productive workers, average productivity is bound to rise**. From this nugget given to me by Rod, the rest follows. Any mistakes are, of course, mine and not Mr. McKnew's.

Let's first look at the theory. Figure 1 is a standard supply and demand diagram, in this case, for labor. The real wage rate is measured on the vertical axis. The real wage rate is defined as the nominal wage rate deflated by the price of goods and services sold by the business sector. The supply of labor curve for labor slopes *upward* and to the right on the assumption that higher real wages will entice currently employed people to work more hours and will entice more people to join the labor force. The demand for labor curve slopes *downward* and to the right on the assumption that businesses will find it profitable to increase labor input as the cost of labor (the real wage rate) falls. It can be demonstrated that the demand for labor curve represents the marginal productivity of labor. As the marginal productivity of labor falls, it will be profitable to employ more labor only if the real wage falls. The marginal productivity of labor is assumed to fall as more labor inputs are employed because of the notion of diminishing marginal returns. In Figure 1, equilibrium between the supply and demand for labor is established at a real wage level indicated by $(W/P)_{E1}$. At this equilibrium real wage rate, the equilibrium level of hours of labor input is L_{E1} . We will call this Case 1.

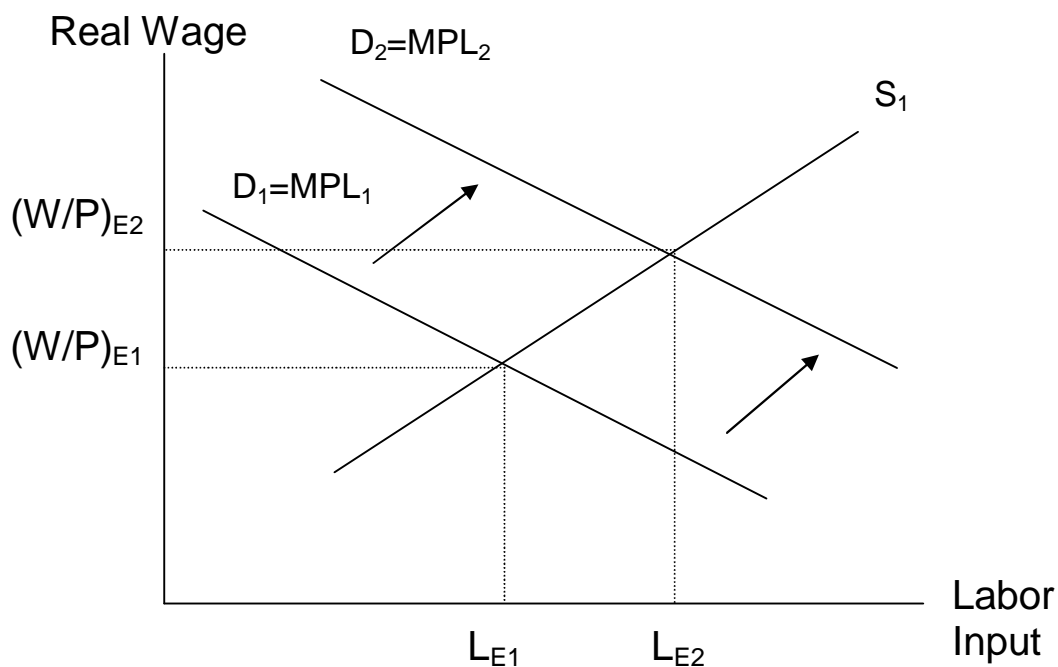


where W = nominal wage rate ; P = selling price of goods; D = labor demand;
 S = labor supply ; MPL = marginal productivity of labor ; L = quantity of labor input;
 Subscript 1 = case or state; subscript E = equilibrium.

Assume that because labor has additional capital (e.g. machines) with which to work, every unit of labor input can now produce more output. In other words, *all* workers are now more productive in this new case, 2. This means that there has been a *shift out* in the demand for labor or marginal productivity labor curve, as shown as the rightward shift in the labor demand curve from D_1 to D_2 in Figure 2. At any given real wage rate in Case 2, more labor input can be profitably employed. Under these circumstances, a new equilibrium real wage rate will be established at $(W/P)_2$ and a new equilibrium level of hours of labor input will be established at L_{E2} . Notice that both the new equilibria real wage rate and hours of labor input are higher in Case 2 (Figure 2) than in Case 1 (Figure 1). So, in Case 2, in which there has been a *shift out* in the marginal productivity of labor curve, we observe a *rise* in the real wage rate and a *rise* in labor inputs employed. Although not shown in Figure 2, a shift out in the marginal productivity curve would also imply a shift out in the *average* productivity curve. Therefore, in the new equilibrium, we also would observe a rise in average productivity.

The new higher equilibrium real wage rate can occur by a decline in selling prices, by a rise in nominal wage rates, or by some combination of the two. Given the Fed's fear of falling prices, the higher equilibrium real wage probably would arise through higher nominal wages.

Figure 2

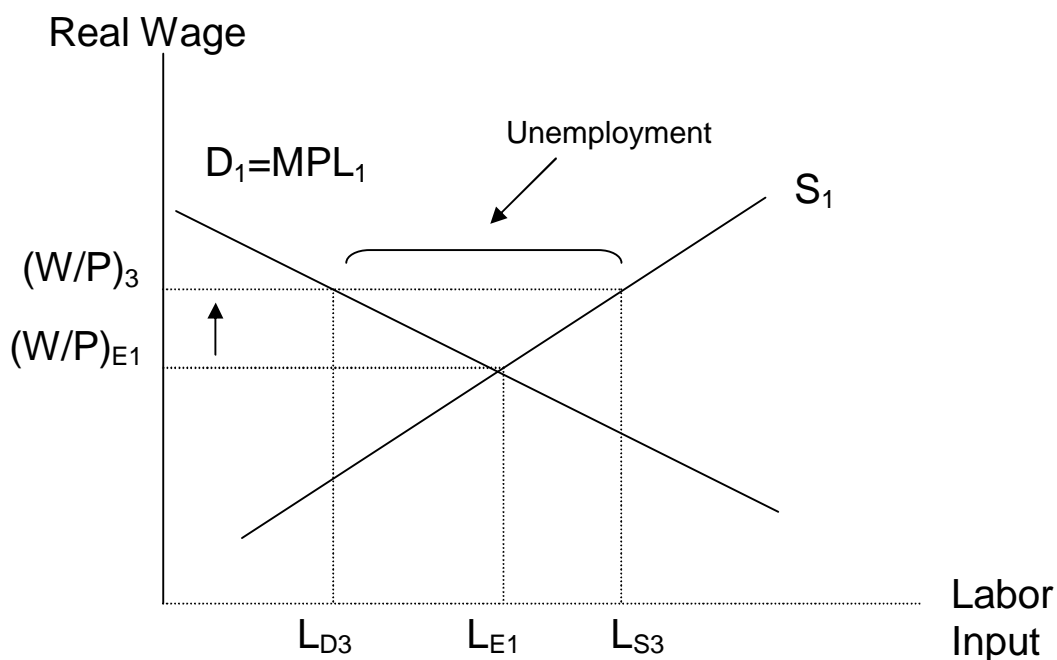


Finally, assume that businesses overestimated the demand for their products when they made previous investments in plant and equipment. As a result, with excess capacity, their selling prices are falling. Also assume that nominal wages are “sticky” in the downward direction. (Typically, sticky nominal wage rates are blamed on labor unwilling to take a nominal pay cut. However, I have observed that management sometimes does not offer labor that option. Perhaps for morale reasons, management simply lays off its perceived less productive workers without giving them a choice to stay on at a reduced nominal wage rate.) In this case, 3, the real wage rate will rise to $(W/P)_3$, as shown in Figure 3. At this higher real wage rate, moving *up along* the demand for labor curve, D_1 (or, moving *up along* the marginal productivity of labor curve MPL_1), at the higher real wage rate, $(W/P)_3$, a *smaller* quantity of labor input is *demanded*, L_{D3} . But at the higher real wage rate, a *larger* quantity of labor input is willing to be *supplied*, L_{S3} . Hence, we have unemployment. So, in Case 3, in which there has been a movement *up along* the marginal productivity of labor curve, we observe a *rise* in the real wage rate and a *fall* in labor inputs employed. Again, the average productivity curve is not shown in Figure 3. A movement *back along* the average productivity curve in its *relevant* range for profit-maximizing-labor input will result in *rising* average productivity. **So, a profit-maximizing firm that is firing employees or cutting back on hours of employment because its labor costs are too high will experience rising marginal and average labor productivity.** (It can be demonstrated that profit-maximizing firms will be operating on the segment of the average labor productivity curve that is past its zenith and, therefore, is downward sloping. So, a movement along this curve back toward the origin implies that average labor productivity will be rising. An intuitive explanation of this is that as a firm hires successively less productive workers, because each new hire contributes less to total output than the prior hire, each successive new hire brings down the average productivity of the total of those

employed. Conversely, as these less productive workers are successively fired, average productivity rises.)

In order to restore equilibrium in the labor market, either nominal wages have to fall or selling prices have to rise. But one way or another, the real wage has to move lower. If the central bank responds by printing more money, equilibrium will be restored by rising prices. If labor is unwilling to accept this lower real wage, then it will demand an increase in its nominal wages, which, in turn, will lead to a rise in unemployment again. If the Fed keeps varying the money supply so as to achieve a target unemployment rate under these circumstances, then a stagflationary spiral will result.

Figure 3



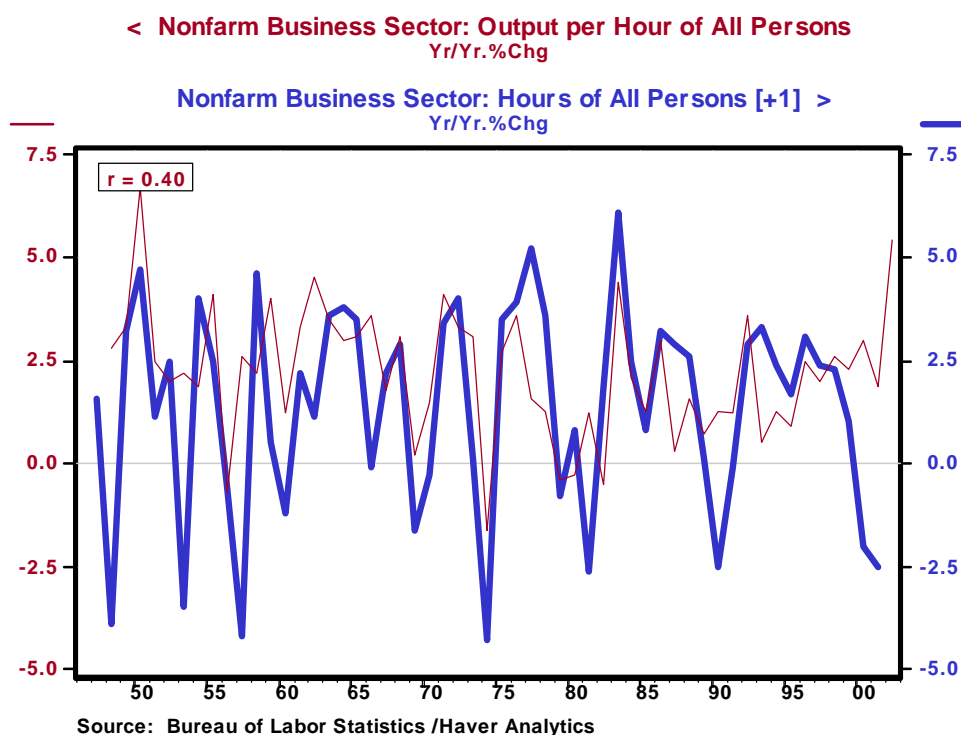
So, rising productivity will result in rising employment if that rising productivity is the result of a shift out in the marginal and average productivity curves. A shift out in the productivity schedules is *not* consistent with falling employment. However, falling employment will result in rising productivity as profit-maximizing firms move back along their marginal and average productivity curves. **In sum, it is theoretically possible that layoffs are resulting in rising observed productivity rather than rising productivity resulting in layoffs.**

Now, let's move from the theoretical world to the real world, if we can make the heroic assumption that government-issued economic statistics are a fair representation of the real world. Chart 1 shows the behavior of annual percent changes in nonfarm productivity and annual percent changes in labor input. (The productivity data provided by the BLS refer to *average* productivity, *not marginal* productivity. This is one reason I went to pains to discuss both marginal and average productivity in the theoretical discussions above. In general, productivity growth tends to be *positively* correlated with labor input growth with productivity *leading* labor input by one year in the postwar era (WWII, that is). This positive correlation between productivity growth and labor input is consistent with Case 2 – a shifting marginal productivity schedule. Because of the one-year lag, it may be too early to

tell, but **it looks as though recent behavior between productivity growth and labor input growth might be an exception to the general postwar relationship.**

Specifically, growth in labor input slowed sharply in 2000 and contracted sharply in 2001 and 2002. Although productivity growth did slip from 3.0% in 2000 to 1.9% in 2001, the contraction in labor input by 2.5% in 2002 seems to be an extreme reaction in an historical context. Moreover, although the rate of labor input contraction so far in 2003 has moderated, given the surge in productivity of 5.4% in 2002, the 2003 response in labor input seems much muted, again in an historical context. **The behavior of the relationship between lagged productivity growth and labor input growth in recent years appears to be more consistent with Case 3 – firing leading to rising productivity growth.**

Chart 1

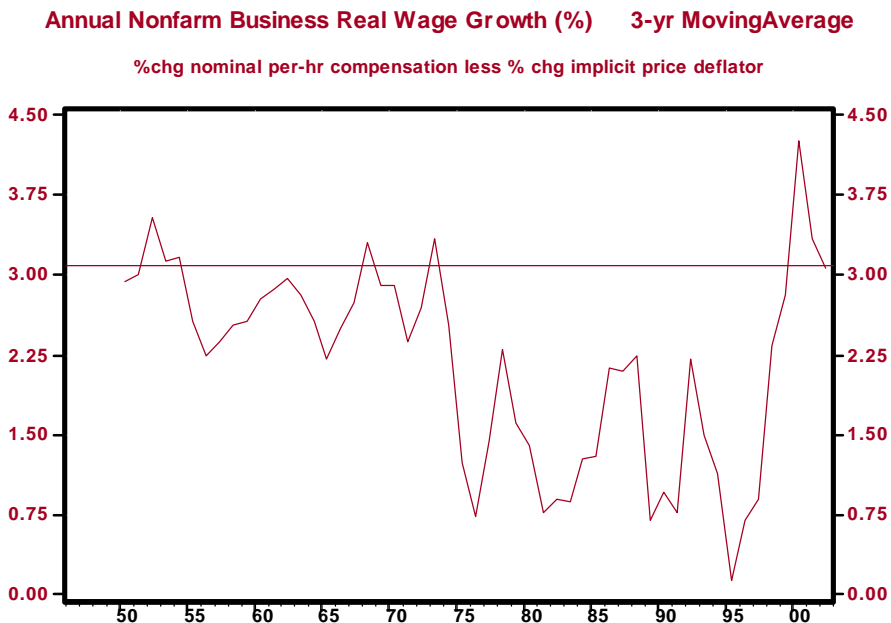


It is conceivable that the lead-lag relationship between these two series could change depending on whether productivity curves are shifting or movements along curves are occurring. It seems reasonable that businesses might take some time before increasing hiring in the face of a shift out in the marginal productivity of labor curve in order to make sure that the increased productivity is not temporary. If, however, labor inputs are cut because real wages are above profit-maximizing levels, there should be an *immediate* increase in observed productivity. **Thus, the more contemporaneous combination of rising productivity growth and contracting labor input growth that we have observed in recent years is more consistent with Case 3 than Case 2.**

In both Cases 2 and 3, real wages are rising. Along with rising real wages in Case 2, when the productivity of labor curve is shifting out, labor input also is rising. In contrast, in Case 3, rising real wages are associated with falling labor input. In recent years, labor input has been contracting. What do you suppose has been happening to the growth in real wages in

recent years? They have been soaring. As shown in Chart 2, on a 3-year moving average basis, annual growth in real wages hit a postwar high of 4.3% in 2000. Subsequently, growth slowed to 3.1% in 2002. But even at this slower rate, real wage growth was high relative to most of the postwar era. **This recent strong growth in real wage rates is consistent with Case 3. Namely, Corporate America has been laying off folks because it is just unprofitable to keep them on the payrolls.**

Chart 2



So, before you take hammer to laptop, consider the possibility that *layoffs are contributing to higher observed productivity* rather than higher productivity contributing to layoffs. If productivity were increasing because *all* workers were becoming more productive, that is, the productivity schedules were shifting outward, then the Fed could print more money with out causing higher absolute inflation. (Of course, by printing more money under these circumstances, the Fed would be creating higher *relative* inflation, which would cause distortions in the economy. But that's another commentary). The Fed believes in the outward-schedule-shift in productivity growth. So, it believes it can print more money without causing higher inflation. But if observed productivity is rising because of movements up along the productivity schedules, then the Fed's printing of more money will ultimately result in higher *absolute* inflation. Is it any wonder, then, that the greenback is under downward pressure and commodity prices are trending higher?

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