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Economic Newsletter for the New Millennium
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PRODUCTIVITY: It is praised by most, cursed by a few, but the most recent report is a Macroeconomic warning sign of trouble. Is it a prelude to another dip in economic activity?

An examination of many of the questions you wanted to ask but for some reason, never did.

Like many topics in economics, productivity has relevance for both macroeconomics and microeconomics. While the editors of this website come from a tradition of micro before macro, we will indulge those of the macro first philosophy. In the latter part of this article, we shall unravel the micro origins and significance of productivity.

Several days ago, the Bureau of Labor Statistics issued a report based upon their last Establishment Survey of Employment, which covers other topics as well, one of which is labor productivity. Besides reporting a dismal sub-par increase in jobs, it also reported a significant decline in the productivity of labor.

http://www.bls.gov/news.release/prod2.nr0.htm

> *PRODUCTIVITY AND COSTS*
> *First Quarter 2012, Revised*

> *Nonfarm business sector labor productivity decreased at a 0.9 percent annual rate during the first quarter of 2012, the U.S. Bureau of Labor Statistics reported today. The decline in productivity reflects increases of 2.4 percent in output and 3.3 percent in hours worked.*

What this means is that while output increased, the hours of work it took to produce that marginal output increased at a more rapid rate; hence, the per unit cost of that output increased, resulting from a decline in the productivity of the labor employed.

http://www.dailyfinance.com/2012/06/06/worker-productivity-fell-first-quarter-hiring-outlook-jobs/

> *"U.S. worker productivity fell by the largest amount in a year from January through March. The steeper drop than first estimated suggests companies would need to hire more if demand were to pick up."*

The Associated Press Reporter, Martin Crutsinger, posted an article on June 6, 2012, wherein he made the argument that this reported drop in labor productivity should trigger an increase in employment to offset that very decline in labor productivity. This may be the scenario, but we here at the New Economic Paradigm doubt very much that this reference to demand picking up augurs an increase in labor hiring to compensate for the decrease in labor productivity. Historical evidence argues the other way.

From a macroeconomic perspective, this may be solid evidence that a further recessionary dip is underway in the U.S. economy. Economic history has shown us on many occasions, that in the initial phase of a recession, the first sign is a decline in labor productivity. Why is this so, you may ask? Well, firms are reluctant to lay off labor until they are sure the weakness in demand will be lasting. As they cut back production, due to the weakening demand for their product, labor productivity declines. Only when they are sure that demand will not pick back up, will they undertake layoffs of labor. Unfortunately, a decline in labor productivity can be caused by other factors, but just the same, recessions usually begin with a decline in labor productivity. This is especially true after a period of strong recovery and growth, and while the U.S. economy has definitely NOT been experiencing an economic rebound, it can also occur if firms had already been at a relatively barebones level as is currently the case.

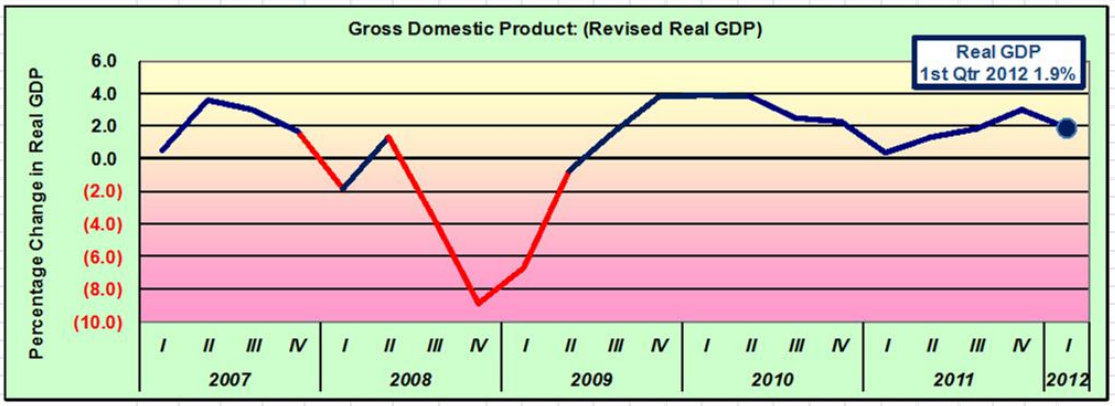
The decrease in the real rate of growth in GDP last quarter, while a bit complex causation-wise, is further evidence of a possible beginning of a recession. Capital goods spending also showed strong evidence of weakening.

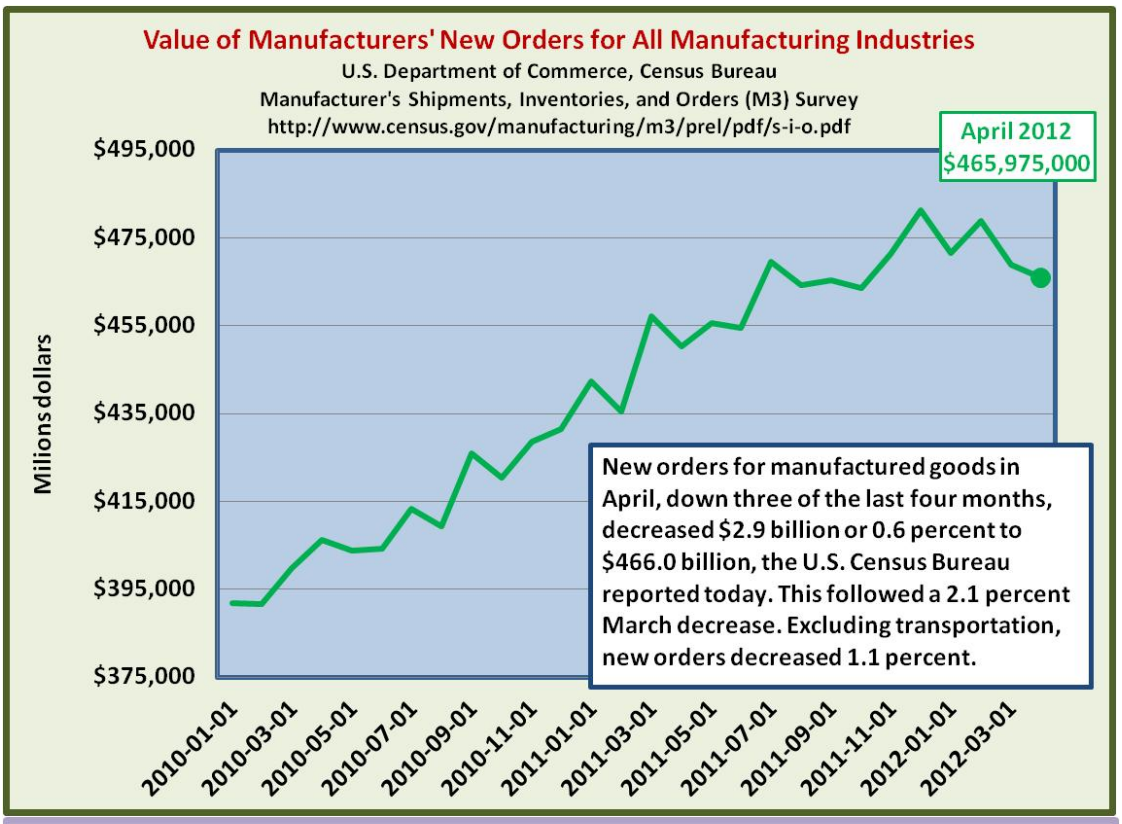
Falling GDP in 1st Quarter 2012 - a sign of more bad news on the way

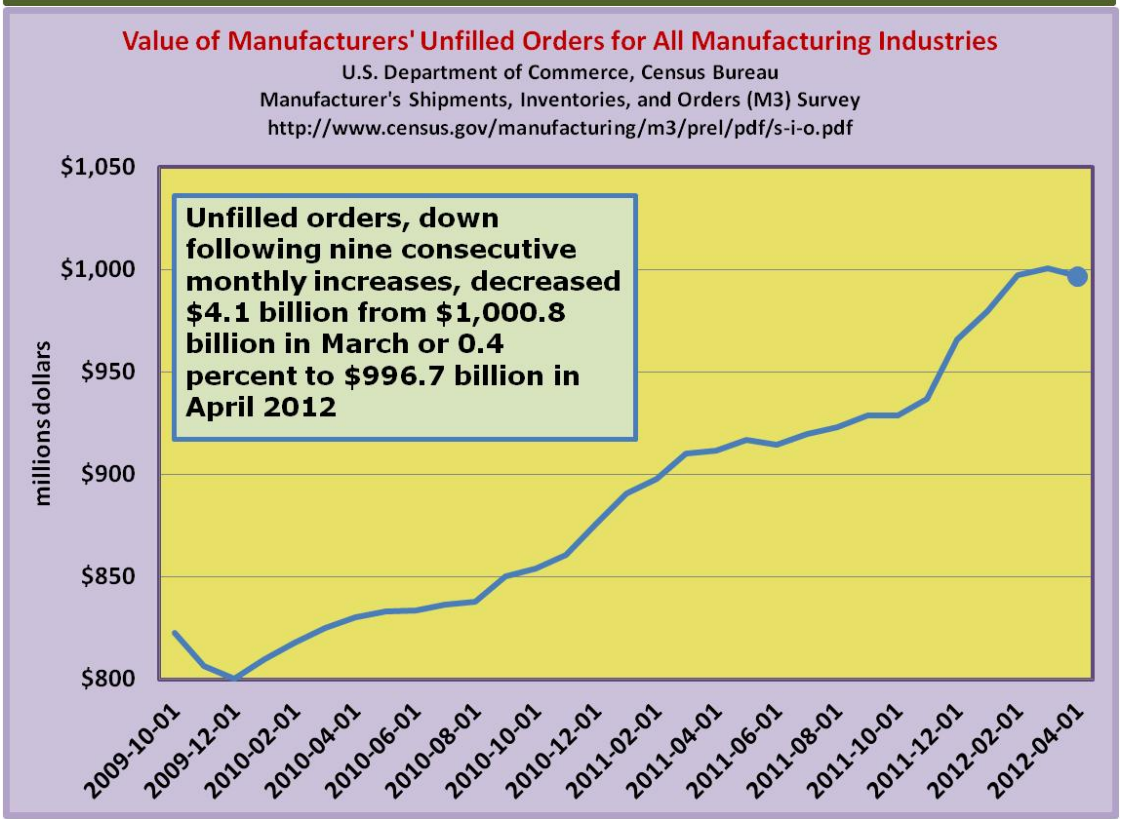
(Webster's Dictionary) RECESSION : A period during which economic activity, as measured by gross domestic product, declines for at least two quarters in a row in a specific country. If the decline is severe and long, such as greater than ten percent, it may be termed a depression.

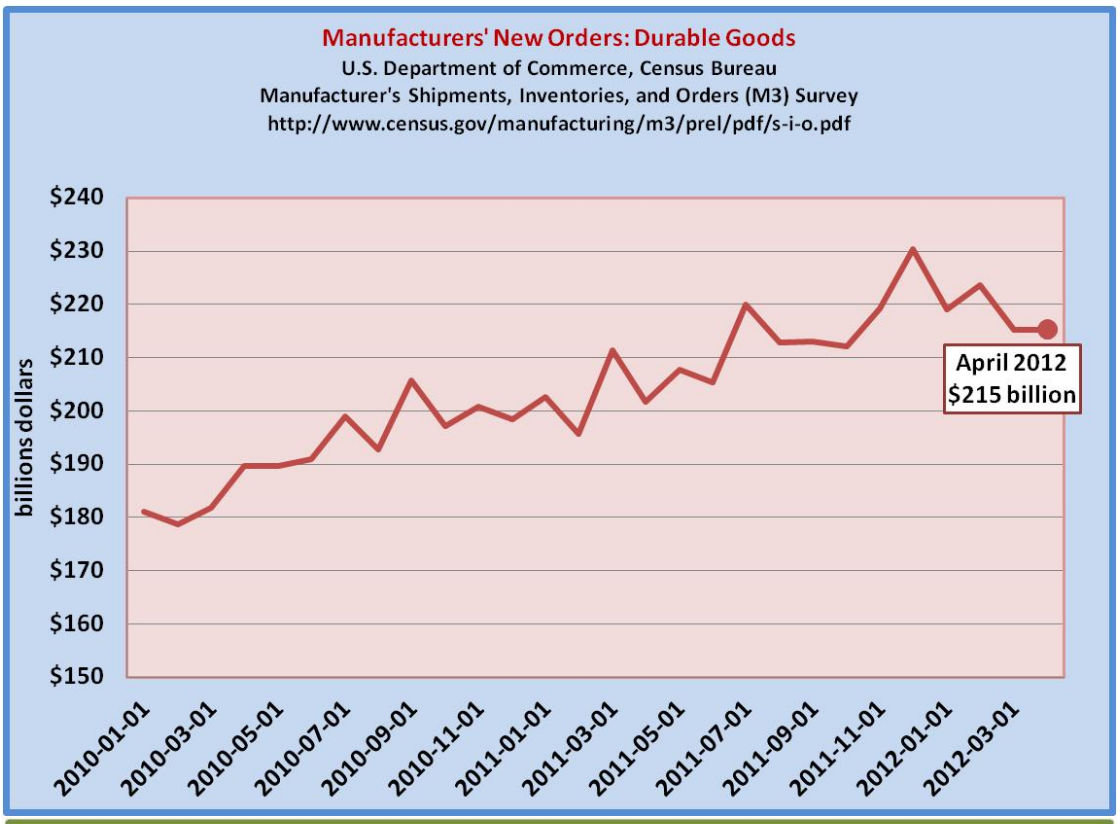
Bureau of Economic Analysis (BEA)
Table 1.1.1. Percent Change From Preceding Period in Real Gross Domestic Product
http://bea.gov/iTable/index_nipa.cfm
[Percent] Seasonally adjusted at annual rates
Today is: 6/18/2012 Last Revised on May 31, 2012 Next Release Date June 28, 2012

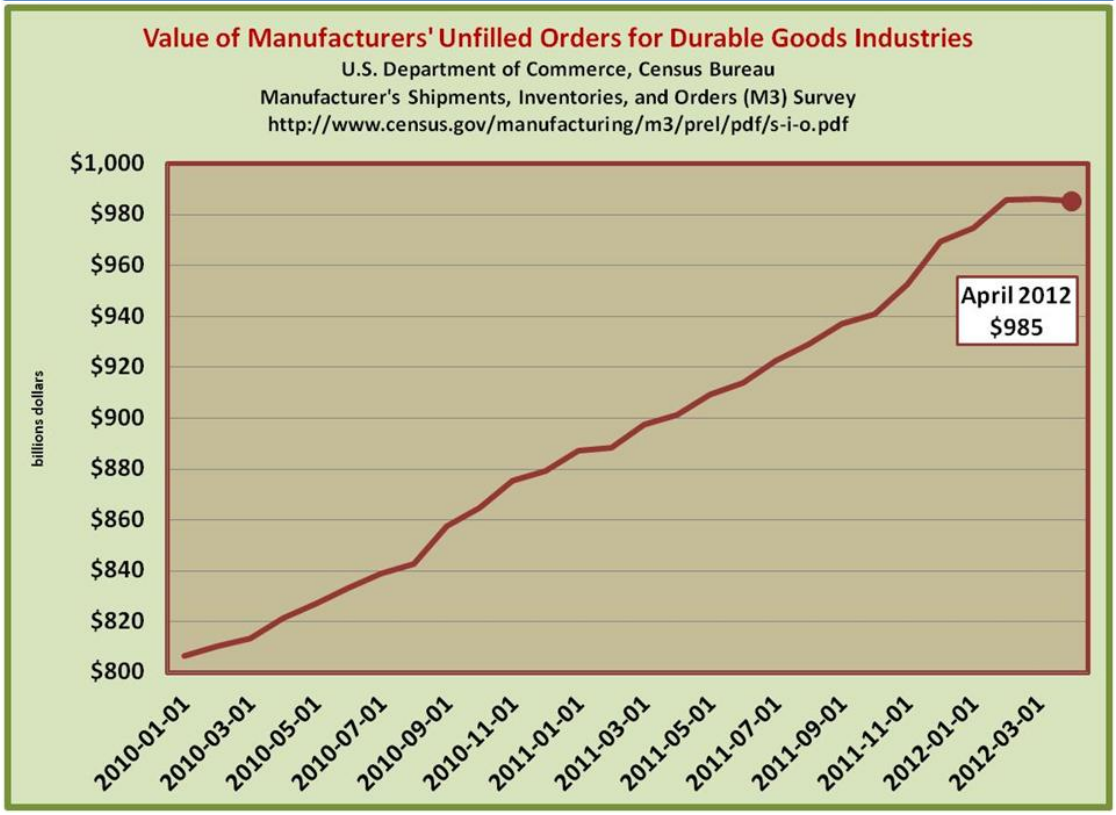
	2007				2008				2009				2010				2011				2012			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
Gross Domestic Product: (Revised Real GDP)	0.5	3.6	3.0	1.7	(1.8)	1.3	(3.7)	(8.9)	(6.7)	(0.7)	1.7	3.8	3.9	3.8	2.5	2.3	0.4	1.3	1.8	3.0	1.9			









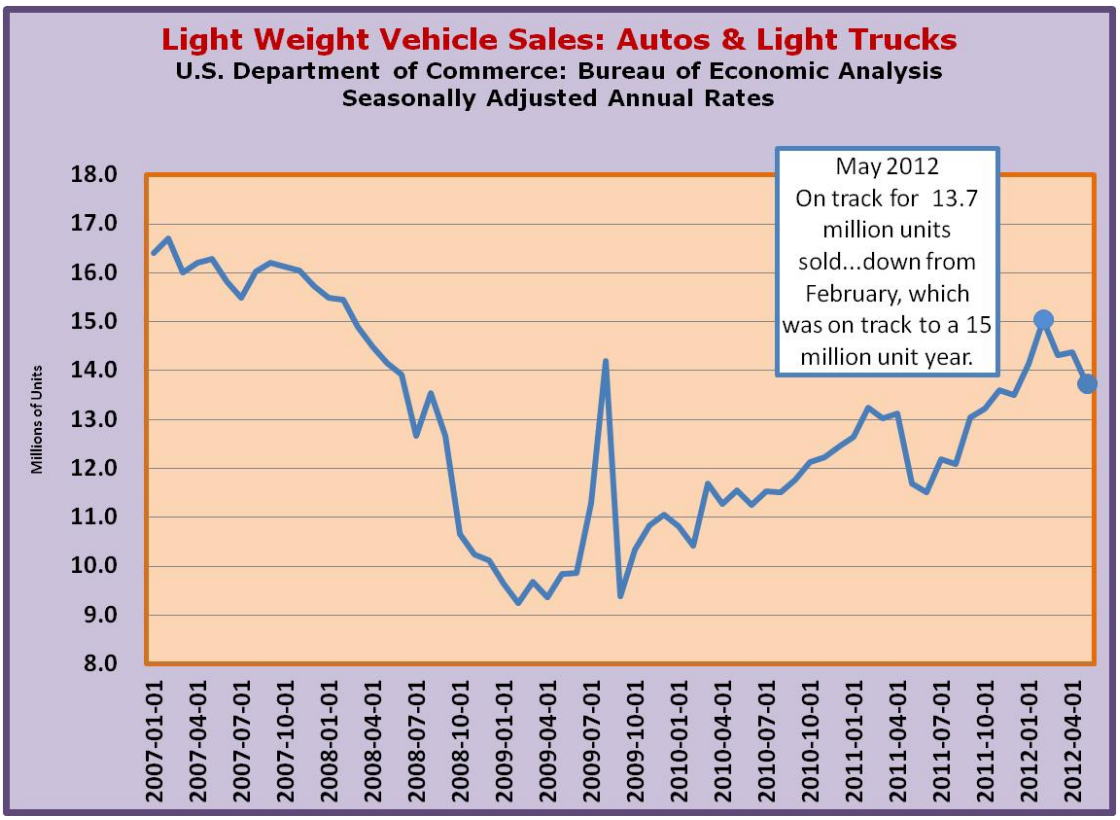


If the recent slight uptick in the labor force participation rate is reversed, and the encouraged workers revert to being once again discouraged workers, it will be further evidence of a weakening economy and along with other labor market figures could indicate a recession had begun or is about to begin. The evidence seems to be mounting.

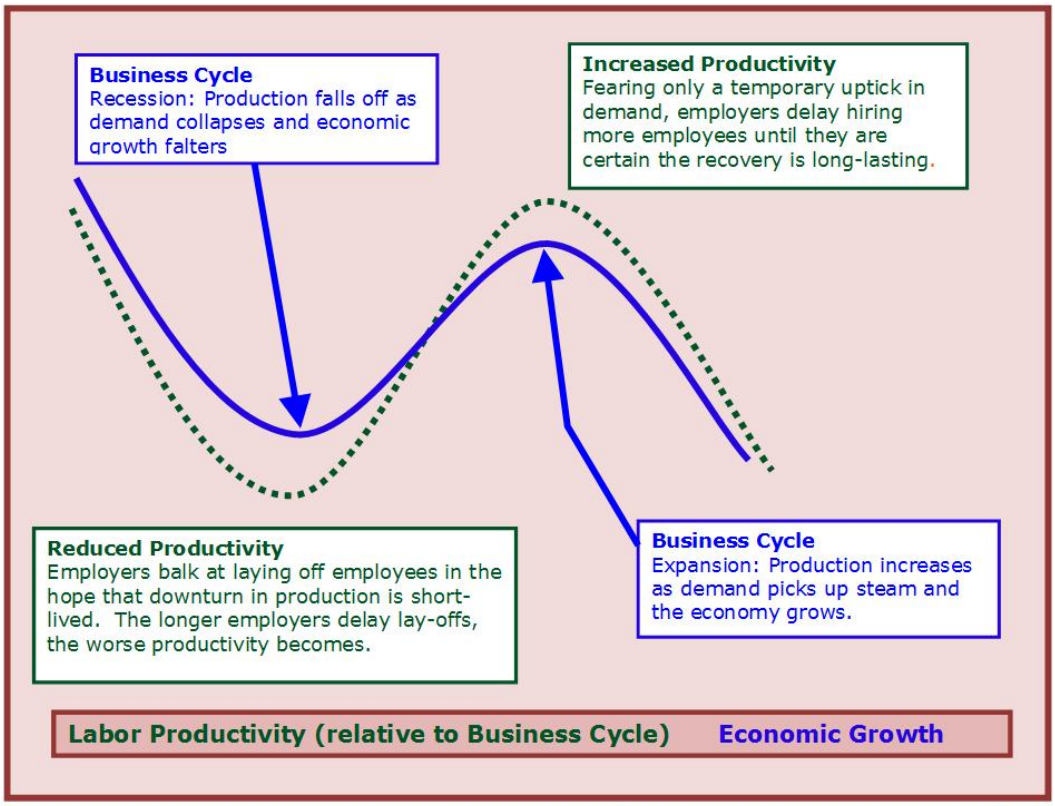
There is a bit of ambiguity in the data from the most recent quarterly and monthly reports coming out of the U.S. Commerce and U.S. Labor Departments. The drop in labor productivity could be interpreted as resulting from microeconomic causes. A decrease in some sectors (e.g., manufacturing) relative to others in the Establishment Report could account for an increase in hours worked at the same time that labor productivity was falling. This would be consistent since the various sectors have different physical productivity patterns.

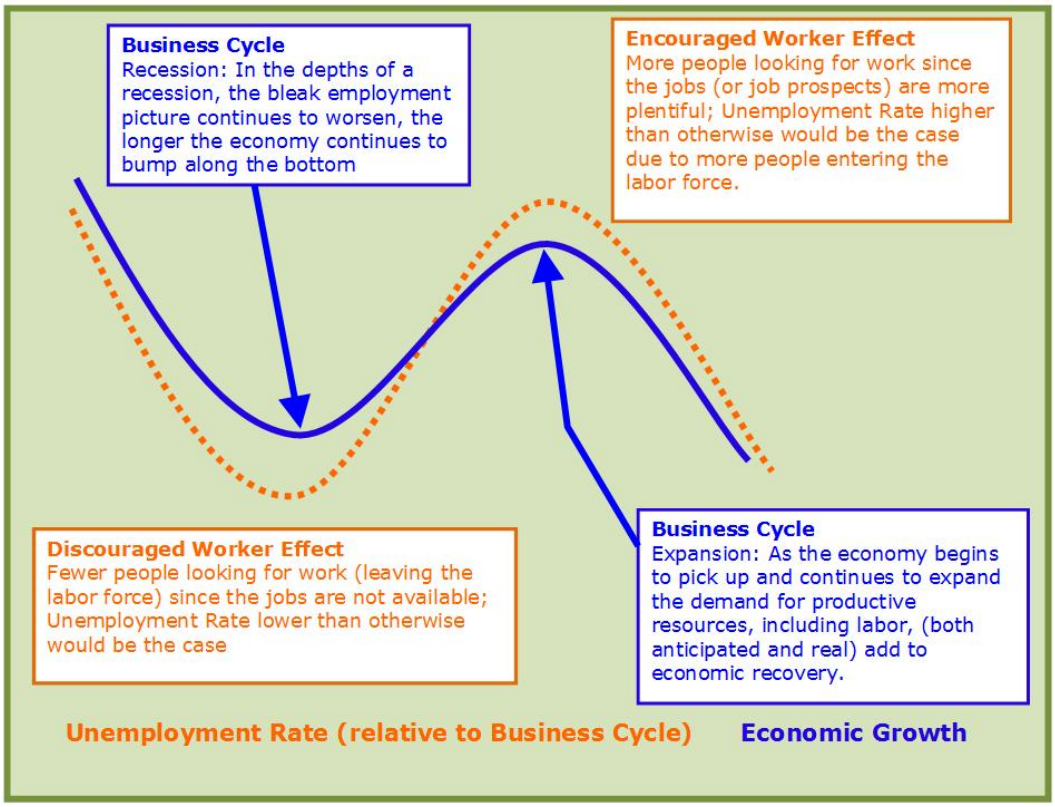
Light vehicle sales peaked in February of 2012 at a seasonally adjusted annual rate (SAAR) of around 15 million units, but then began a downward slide through May to 13.7 million units (SAAR), according to the latest data available.

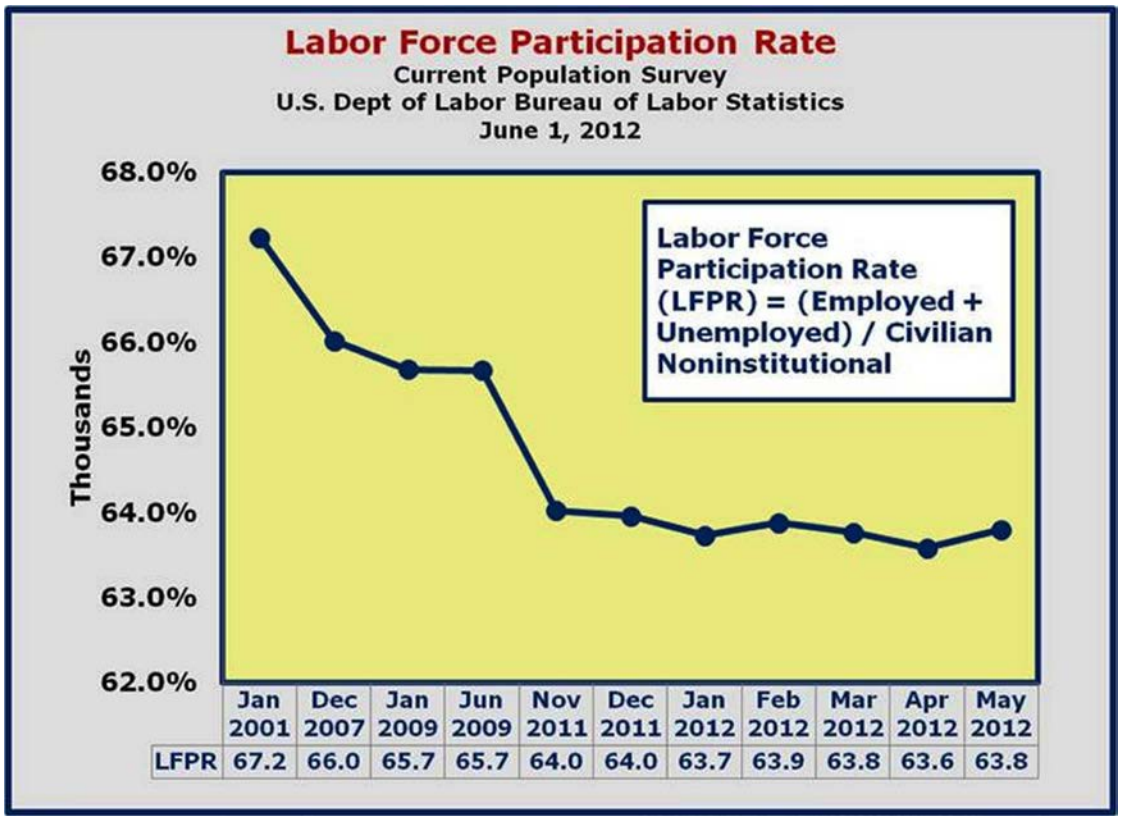
Ending in February, this spike in light vehicle sales is attributable by most analysts as a response to pent-up demand related to the massive fall-off in light vehicles over the past few years. At least some of the increased production certainly resulted in more labor hours in the form of overtime. Increased usage of overtime often accompanied by a drop in marginal physical productivity of labor is due to a less efficient labor to capital ratio, a kind of diminishing returns, as well as the fatigue issue on the part of the workers. This is consistent with both the micro and macro aspects of labor productivity over this time period.



Given the most recent reports on manufacturing declines, such data is also consistent with the more historical macroeconomic productivity pattern of a decline in labor productivity occurring at the beginning of an economic downturn.







Now we can look more deeply into the microeconomic analysis of productivity. Understanding this concept will be very helpful in a newsletter on the labor market to follow in a week or two.

The issue of what is productive or creates 'surplus value' has a long history in economics. Perhaps the Labor Theory of Value has drawn the most attention. Whether it be David Ricardo's version or that of Karl Marx, it has had many disciples through the last two hundred plus years. Socialism and its more virulent form, communism, are examples of economies, at least nominally, being directed by the Labor Theory of Value.

Land has been another candidate for the producer of surplus value whether it be the version of Francois Quesnay's Physiocratic School, so influential on Adam Smith, or that reflected in Henry George's land taxation system.

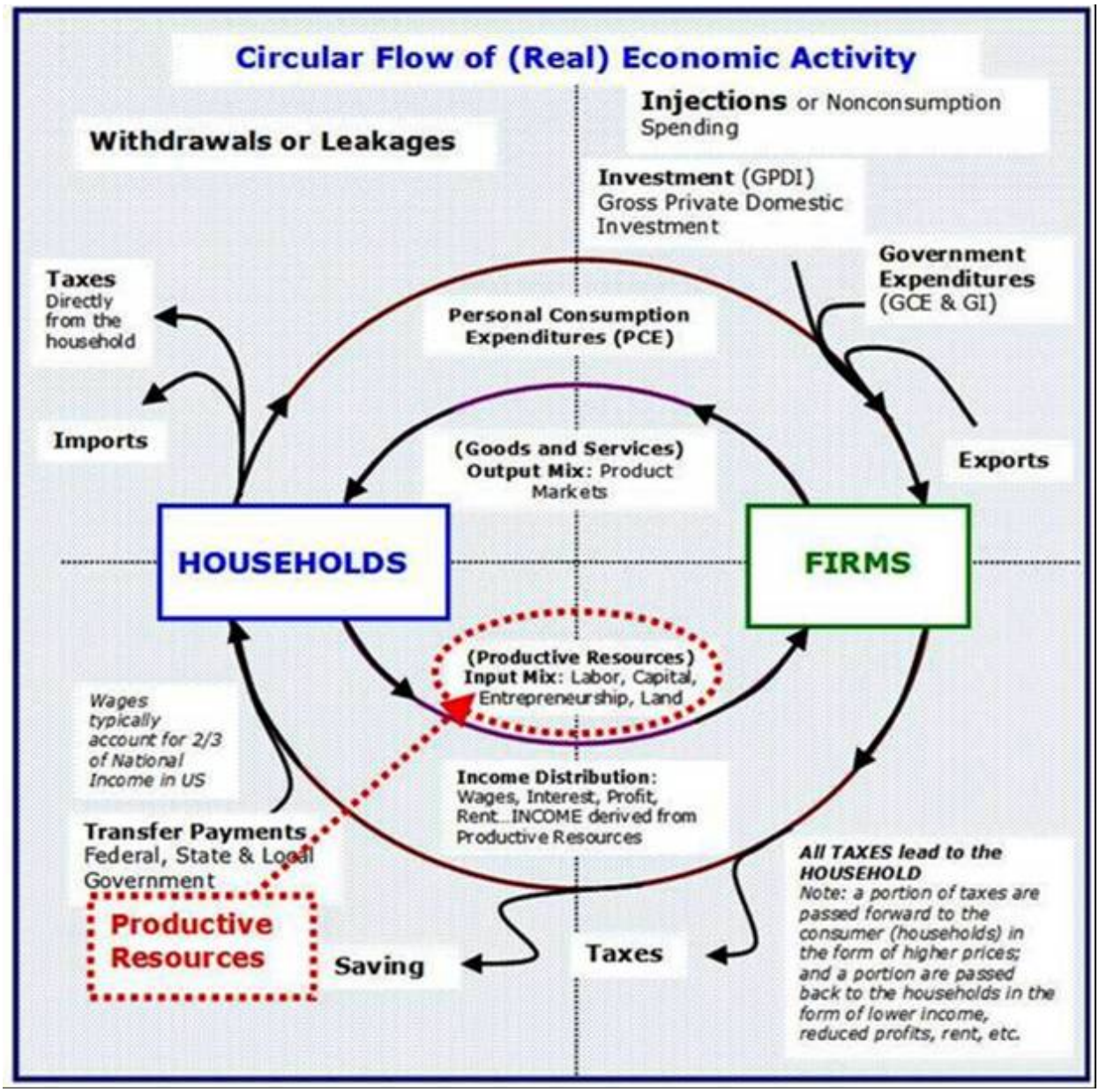
Our view here at the New Economic Paradigm Associates is that all value, including surplus value, is created by human effort as it is directly or indirectly involved the transformation process termed production. The human beings living in households ultimately supply all the productive resources, labor, debt and equity capital, entrepreneurship, and land.

They are directly involved in the production process when supplying labor and entrepreneurship to the production process occurring at the firm where production occurs. Households (human beings) are less directly involved when they supply debt and equity capital and land. The latter two are a result of households earning incomes, saving or deferring consumption, bearing risks and investing their saving. Even if government intervenes in the production process, it is financed by taxes which are effectively a form of forced savings required of households, the fruits of which whether desired by the taxed or not desired, are collective consumption and investment.

Productivity comes in two basic metrics, the real physical productivity, such as in diminishing returns, or the monetized one such as in unit labor costs. Think of the Gross Domestic Product of an economy as the result of all of the productive resources that participate in the transformation process called production times their physical productivity monetized by the prices of those goods and services. GDP will increase in one of three ways: either the quantity of productive resources employed increases, or their productivity increases, or the market price of the product produced increases. The latter factor monetizes the change in real GDP.

While much of the literature on productivity focuses on labor, all resources (labor, debt and equity capital, entrepreneurship and land) are productive. All productive resources emanate from the direct or indirect involvement of households.

Let's begin with the basics. Just below is a picture of the Circular Flow of Economic Activity. On the left-hand side of the circular flow of economic activity are the households. As explained above, in a free-market capitalistic system, households supply all the resources. They do this through direct involvement in the transformation process of production by supplying labor and entrepreneurship. The households are indirectly involved by supplying debt and equity capital and land to the production process. All resources are thus supplied by households to the firm.



The firm is the place where this transformation process of production occurs. That's all the firm is, the place where production occurs. The firm is not the productive resources. The households supply the productive resources to the firm in order to earn or receive a reward that is called income. Income is the reward to households for the current supply of productive resources to the production process occurring at the firm.

At the firm these resources are combined and transformed into useful goods and services sold by the firm in the markets for goods and services, the

upper half of the circular flow, the product or output markets. The households can then choose to spend this income by buying back the goods and services they helped produce through the production process. Households buy goods and services that are called consumption, technically Personal Consumption Expenditures (PCE). They also spend some of their income in order to buy residential housing, technically part of Gross Private Domestic Investment (GPDI) in the National Income and Product Accounts or NIPA.

That income not spent to buy back the goods and services they helped produce are called withdrawals and include saving, taxes, and in the purchase of those goods and services produced in the rest of the world, termed imports.

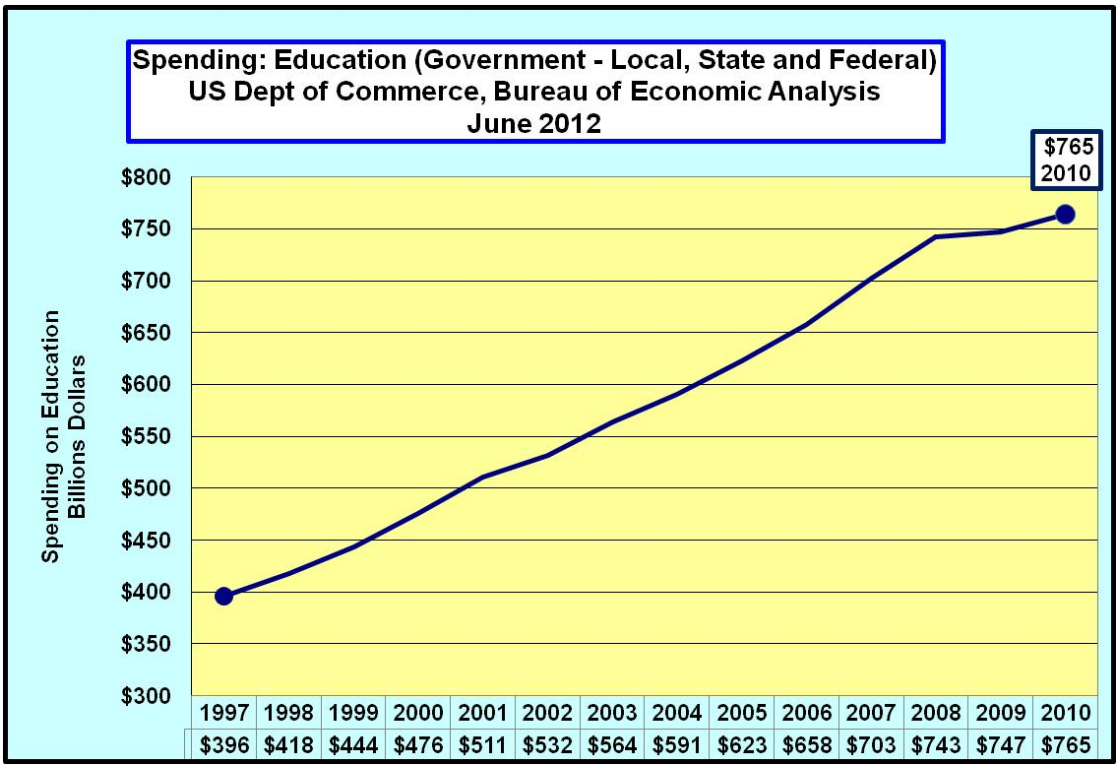
Note that in the market for goods and services, households demand the goods and services while firms supply those goods and services in these same product markets. The revenues to the firm are the expenditures of the households and other non-household buyers such as exports to the rest of the world, government expenditures on goods and services, so-called collective consumption and investment, and the investment spending on capital goods by firms and households. The non-consumption spending components are grouped together and are called injections which along with consumption constitute what is termed, aggregate demand.

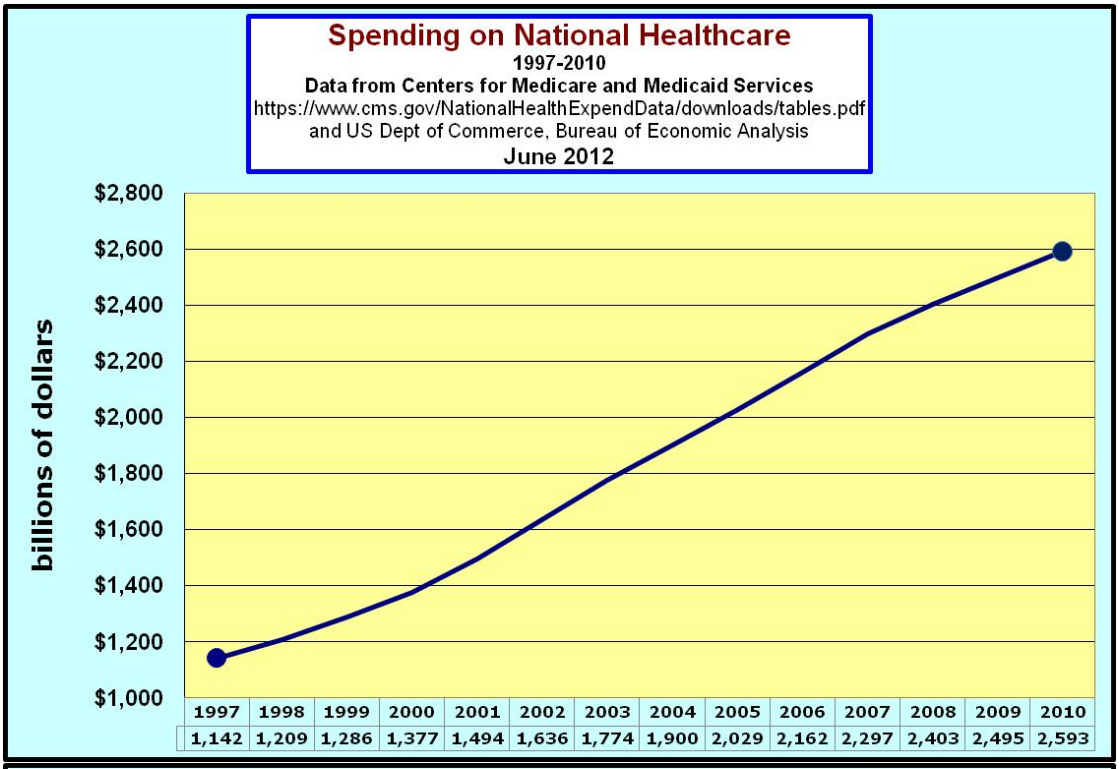
If we move to the lower half of the circular flow of economic activity, we find the markets for the productive resources or input markets. Note the role reversal. In these markets, the households are the suppliers of the productive resources of labor, debt and equity capital, entrepreneurship, and land while the firms are the demanders of these productive resources. The income of the productive resources is a cost to the firms.

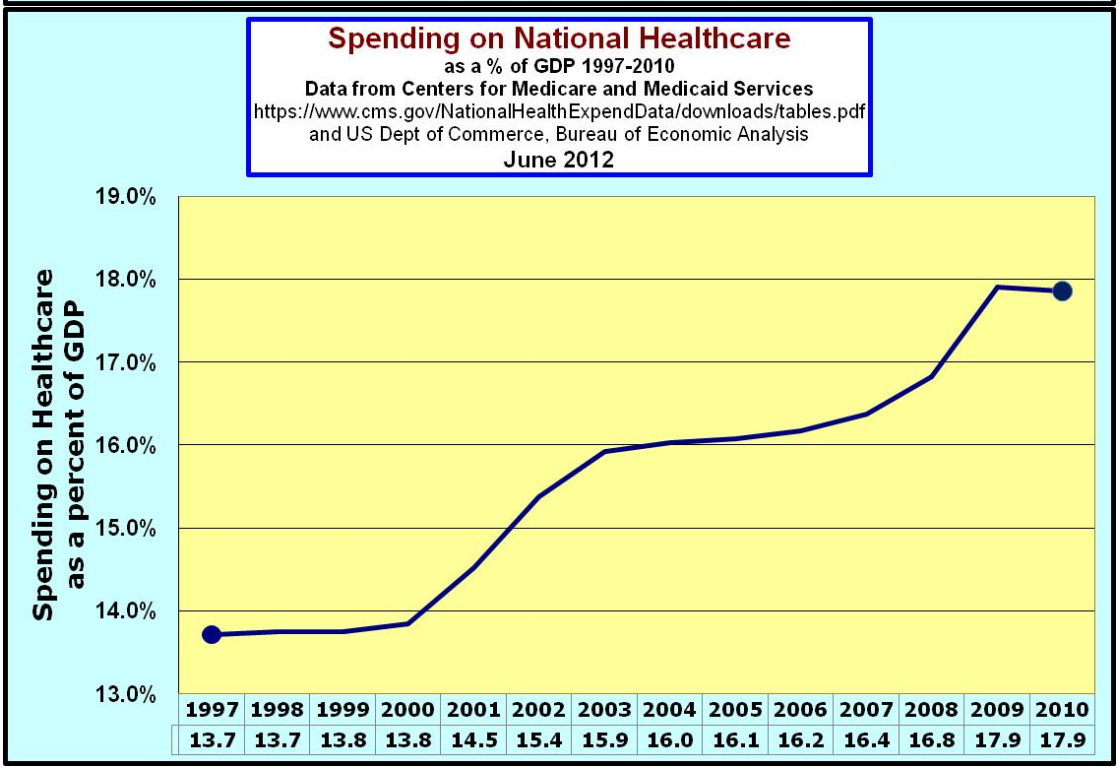
The productivity of a productive resource such as labor is what that resource adds to production or output when it is employed in the production process by the firm.

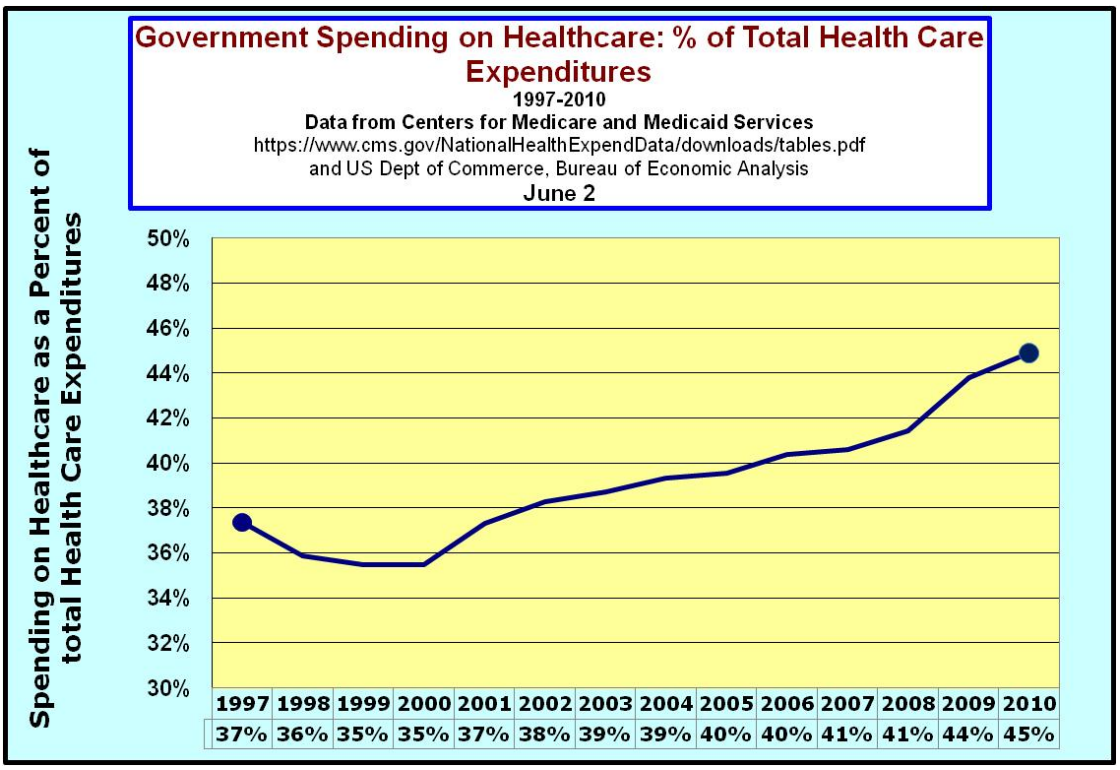
It may seem confusing to the reader, but the equity capitalist, the owner of the firm, is also employed by the firm that the equity capitalist owns. In effect, the equity capitalist is self-employed not as a worker but as an owner financing the assets of the firm along with the creditors, the debt capitalists. It may also be confusing to the reader not well versed in economic theory, that the productive resource we refer to as labor is increasingly an

embodiment of capital, human capital that is. The discipline of economics has been amiss in this regard. Education, training, etc are the ways of embodying human capital in labor. It, like physical capital such as machinery and factories is essential to increasing productivity and increasing the standard of living of society. One might reasonably argue that much of the expenditures on health care also maintain and increase the productivity of productive resources, especially that of labor. There is no free lunch in promoting productivity and the good material life.









End of Newsletter

Addendum on the theoretical aspects of productivity…

For those who have the time and desire to delve more deeply into the theoretical aspects of productivity and how that is related to the economy's behavior, we refer you to the following.

Now we turn to the microeconomic causes and effects of productivity change in such concepts as the law of variable proportions of which diminishing returns is a part. The variations on this topic are endless. In this analysis we will focus on how productivity related to the labor market.

Productivity is the essence of many popular terms, usually not very well understood by many including those using the term. Automation, labor intensive, comparative advantage and featherbedding are but a few of those terms into which we will now delve.

PRODUCTIVITY: a Microeconomic journey

Focusing on labor productivity, we can distinguish between several measures of the physical productivity of labor, namely total, marginal, and average physical product. Each has different implications. Just below, you'll find a picture or graph of what is called a production function, in this case for labor. It assumes that all other productive resources such as physical capital are fixed in quantity and that the only resource that can be varied in quantity employed is that of labor. On the vertical axis of this graph is measured the output of units of production resulting from the transformation process of production. On the horizontal axis we measure the quantity or number of units of the variable input labor, e.g. person years.

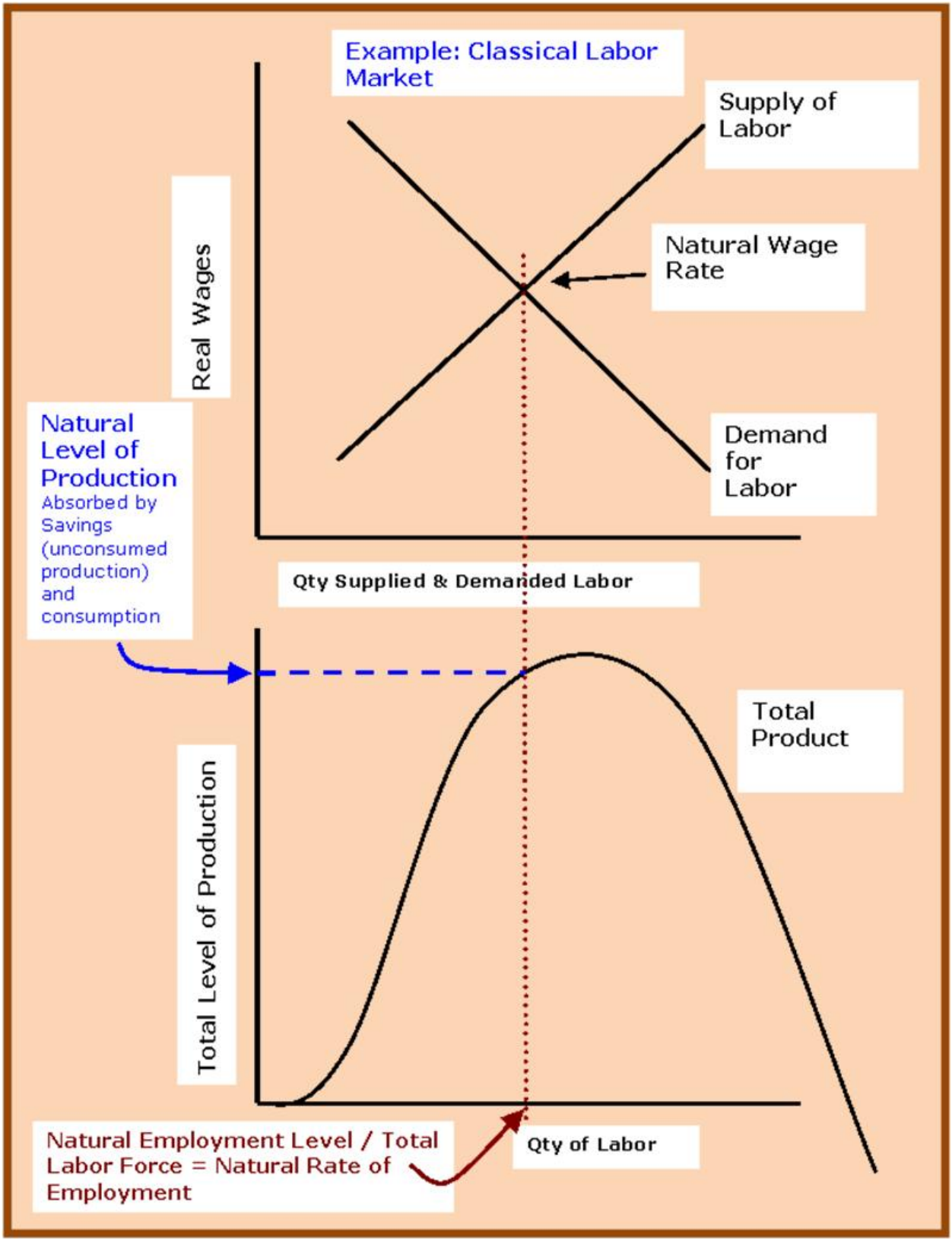
See below the graphs related to the following paragraphs.

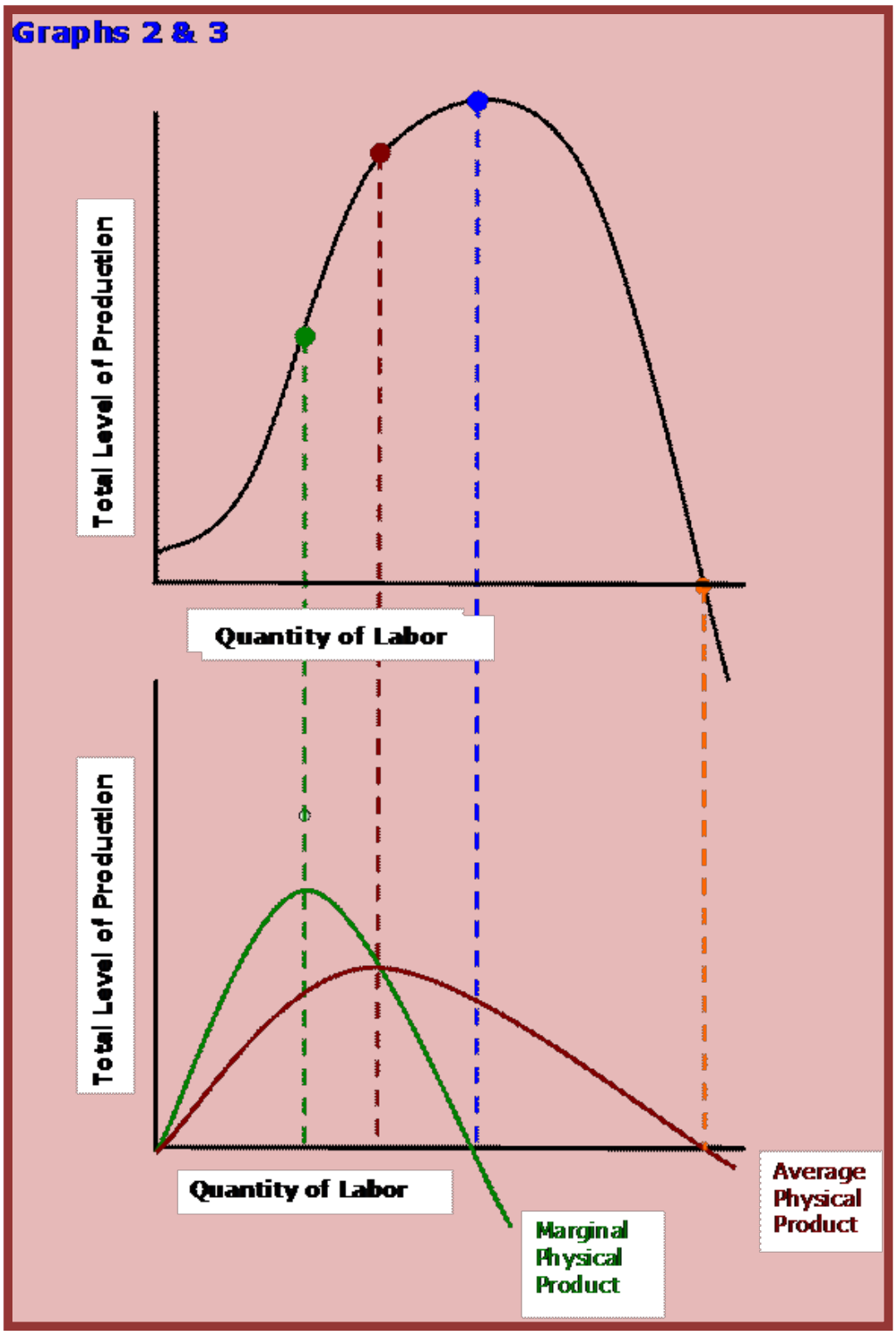
Graph one is the labor market. The supply of labor and the demand for labor determines the equilibrium real wage. The use of the real wage or nominal wage divided by the price level assumes that there is no price illusion. In the current literature, this is equivalent to the assumption in rational expectations, where the consumer reacts immediately to any change in prices in the market place. "Money is a veil," as noted by Jean-Baptiste Say, where he points to the idea that financial capital merely facilitates the purchase of goods and services.

The quantity supplied of labor increases as the real wage rises. This is so for two reasons. As each worker works more hours, less leisure remains. The scarcer is leisure, the more valuable is each remaining hour of leisure. To overcome this, a higher real wage must be paid. Secondly, as the real wage rises, it overcomes the reservation price of those who are now willing to engage in work.

The demand for labor is the marginal revenue product of labor. If labor is subject to diminishing returns, as more labor is hired, the marginal physical product declines. This is NOT because firms are scraping the bottom of the labor pool so to speak, they are all clones of each other. It is due to the more intensive use of labor relative to a fixed amount of capital, etc. To monetize the physical product of labor, we multiply labor's physical product by the price it sells for in the firm's product market (price X MPP or value of labor's marginal physical product or by the marginal revenue (MR X MPP or labor's marginal revenue product.

If the firm employing labor is selling in a perfectly competitive market, the two are the same since price equals marginal revenue for a perfectly competitive firm since the demand curve facing a firm in a perfectly competitive market is perfectly elastic or horizontal at the level of the market price.





In graph two, directly below the labor market graph, is the relationship of the output or physical product of labor as we increase the quantity of labor by one unit (e.g. person years) at a time. It is called the production function. Beneath it in graph three are the counterpart, marginal physical product of labor and average physical product of labor curves. Since we are assuming a fixed stock of capital, constant technological state, etc., we are in the short-run; the physical product is not monetized. A traditional production function is used in the following example. It exhibits, first increasing physical returns to labor, maxes out and then exhibits diminishing physical returns to labor. Once the point of diminishing physical returns is reached, there are three aspect of this phenomenon can be distinguished.

They are diminishing marginal returns, diminishing average returns, and absolute or total diminishing returns. The Marginal Physical Product (MPP) and Average Physical Product (APP) curves are drawn directly below the total Physical Product (TPP) curve (production function) so graphs two and three have identical X or quantity of labor axes. In graph two, the slope of the tangent to each point on the TPP curve is the MPP. In the same graph, the slope of a line from the origin to each point on the TPP curve is the APP curve in graph three. Note there are three points of inflection in the TPP curve. The first identifies the point of diminishing marginal returns, where MPP is maximized. The second is the point of diminishing average returns, where APP is maximized. The third is the point of diminishing total returns, where TPP is maximized.

By extending the equilibrium real wage *from graph one down to graph two*, the level of total product produced by labor can be determined. This is termed the natural level of production as produced by the natural level of labor employed (at the equilibrium real wage). The natural quantity of labor employed in producing all goods and services (all markets cleared) divided by the labor force is the natural rate of employment. That percent subtracted from 100% is the natural rate of unemployment.

In the classical model, what assures that there will be sufficient demand for the natural level of production? The answer to that question is found in the classical theory of interest rates, where prices of goods and services rise and fall to clear markets (where the price of a good or services is too high and results in increased supply, which is followed by a fall in prices to facilitate market clearing to eliminate the glut.

Lord Keynes (John Maynard Keynes) disputed this vigorously and offered an alternative theory of interest rates called the Liquidity Preference theory of interest rates. He also pointed out that there were other withdrawals besides saving: taxes and imports, like savings, resulted in unconsumed production. They were not determined solely by interest rates but rather by other things, especially the domestic level of production and income. He also disputed the dominance of interest rates as the variable determining the behavior of saving. Both saving and consumption were predominantly determined by the level of income and production, the other side of the income coin, so to speak.

Note that if no labor was used, looking at the total product curve, no output will be produced. But as we increase the quantity of labor employed by the firm in the production process, total output rises. We are portraying in this graph the more classical view of first experiencing increasing returns, then constant returns, and finally diminishing returns as we continue to increase the quantity of labor employed by a firm with a fixed amount of all other resources. As mentioned above, this is an example of the law variable proportions at work.

Focusing on the total product curve, as we increase the quantity of labor employed from zero to a positive number, note that total product rises at an increasing rate, or more than proportional to the increase in labor, then begins to increase at a decreasing rate or less than proportional to the increase the quantity of labor. We have passed through this inflection point where for an instant the productivity of labor has gone from one of increasing returns to diminishing returns.

But as we continue to increase the quantity of labor employed with the fixed amount of all other resources note, that the total product curve continues to increase at a decreasing rate and finally reaches a maximum of total output or total product. Further increases in the quantity of labor employed cause total product to fall meaning that we have reached the point of absolute diminishing returns. If we were to continue adding more labor to the same amount of fixed amount of all other resources, we would eventually have the total product curve become negative as it crosses the quantity of labor or X axis.

If we were to take a line straight line from the origin that is just tangent to the total product curve, that is to say it just touches it in one place, and take the trace or the locus of those tangency points, we would generate what is

called a marginal physical product curve which is seen in the second graph just below the first or upper graph. Note that when the first inflection point is reached in the upper graph, increasing returns changes to diminishing returns, we have reached the maximum marginal physical product and by juxtaposition going up and down between two graphs, you can see that the two correspond to each other at that first point of inflection and the maximum marginal physical product. If we continue to increase the quantity of labor employed with the given amount of all other resources, the marginal physical product will gradually turn negative. If we look at that point in the lower graph and go straight up to the upper graph you see that's were total physical product is reached the maximum quantity. Any further increase in the quantity of labor will bring us into the negative marginal physical product range or the range where the total physical product begins to turn downward. Unless you subsidize the employment of that resource called labor, it would be economically irrational to use labor past this point or this quantity. Furthermore, once we recognize that you have to reward labor and pay them an income, it becomes economically irrational even when labor's marginal physical product is positive at least over some of the range of diminishing marginal physical product of labor curve.

If we were to take a straight line from the origin of the upper graph and trace the locus of where that straight line intersects the total product curve in the upper graph we would generate an average physical product curve as is seen in the lower graph. Note that when the straight line emanating from the origin is just tangent to the total product curve the average physical product curve is at a maximum and given this classical drawing of the total product curve that would be to the right or were a greater amount of labor is employed with the fixed amount of all other resources to the right of the maximum marginal physical product, in other words, we would first encountered the point of diminishing marginal returns and then the point of diminishing average returns or diminishing average physical product of labor. Finally as we continue to add more labor, we would reach the point of absolute or total diminishing returns which is the uppermost part of the total product curve in the upper graph.

This relationship is sometimes called the average marginal relationships and many instructors in economics would explain all this as it relates to batting averages. If the player comes into the game with a 0.250 batting average or one for four over the season, he must hit on the marginal or incremental day better than 0.250 or better than one for four in order to improve his average. Should he go one for 4, it will not change his season's average and

should he end up zero for four his season average will fall. These relationships are very general relationships which occur in many areas of the measurement.

In our case where labor is concerned, the MPP intersects the APP from above at the maximum average physical product. As we monetize these physical product curves we will generate the cost curves of a firm. We will see that the marginal cost curve intersects the average cost from the bottom at the minimum average cost.

So far we have been in physical space, the relationship of output to the inputs that are used in the transformation process called production that produces the goods or services.

These physical relationships are only part of the problem and part of the solution. What we have to do is to monetize the physical product curves. We do this in order to arrive at the cost curves for total cost, average cost, and marginal cost for the firm.

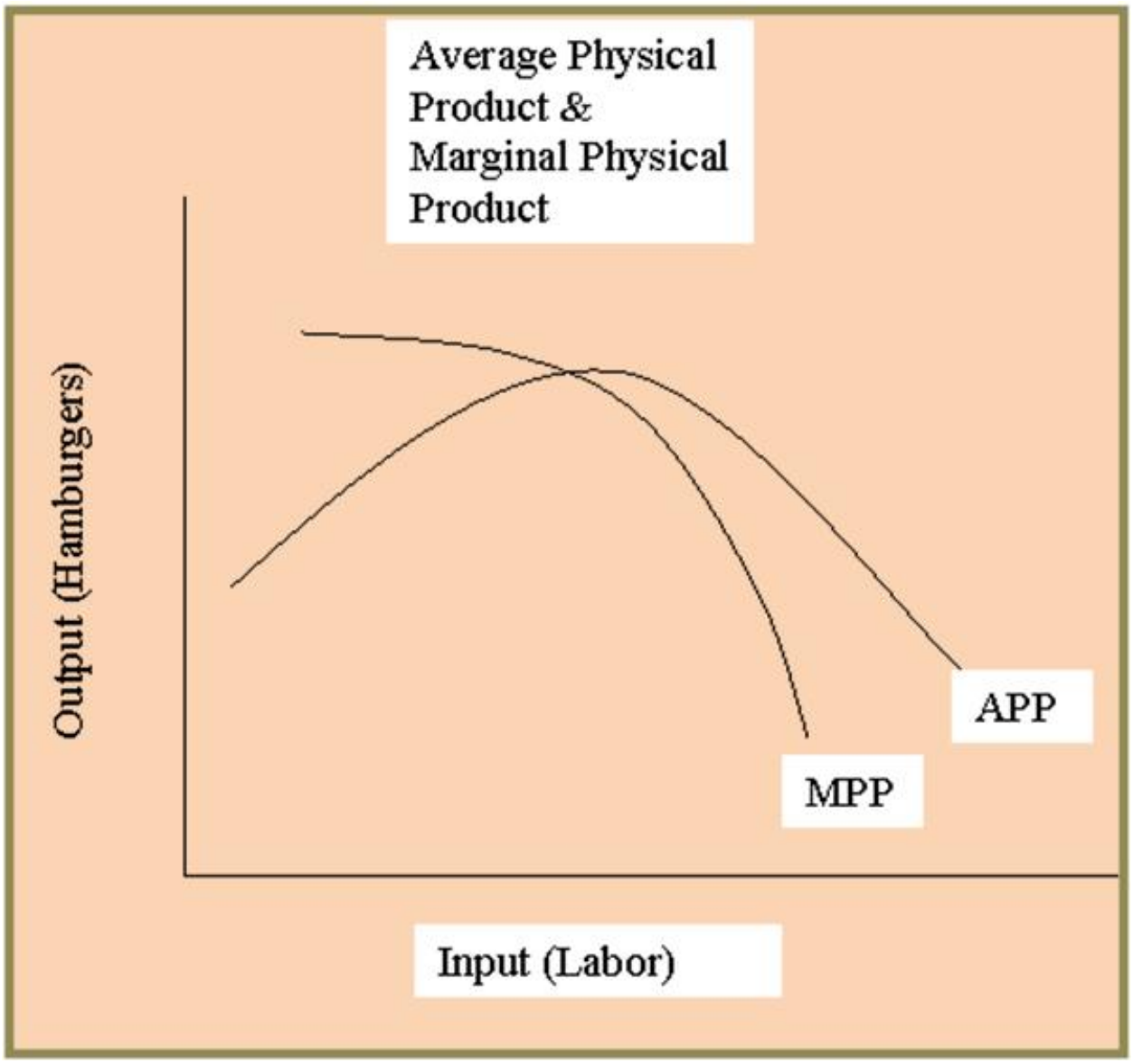
This is done by dividing the physical product of measures of total, average, and marginal into their related costs. Just below is a chart showing these relationships and how we monetize the third graph by converting the physical product curves, given the cost of various resources, into the cost curves of a firm's total, marginal and average cost curves.

– Explaining how changes in labor compensation change unit labor costs –

Unit labor costs rise when labor compensation increases at a rate greater than the rate of increase in labor productivity and fall when compensation increases at a rate less than the increase in the labor productivity rate of increase.

A Connection between Lug Nuts and Productivity?			
		With a 10% increase in Productivity	With a 10% increase in Labor
Hourly Compensation of Labor ($/Hr)	20	20	22
Physical Productivity of Labor/Hr	100	110	100
Unit Labor Cost	$0.20	$0.18	$0.22

By making these calculations, the cost curves become U-shaped as the product curves are inverted. Again, they are U-shaped as they are related to the physical product curves as cost curves are partly derived from the physical product curves and once we monetize a physical product curves we have arrived at the cost curves of the firm.

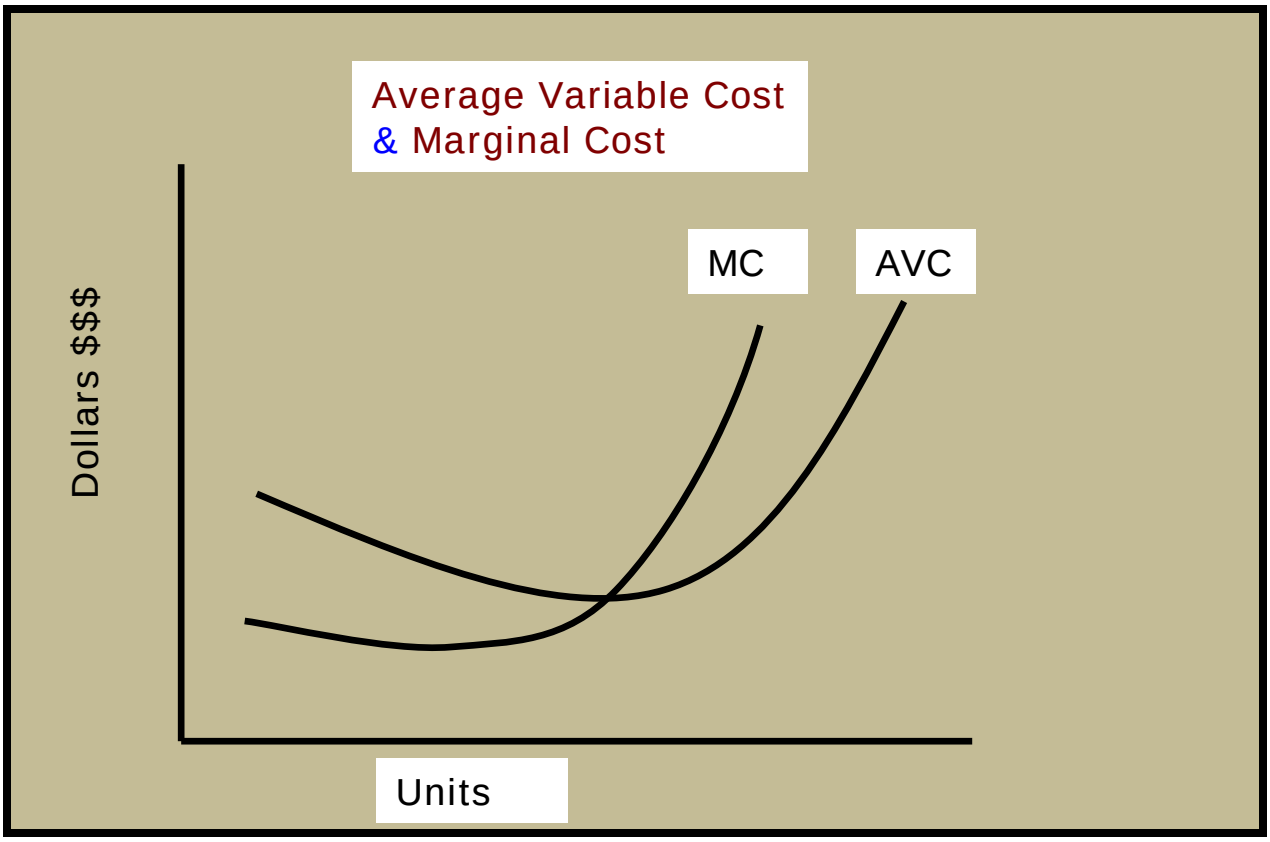


Where Average Physical Product is at a maximum, Marginal Physical Product is equal to it.

MPP > APP, APP is rising

MPP = APP, APP is at a maximum

MPP < APP, APP is falling



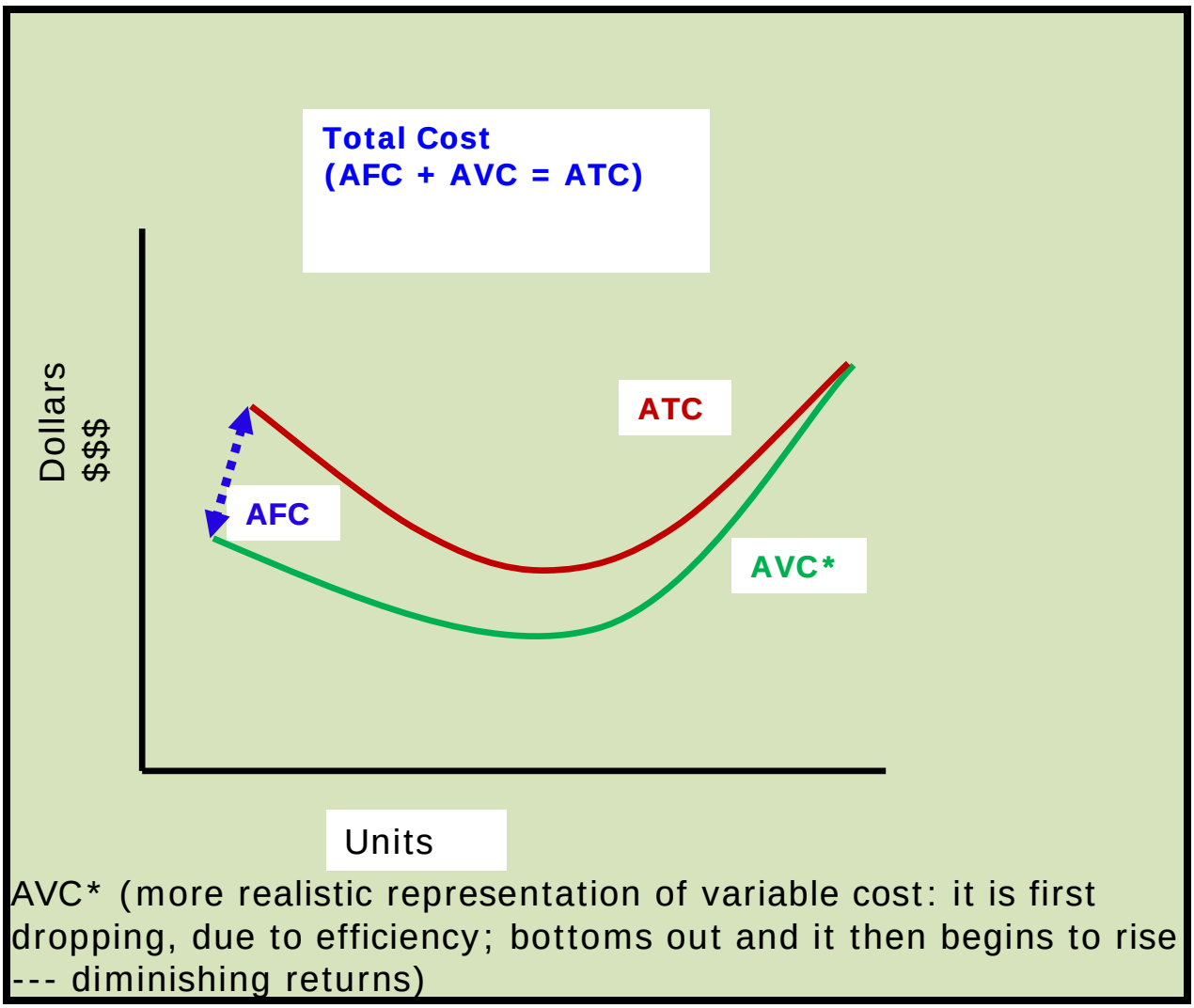
Where Average Variable Cost is at a minimum, Marginal Cost is equal to it.

MC < AVC, AVC is falling

MC = AVC, AVC is at a minimum

How does the principle of diminishing returns generally result in a U-shaped, or bow-shaped average and marginal cost curve?

At low levels of production where variable inputs such as labor are used less intensively relative to capital such as plant and equipment, physical productivity of labor is relatively low. As more efficient combinations of labor and capital is achieved by increasing production, productivity of a variable input, such as labor, increases over a range of output or production. In this range of output, increasing ret urns to labor result. But eventually that physical productivity maxes out so to speak, and diminishing returns to labor occur. Labor is being used in physical or engineering sense, too intensively.



AVC* (more realistic representation of variable cost: it is first dropping, due to efficiency; bottoms out and it then begins to rise --- diminishing returns)