

Falling Interest Rates Have Postponed “Peak Oil”

Falling interest rates have huge power. My background is as an actuary, so I am very much aware of the great power of interest rates. But a lot of people are not aware of this power, including, I suspect, some of the people making today's decisions to raise interest rates. Similar people want to sell securities now being held by the Federal Reserve and by other central banks. This would further ramp up interest rates. With high interest rates, practically nothing that is bought using credit is affordable. This is frightening.

Another group of people who don't understand the power of interest rates is the group of people who put together the Peak Oil story. In my opinion, the story of finite resources, including oil, is true. But the way the problem manifests itself is quite different from what Peak Oilers have imagined because the economy is far more complex than the Hubbert Model assumes. One big piece that has been left out of the Hubbert Model is the impact of changing interest rates. When interest rates fall, this tends to allow oil prices to rise, and thus allows increased production. This postpones the Peak Oil crisis, but makes the ultimate crisis worse.

The new crisis can be expected to be “Peak Economy” instead of Peak Oil. Peak Economy is likely to have a far different shape than Peak Oil—a much sharper downturn. It is likely to affect many aspects of the economy at once. The financial system will be especially affected. We will have gluts of all energy products, because no energy product will be affordable to consumers at a price that is profitable to producers. Grid electricity is likely to fail at essentially the same time as other parts of the system.

Interest rates are very important in determining when we hit

“Peak Economy.” As I will explain in this article, falling interest rates between 1981 and 2014 are one of the things that allowed Peak Oil to be postponed for many years.



Figure 1. 10-year Treasury Interest Rates. Chart prepared by St. Louis Fed.

These falling interest rates allowed oil prices to be much higher than they otherwise would have been, and thus allowed far more oil to be extracted than would otherwise have been the case.

Since mid 2014, the big change that has taken place was the elimination of Quantitative Easing (QE) by the US. This [change had the effect of disrupting the “carry trade”](#) in US dollars (borrowing in US dollars and purchasing investments, often debt with a slightly higher yield, in another currency).

Price problem only appears near limit

► Appears “well-behaved” elsewhere

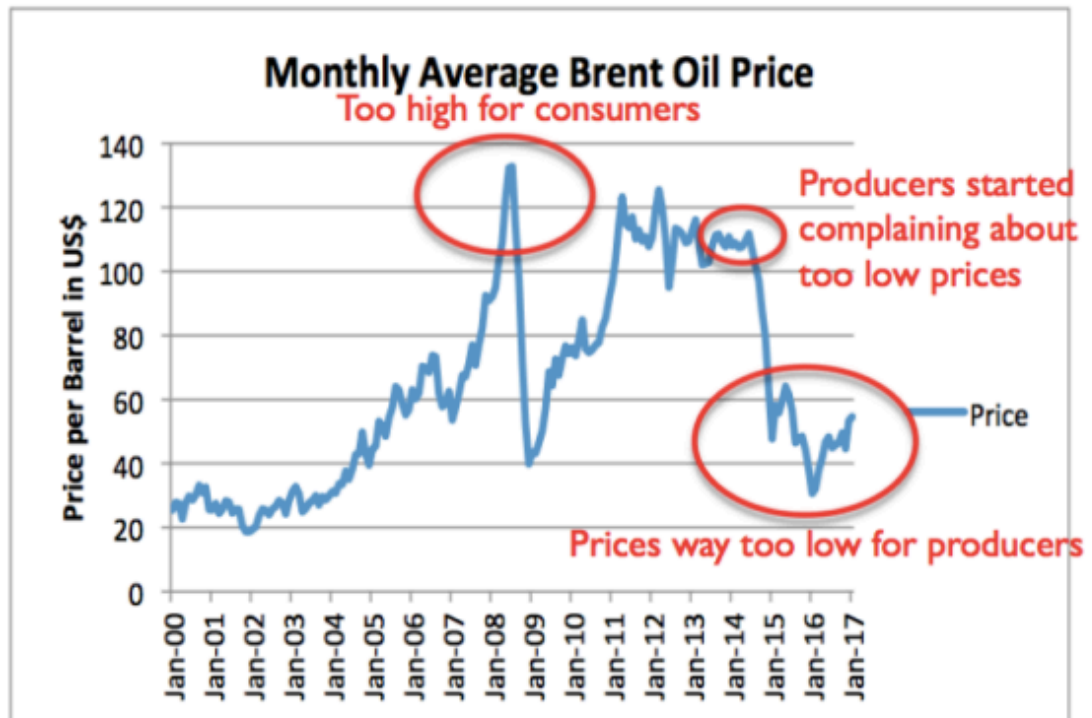


Figure 2. At this point, oil prices are both too high for many would-be consumers and too low for producers.

As a result, the US dollar rose, relative to other currencies. This tended to send oil prices to a level that is too low for oil producers to make an adequate profit (Figure 2). In addition, governments of oil exporting countries (such as Venezuela, Nigeria, and Saudi Arabia) cannot collect adequate taxes. This kind of problem does not lead to immediate collapse. Instead, it “sets the wheels in motion,” leading to collapse. This is a major reason why “Peak Economy” seems to be ahead, even if no one attempts to raise interest rates.

The problem is not yet very visible, because oil prices that are too low for producers are favorable for importers of oil, such as the US and Europe. Our economy actually functions better with these low oil prices. Unfortunately, this situation is not sustainable. In fact, rising interest rates are likely to make the situation much worse, quickly.

In this post, I will explain more details relating to these problems.

Low interest rates are extremely beneficial to the economy; high interest rates are a huge problem.

Low interest rates allow consumers to purchase high-priced goods with affordable monthly payments. With low interest rates, consumers can afford to buy more consumer goods (such as homes and cars) than they could otherwise. Thus, low interest rates tend to lead to high *demand* for commodities of all kinds, thus raising the price of commodities, such as oil.

Low interest rates are also good for businesses and governments. Their borrowing costs are favorable. Because consumers are doing well, business revenues and tax revenues tend to grow at a brisk pace. It becomes easier to afford new factories, roads, and schools.

While low interest rates are good, a *reduction* in interest rates is even better.

A reduction in interest rates *tends to make asset prices rise*. The reason this happens is because if someone already owns an asset (examples: a home, factory, a business, shares of stock) and interest rates fall, that asset suddenly becomes more affordable to other people, so the price of that asset rises because of increased demand. For example, if the monthly mortgage payment for a house suddenly drops from \$ 600 per month to \$ 500 per month because of a reduction in interest rates, many more potential homeowners can afford to buy the house. The price of the house may be bid up to a new higher level—perhaps to a price level where the monthly payment is \$ 550 per month—higher than previously, but still below the old payment amount.

Furthermore, if interest rates fall, owners of homes that have

risen in value can refinance their mortgages and obtain the new lower interest rate. Often, they can withdraw the “excess equity” and spend it on something else, such as a new car or home improvements. This extra spending tends to stimulate the economy, and thus tends to raise commodity prices. Suddenly, investments in oil fields that previously looked too expensive to extract, and mines with ores of very low grade, start looking profitable. Businesses hire workers to staff the investments that are now profitable, stimulating the economy.

Businesses receive other benefits, as well, when interest rates fall. Their borrowing cost on new loans falls, making new investment more affordable. Demand for their products tends to rise. The additional demand that results from lower interest rates allows economies of scale to work their magic, and thus allows profits to rise.

Companies that have large portfolios of investments, such as insurance companies and pension funds, find that the values of their assets (stocks, bonds, and other investments) rise when interest rates fall. Thus, their balance sheets look better. (Of course, the low interest payments when interest rates are low provide a different problem for these companies. Here, we are talking about the impact of *falling* interest rates.)

Of course, the reverse of all of these things is also true. It is truly bad news when interest rates rise!

Wages Depend on Interest Rates and Debt Growth

When interest rates fall, debt levels tend to rise. This happens because expensive goods such as homes, cars, and factories become more affordable, so customers can buy more of them. Thus, falling interest rates are very closely associated with rising debt levels.

We find that when we look at debt levels, rising debt levels seem to be highly correlated with rising US per capita wages, (especially up until China joined the World Trade Organization

in 2001, and globalization took off). “Per capita wages” are calculated by dividing total wages and salaries by total population. Per capita wages thus reflect the impact of both (a) changes in the wages of individual workers and (b) changes in workforce participation. Using this measure “makes sense,” if we think of the total population as being supported by the wages of the working population, either directly or indirectly (such as through taxes).

**Growth in US Wages vs.
Growth in Non-Financial Debt**
(Both on per capita basis and adjusted for inflation)

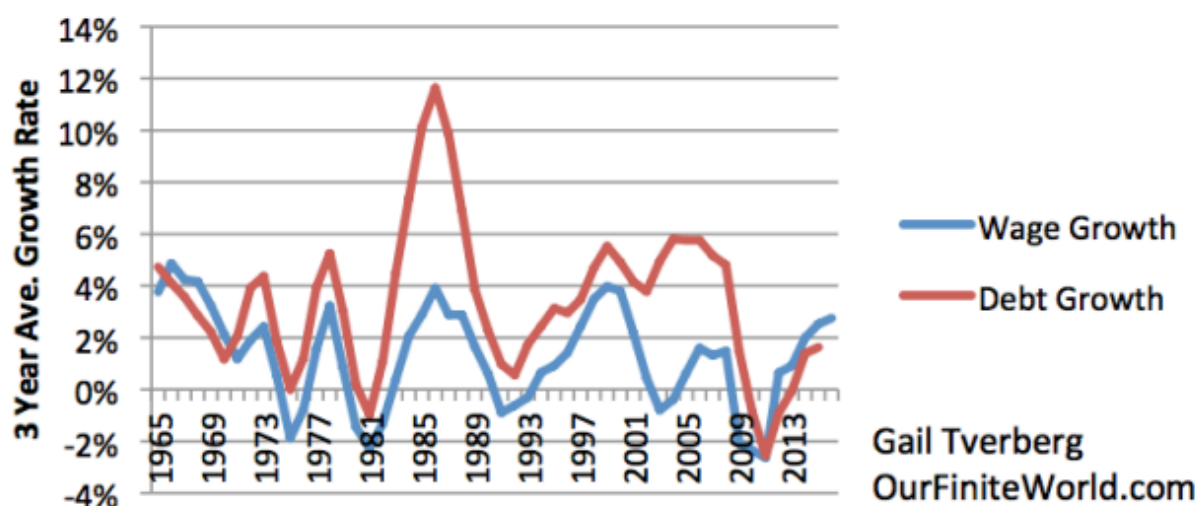


Figure 3. Growth in US Wages vs. Growth in Non-Financial Debt. Wages from US Bureau of Economics “Wages and Salaries.” Non-Financial Debt is discontinued series from St. Louis Federal Reserve. (Note chart does not show a value for 2016.) Both sets of numbers have been adjusted for growth in US population and for growth in CPI Urban.

What does oil price depend upon?

Oil price depends upon the amount customers can *afford* to pay for oil and the finished products it produces. The amount customers can afford, in turn, depends very much on interest rates, since these influence both wages and monthly payments

on loans. If the price that a significant share of consumers can afford is below the selling price of oil, we get an oil glut, as we have today.

It is important to note that oil and other energy products are important in determining the cost of finished products, such as cars, homes, and factories. Thus, high prices on energy products tend to ripple through the economy in many different ways. Many people consider only the change in the cost of filling a car's gasoline tank; this approach gives a misleading impression of the impact of oil prices.

Affordability is also affected by growing wage disparity. Growing wage disparity tends to occur because of growing complexity and specialization. Globalization also contributes to wage disparity. These are other problems we encounter as we approach energy limits. Demand for commodities is to a significant extent determined by the wages of non-elite workers because there are so many of them. High wage workers tend to influence commodity prices less because their purchases are skewed toward a greater share of services, and toward the purchase of financial assets.

Because interest rates, debt, wages, and oil prices (and, in fact, commodity prices of all kinds) are linked, the system is much more complex than what most early modelers assumed was the case.

Hubbert's Theory Underlies Many Mainstream Energy Beliefs

Today's mainstream beliefs about our energy problems seem to be strongly influenced by Peak Oil theory. Peak Oil theory, in turn, is based on [an analysis](#) by geophysicist M. King Hubbert. This view does not consider interest rates, debt, or prices.

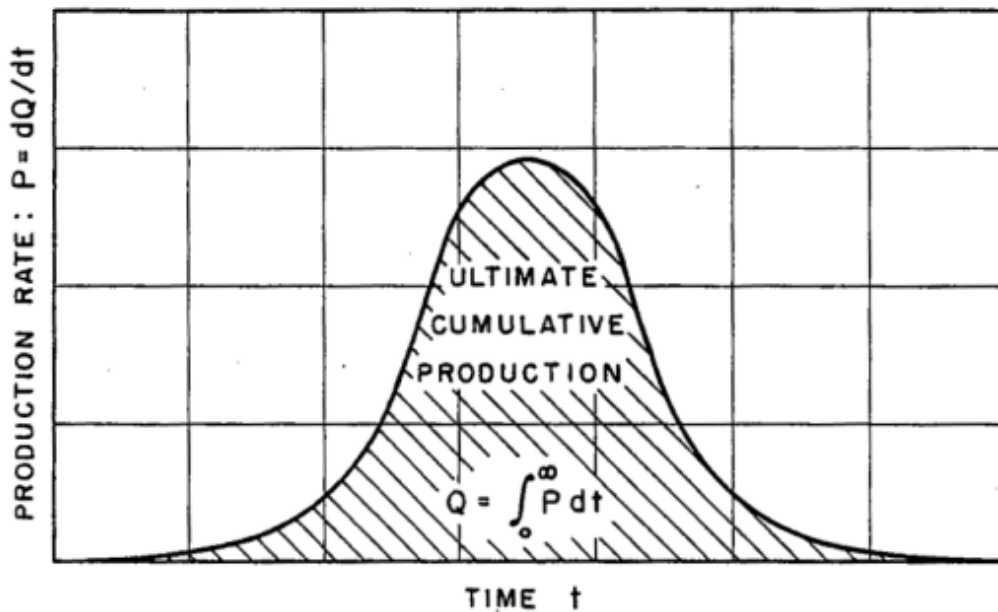


Figure 11 – Mathematical relations involved in the complete cycle of production of any exhaustible resource.

Figure 4. M. King Hubbert's symmetric curve explaining the way he saw resources depleting from [Nuclear Energy and the Fossil Fuels](#), published in 1956.

In this view, the amount of any exhaustible resource that we can extract depends on the resources in the ground, plus the technology we have to extract these resources. In general, Hubbert expected an approximately symmetric curve of extraction, as illustrated in Figure 4. The peak is expected when about 50% of the resource is extracted. Hubbert believed that improved technology might allow more exhaustible resources to be extracted after peak, making the actual extraction pattern somewhat asymmetric, with a larger share of a resource, such as oil, being extracted after peak.

With this theory, we can expect to extract a considerable amount of resources in the future, even if the energy supply of a particular type starts to fall, because it is "past peak." With the relatively slow decline rate shown in Figure 4, it should be possible to "stretch" supplies for some years, especially if technology continues to improve.

At some point, the standard view is that we will “run out” of energy supplies if we don’t make substitutions or conserve the use of these nonrenewable resources. Thus, an increase in efficiency is viewed as one part of the solution. Another part of the solution is viewed as substitution, such as with wind and solar energy.

In the mainstream view, the major influence on commodity prices is scarcity, not affordability. The expectation is that scarcity will cause oil prices will rise; as a result, expensive substitutes will become cost competitive. The higher prices will also encourage more conservation and more high-cost technologies. In theory, these can keep the economy operating for a very long time. The very inadequate models that economists have developed have encouraged these views.

The Usual Energy Model Is Overly Simple

Hubbert assumed that the amount of oil extracted would depend only upon the amount of resources available and available technologies. In fact, the amount of oil extracted depends on price, in part because price determines which technologies can be used. It also governs whether oil can be extracted in areas that are inherently expensive—for example, deep under the sea, or heavily polluted with some other material that must be removed at significant cost. Because of this, if oil prices are high, new technologies can be brought into play, and resources that are expensive to reach can be pursued.

If oil prices are lower than really needed, for example in the \$ 40 to \$ 80 per barrel range, the situation is more complex. The problem is that taxes on oil are important, especially for oil exporters. In this range, many producers can continue to produce, but their governments collect inadequate taxes. Their governments find it necessary to borrow money to maintain programs upon which the populations of the countries depend. Governments with inadequate tax revenue tend to get into more conflicts with other countries, such as is happening today

with other Middle Eastern countries fighting with Qatar.

The situation of inadequate tax revenue is inherently unstable. It can eventually be expected to lead to the collapse of oil exporting countries.

Factors Underlying the Rise and Fall of Historical Oil Prices

The fundamental problem regarding the cost of resource extraction is that we tend to extract the cheapest-to-extract resources first. Thus, the cost of extracting many types of resources, including oil, tends to rise over time. Wages grow much more slowly.

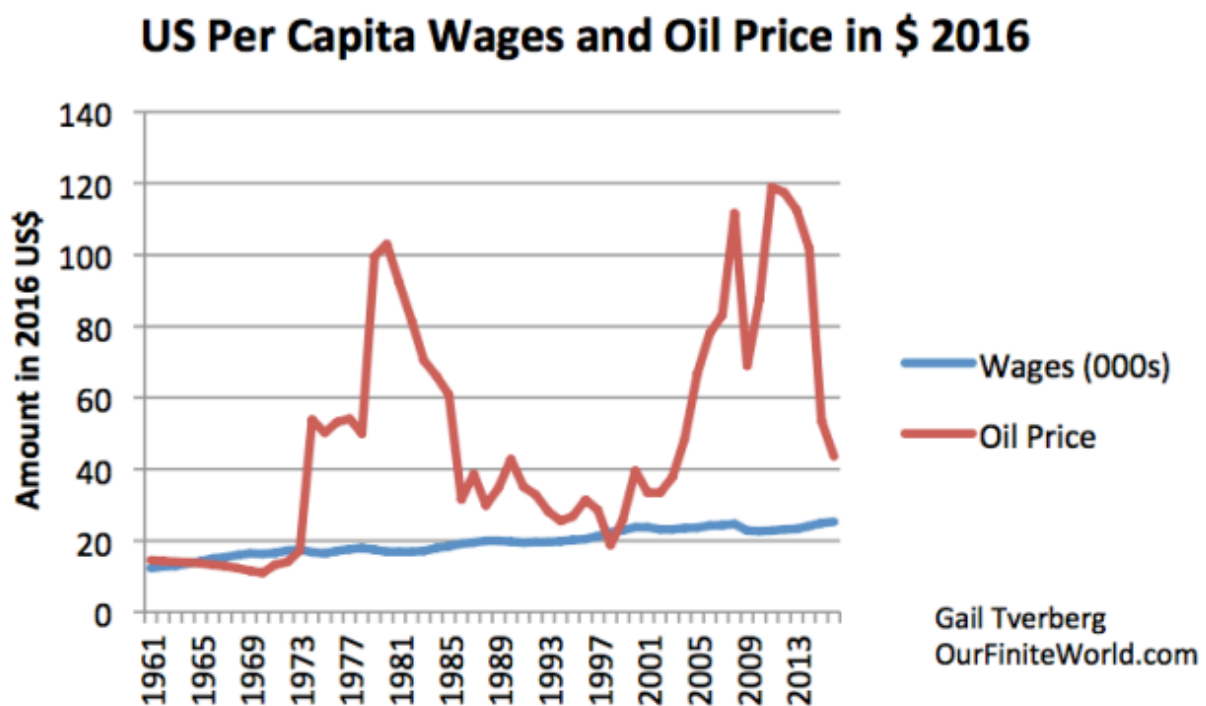


Figure 5. Average per capita wages computed by dividing total “Wages and Salaries” as reported by US BEA by total US population, and adjusting to 2016 price level using CPI-Urban. Average inflation adjusted oil price is based primarily on Brent oil historical oil price as reported by BP, also adjusted by CPI-urban to 2016 price level.

This mismatch between wages and oil price tends to cause increasing affordability problems over time, even as we switch

to cheaper fuels and increased efficiency. Part of the reason why affordability problems get worse has to do with our inability to keep reducing interest rates; at some point, they reach an irreducible minimum. Also, as I mentioned previously, there is a growing wage disparity problem caused by growing complexity and globalization. Those with low wages find themselves increasingly unable to afford goods such as homes and cars that require oil products in their construction and use.

Looking at Figure 5, we see two major price “humps.” The first of these is in the 1970-1998 period, and the second is in the 1999 to present period. In the first of these two periods, we often hear that the run up in oil prices was the result of an oil supply problem. This occurred because the US oil supply peaked in 1970, and the Arabs made the situation worse with an [oil embargo](#).

In fact, I think that at least half of the problem in the 1970-1981 period may have been that wages were growing rapidly during this period. The rapid run up in wages ***allowed oil prices to increase in response to a fairly small oil shortage***. Thus, the run up in prices was caused to a significant extent by greater *demand*, made possible by greater *affordability*. Note that timing of wage increases is slightly ahead of the timing of increases in CPI Urban. This suggests that wage growth tends to *cause* price inflation. It seems likely that globalization reduces the influence of US wages on oil prices, and thus on price inflation, in recent years.

Growth in US Wages vs. Growth in Inflation

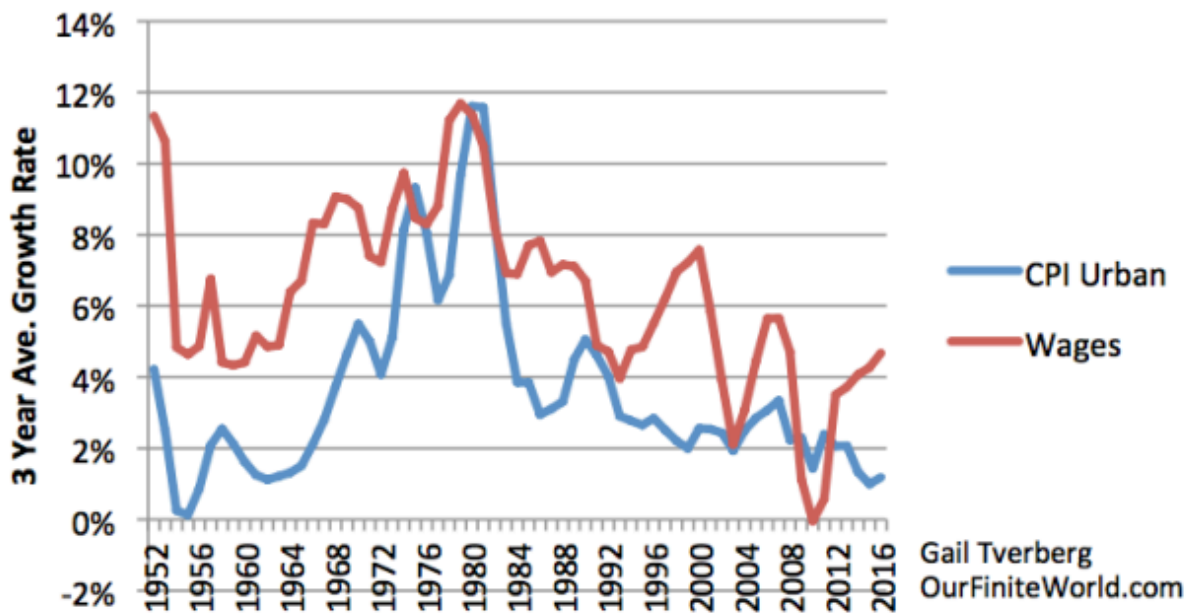


Figure 6. Growth in US wages versus increase in CPI Urban. Wages are total “Wages and Salaries” from US Bureau of Economic Analysis. CPI-Urban is from US Bureau of Labor Statistics.

The large increases in wage payments shown in Figure 6 were made possible by growing total population, by rapidly growing productivity, and by an increasing share of women being added to the workforce. Figure 6 shows that the big increases in wages stopped after interest rates were raised to a very high level in 1981.

Economists hope that rising oil prices will bring about new supply, substitution, and greater efficiency. In the 1970s and 1980s, oil prices did seem to come back down for precisely these reasons. I explain the situation in more detail in the Appendix. Rising inflation rates and interest rates were a problem during this period for insurance companies. One insurance company I worked for went bankrupt; another almost did.

We have not been able to achieve the same new

supply–substitution–efficiency result in the 1999 to 2016 period, partly because whatever easy efficiency and substitution changes could inexpensively be made were made earlier, and partly because we are reaching diminishing returns with respect to extracting energy products, especially oil. Also, the wage disparity of workers is growing. Growing wage disparity makes debt growth increasingly ineffective in raising wages. Instead of debt growth funding more wages and more affordable goods for the working poor, the additional debt seems to go to the already rich.

The decreases in interest rates since 1981 have given the economy an almost continuous upward lift. This long-term decrease tends to get overlooked because it has gone on for such a long time. The major exception to the long-term decrease in interest rates since 1981 was the big increase by the Federal Reserve in target interest rates in the 2004-2006 period (shown indirectly in Figure 7).

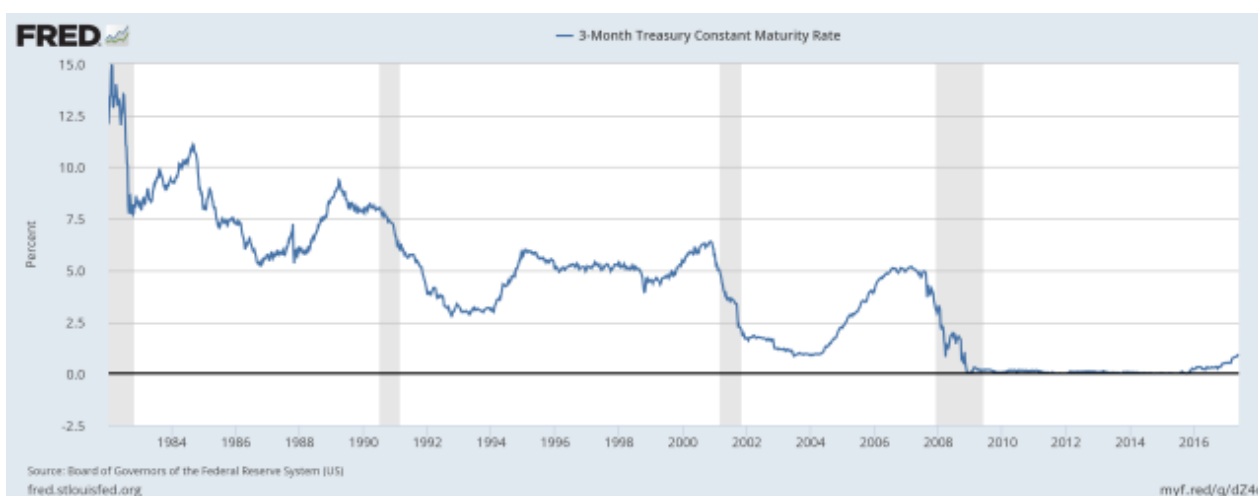


Figure 7. Three-month treasury rates. Graph prepared by the St. Louis Fed.

The problem started when Alan Greenspan dropped target interest rates very low in the 2001-2004 period to stimulate the economy, and then raised them in the 2004-2006 period to cut back growth (Figure 7). This seems to have been one of the major causes of the Great Recession. The other major cause of

the Great Recession was fact that oil prices rose far more rapidly than wages during the 2003-2008 period. More information is provided in the Appendix.

Where We Are Now

We have many leaders who do not seem to understand what our real problems are, and how successful programs have been to date in keeping the system from crashing. Way too much of their understanding has come from traditional models regarding “land, labor and capital,” “supply and demand,” and “higher prices bring substitution.” These models are not suitable for understanding how the economy, as a self-organized networked system, really works.

These leaders seem to believe that QE worldwide is no longer working well enough, so it should be removed. In addition, securities currently held by central banks should be sold. Also, the growth in debt should be slowed, because it is getting too high. Whether or not debt is too high, this strategy will lead to “Peak Economy.” As I explained in an earlier post, [debt is what pulls an economy forward](#). It is the promise (which may or may not actually be kept) of future goods and services. These goods will be made with energy resources and other resources that we may or may not actually have in the future. Once we pare back our expectations, the system is likely to spiral downward.

It is not entirely clear the extent to which interest rates have already started to influence the economy. Long term interest rates, such as 10 year Treasuries, have not yet changed in yield (Exhibit 1). But short-term interest rates clearly have increased (Figure 7). An increase from 0% to 1% is a huge increase, if someone is using very short-term interest rates to fund highly levered investments.

Worldwide, the [International Institute of Finance](#) reported an increase in debt of \$ 70 trillion, to \$ 215 trillion between

2006 and 2016. This sounds like a huge increase, but it only amounts to a 4.0% increase per year during that period. It is doubtful this is enough to support the GDP growth the world needs, plus the increase in commodity prices demanded by diminishing returns.

There is evidence the economy is already headed downward. A recent report indicates that in the US, the [smallest increase in consumer credit in 6 years took place in April 2017](#).

Another worrying area is auto loans. This is an area where interest rates have already begun to increase a bit, making monthly payments on cars higher.

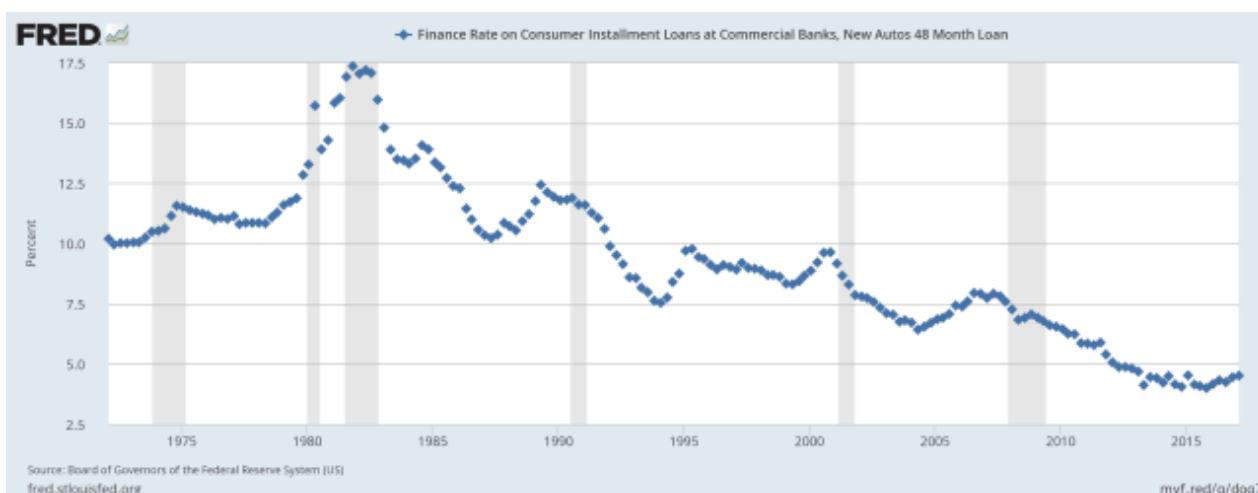


Figure 8. Finance rate on 48-month new car loans through February 2017. Chart by St. Louis Fed.

The average finance rate in February 2017 was 4.52%, compared to an average finance rate of 4.00% in November 2015 (the low point). We don't yet have information on what the increase would be to May 2017. A person would expect that if finance rates are following the interest rates on short to medium term US government securities, the finance rate would continue to rise. This interest rate rise would be one of the things that discounts provided by auto dealers would act to offset.

Because of the higher cost to the buyer of rising auto financing rates, a person would expect such a rise to

adversely affect [new auto sales](#). Higher interest rates would also affect lease prices and auto resale prices. We don't yet know the extent to which higher interest rates are currently affecting auto sales, but the kinds of changes we are seeing are precisely the kinds of changes we would expect to see from higher interest rates. We have had a long history of falling interest rates (plus longer maturities) helping to prop up auto sales. Simply getting to the end of this cycle could be part of the problem.

Peak Economy is likely not very far away. We do not need to encourage it, by raising interest rates and selling securities held by the Federal Reserve. We badly need more people to understand the connection between interest rates and oil prices, and how important it is that interest rates not rise—in fact, more QE would be better.

Appendix – More Detail on Changes Affecting Oil Prices

(a) **Between 1973 and 1981.** Our oil problems started when US oil production began to decline in 1970, and Arab countries took advantage of our problems with [an oil embargo](#). We immediately started work on extracting oil from other locations that we knew had oil available (Alaska, North Sea, and Mexico). Also, Japan was already making smaller cars. We started building smaller, more fuel-efficient cars in the US, too. We also began to substitute other fuels for oil in home heating and in the making of electricity.

(b) **Between 1981 and 1998.** In 1981, [Paul Volker decided to force oil prices down by raising target interest rates](#) to a very high level. He knew that such a high interest rate would lead to recession, which would reduce demand and thus prices. Also, earlier efforts at new oil supply and demand reduction approaches began to be effective. The new oil supply was somewhat higher priced than the pre-1970 oil. Falling interest rates made it possible for consumers to tolerate the somewhat higher oil prices required by the new higher priced oil.

(c) **Between 1999 and 2008.** Oil prices rose rapidly during this period, in large part because of rising *demand*. Globalization added huge demand for oil. Also, Alan Greenspan reduced target interest rates at about the time of the 2001 recession. (Target interest rates affect 3-month interest rates, shown in Figure 7.) At the same time, banks were encouraged to be more lenient in lending standards, and to offer loans based on the very favorable short-term interest rates available at that time. This combination of factors led to rapidly rising housing debt and much refinancing activity. All of this activity also added to oil demand.

Fortunately, these demand increases coincided with an increase in the cost of oil extraction. The world's supply of "conventional oil" was becoming limited in supply, and began to decline in 2005. The higher demand raised prices, thus encouraging producers to pursue more expensive unconventional oil production.

(d) **The 2008 Crash** occurred after the Federal Reserve *raised* target interest rates in the 2004-2006 period, in an attempt to damp down rising food and energy prices. This interest rate rise made home buying more expensive. Oil prices were also increasing in the 2002-2008 period. The combination of rising interest rates and rising oil prices reduced demand for new homes and cars. Home prices fell, debt levels fell, and oil prices fell. Many people blamed the problems on loose mortgage underwriting standards, but the basic issue was falling affordability of oil, as oil prices rose and as higher interest rates took away the huge boost the economy previously had received. See my article, [Oil Supply Limits and the Continuing Financial Crisis](#).

(e) **2009-2011 ramp up in prices** was enabled by QE. This QE brought a broad range of interest rates to very low levels.

(f) **2011-2014.** Oil prices gradually slid downward, because there was no longer enough upward "push" created by QE, since

interest rates were no longer falling very much.

(g) **Mid to late 2014 to Present.** The US removed its QE, leading to a sharp reduction in carry trade in US dollars. Many currencies fell relative to the US dollar, making oil products less affordable in these currencies. As a result, oil prices fell to a level far below that needed by oil producers, especially oil exporters.

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