

## Low Oil Prices Lead to Economic Peak Oil

We have all heard the story about oil supply supposedly rising and falling for geological reasons. But what if the story is a little different from this—**oil production rises and falls for economic reasons**? If this is the issue, it doesn't really matter how much oil is in the ground. What matters is if economic conditions are "right" for continued and rising extraction. I have shown in previous posts that oil prices that are too high are a problem for oil importers while oil prices that are too low are a problem for oil exporters. As a result, oil prices need to be in a Goldilocks zone, or we have serious problems, of one sort or another.

As long as the price of oil keeps rising, there is at least some chance the amount of oil extracted each year will keep rising, because more oil resources will become economic to extract. The real problem arises when oil price falls back from a price level it has held, as it has done recently, and as it did back in July 2008. Then there is a real chance that investment will become non-economic, and because of this, oil production will fall.

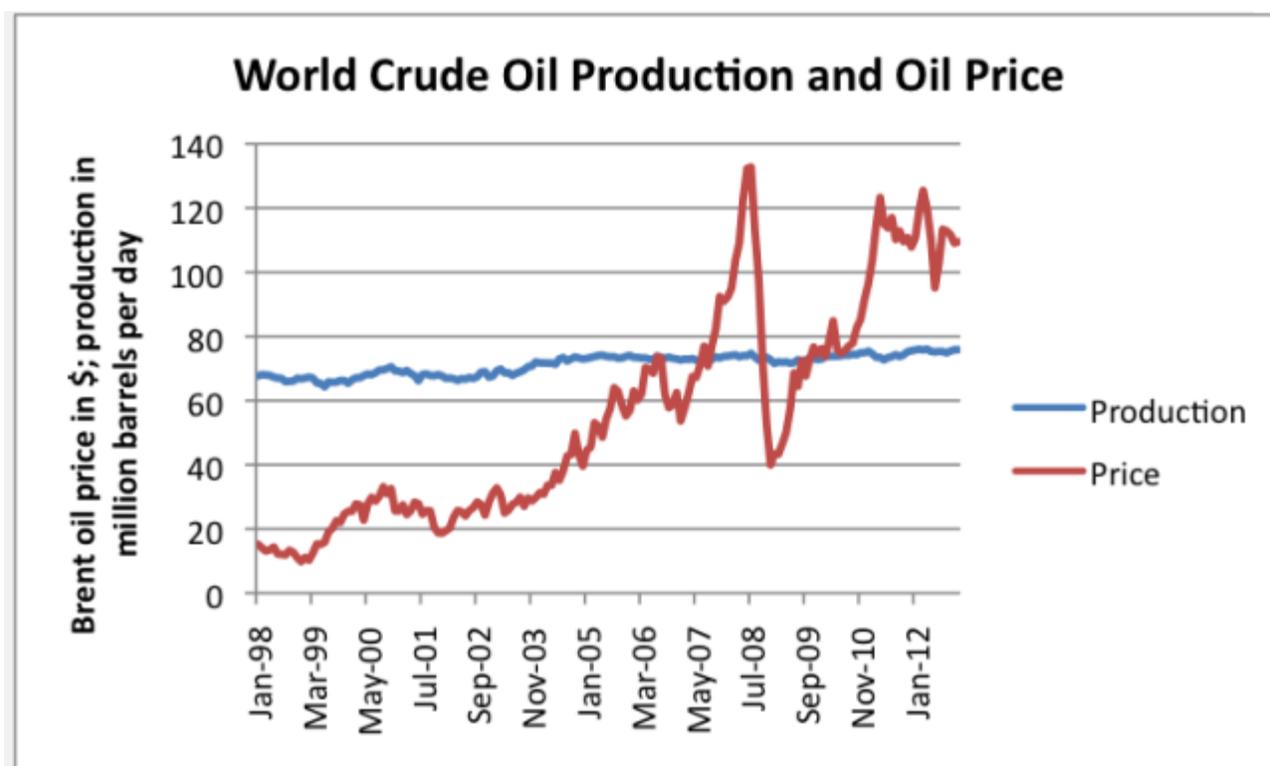


Figure 1. World crude oil price and production, based on monthly EIA data. The corresponding price in late April is approximately \$100 barrel, so is even lower yet.

Oil prices play multiple roles:

1. High oil prices encourage extraction from more difficult locations, because the higher cost covers the additional extraction costs.
2. High oil prices allow exporters to have adequate money to pacify their populations, even if their oil exports have been declining, as they have been for many exporters.
3. High oil prices allow funds for investment in new oil fields, as old ones deplete.
4. High oil prices tend to put oil importing countries into recession, because it raises the costs of goods and services produced, without raising the salaries of the workers. In fact, there is evidence that high oil prices lower wages (both directly and through lower workforce participation).
5. High oil prices make countries that use large amounts of oil less competitive with countries that use less fuel in general, and less oil in particular.

When oil prices decline, it is evidence that Items 4 and 5 above are outweighing Items 1, 2, and 3. This tips the scale in the direction of a fall in oil production.

Debt also affects oil prices. As long as investors have faith that businesses can make money, despite high oil prices, they will continue to borrow to expand their businesses. This additional debt helps drive up demand for goods and services of all kinds, including oil, so oil prices rise. Also, if consumers are able to borrow increasing amounts of money, this also drives up demand for goods that use oil, such as cars. But once the debt bubble bursts, it is easy for oil prices fall very far, very fast, as they did in 2008.

If we look at the 2008 situation, oil limits were very much behind the overall problem, even though most people do not recognize this connection. It was the fact that oil limits eventually led to credit limits that caused the system (including oil prices) to crash as it did. High oil prices led to debt defaults and bank write offs, and eventually led to a huge credit contraction in economies of the developed world. This credit contraction affected not just oil demand, but demand for other energy products as well.

The problems of the 2008 period were never really solved: the lack of growth in world oil supply remains, and this lack of growth in world oil supply continues to hold back world economic growth, particularly in developed countries. We recently have not been feeling the effects as much, because with deficit spending, the problems have largely moved from the private sector to the government sector.

The situation remains a tinderbox, however. The financial situation is propped up by ultra-low interest rates, continued government deficit spending, and Quantitative Easing. In a finite world, debt growth cannot continue indefinitely. But if debt growth permanently stops, and switches to contraction, we would end up in an even worse financial mess than in 2008. In fact, such a change would very likely to would lead to a contraction of “Limits to Growth” proportions.

In this post, I will explain some of these issues further.

### The Rise and Fall of Oil Prices in 2008

In Figure 1 (near the top of this post), a person can see huge swings in oil prices, with virtually no change in oil production. If the scale on oil production is modified as in Figure 2 below, a person can see that indeed, oil prices and oil production do to some extent vary together.

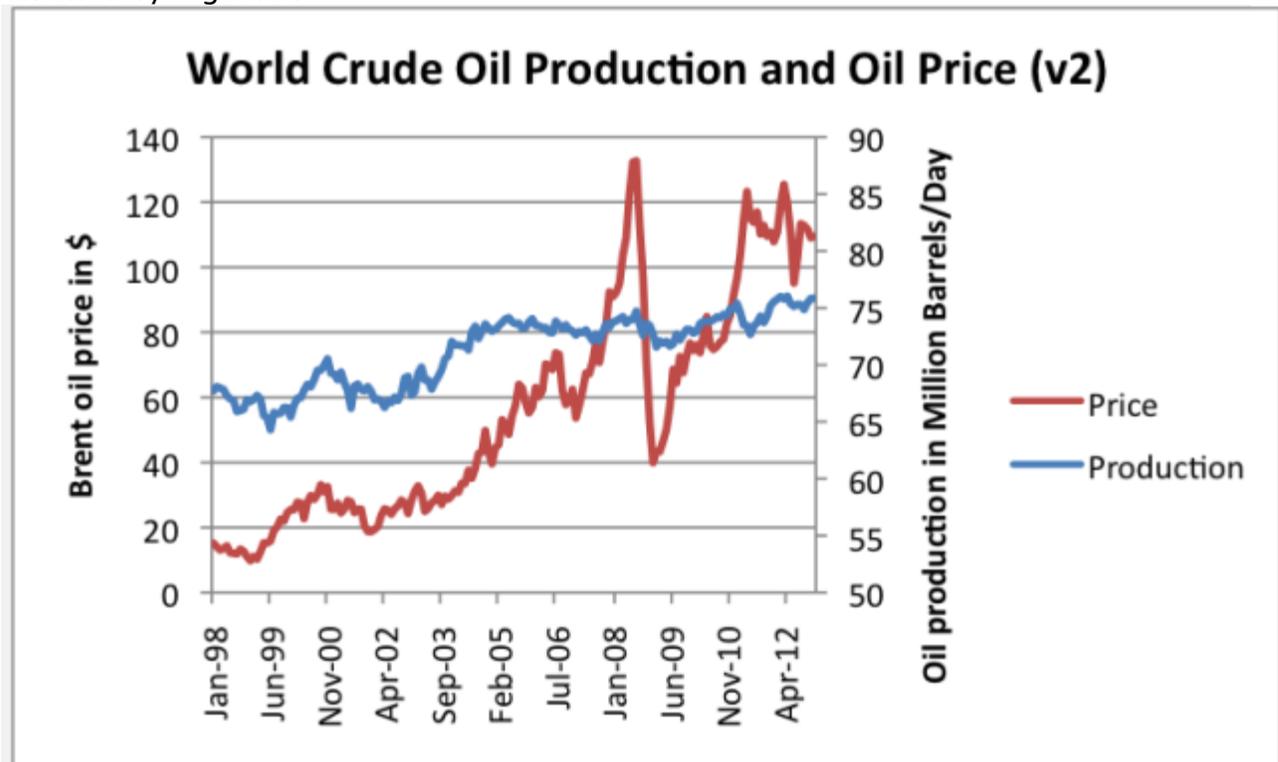


Figure 2. World crude oil production and Brent oil prices, based on monthly EIA data, with different scale for oil production.

If we look at world oil production and price between January 1998 and July 2008 on an X-Y graph, we see that as long as oil demand stayed below 71 million barrels a day, oil price stayed low (Figure 3, below). But once demand started to push above that level, oil price started to rise rapidly, with little increase in production. It was as if a brick

wall on oil supply had been hit. No matter how much the oil price rose, virtually no more production was available.

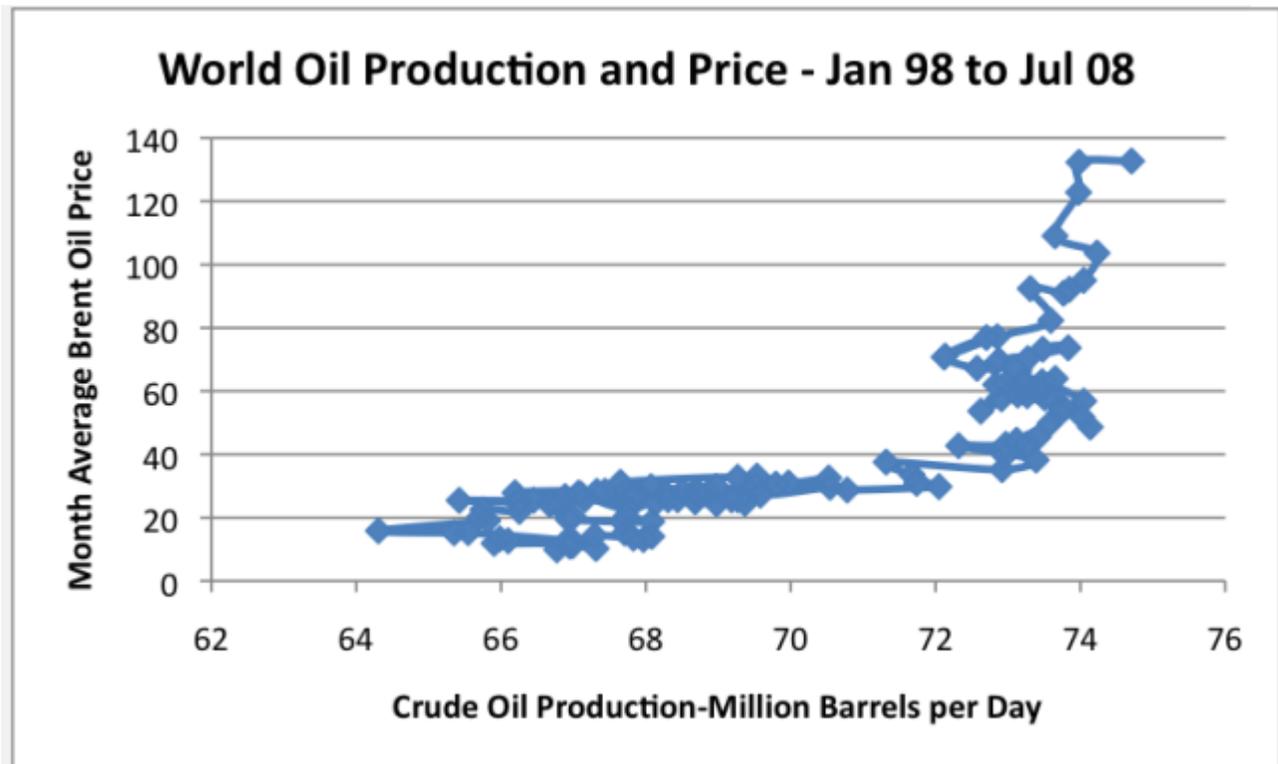


Figure 3. X-Y graph of world of monthly world oil production and price data, based on the EIA data shown in Figures 1 and 2.

If we look at an X-Y graph of the non-OPEC portion of oil supply, we see that the situation was even worse for the non-OPEC portion (Figure 4, below). The amount of oil that could be produced at a given price had actually begun to fall back. While in 2003 and 2004, non-OPEC had been able to produce 42 million barrels a day for only \$30 barrel, by 2008, non-OPEC could not reach 42 million barrels a day, no matter how high the price. It looked as though non-OPEC had hit “peak oil” production. Geological limits appeared to have the upper hand.

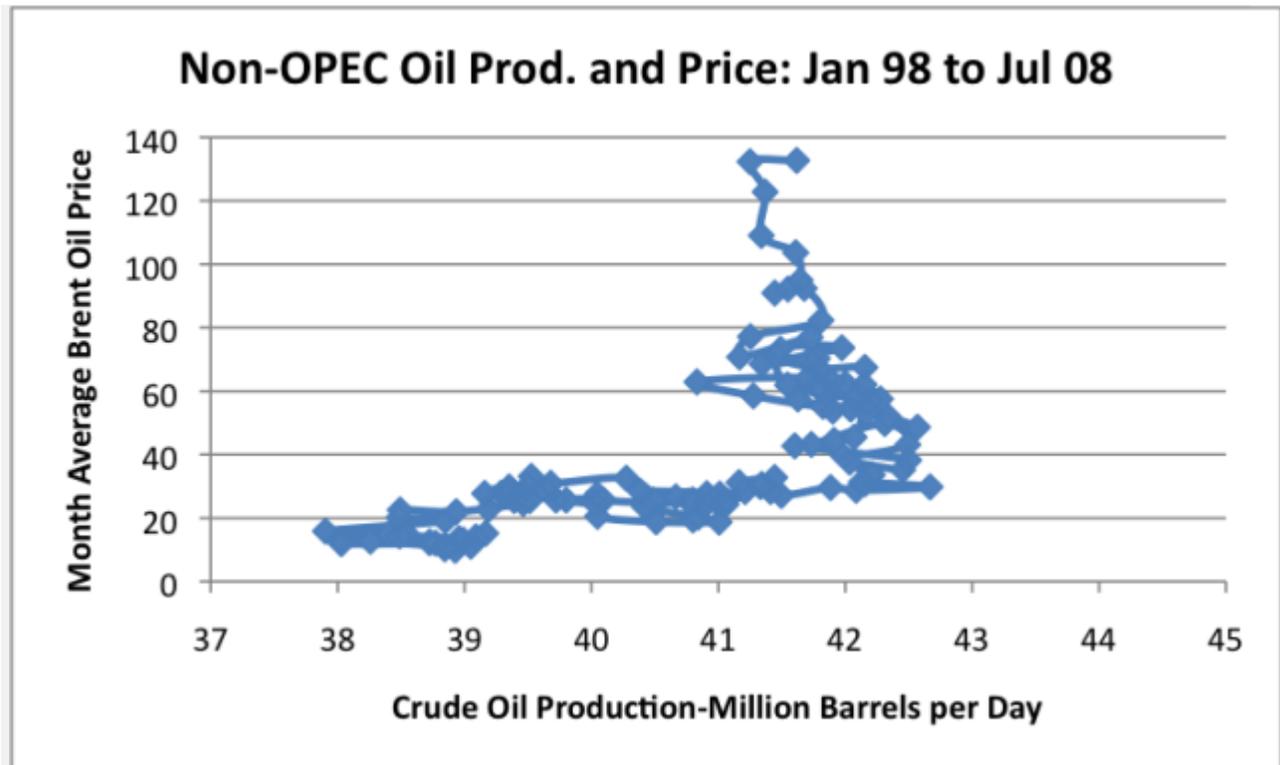


Figure 4. X-Y graph of world of non-OPEC world oil production and price data, based on EIA data.

Fortunately, during this period OPEC was able to raise its production somewhat, in response to higher prices, as illustrated in Figure 5, below. Between July 2007 and July 2008, it was able to raise oil production by 2.1 million barrels a day, in response to a \$56 dollar a barrel increase in price in a one-year time-period. (The small increase in response to a huge price rise suggests that OPEC's spare capacity was not nearly as great as claimed, however.)

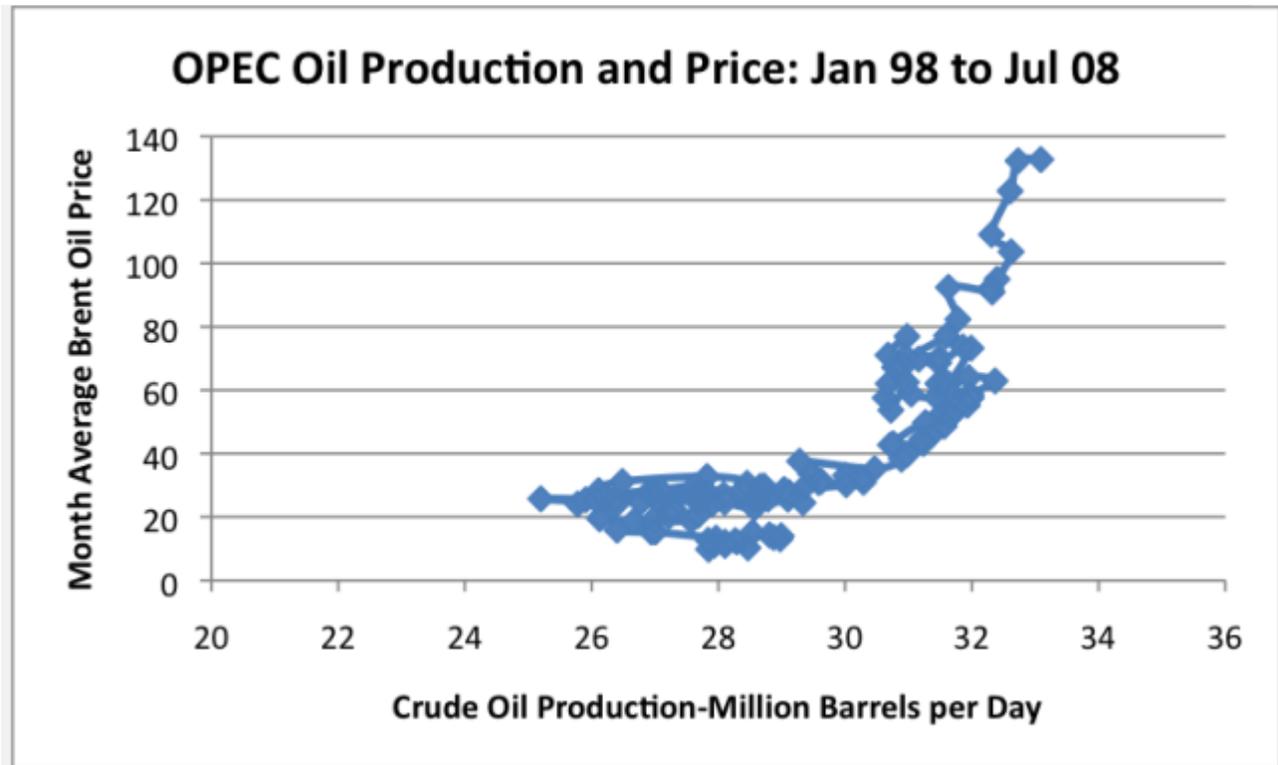


Figure 5. X-Y Graph of OPEC oil production and price, based on EIA data.

What brought about the collapse in oil prices in July 2008? I believe it was ultimately a financial limit that was reached that eventually worked its way to the credit markets. Once the credit markets were affected, individuals and businesses were not able to borrow as much, and it was this lack of credit that cut back demand for many types of products, including oil.

The way this cutback in credit came about was as follows: Oil prices had been rising for a very long time—since about 2003, affecting the inflation rate in food and fuel prices. The Federal Reserve Open Market Committee tried (unsuccessfully) to get oil prices down by raising target interest rates. I describe this in an article published in the journal *Energy* called, “Oil Supply Limits and the Continuing Financial Crisis,” available [here](#) or [here](#). The combination of high oil prices and higher interest rates led to falling housing prices starting in 2006 (big oops for the Federal Reserve), and debt defaults, particularly among the most vulnerable (those with sub-price mortgages). As early as 2007, large banks had large debt write-offs, lowering their appetite for more debt of questionable quality. Total US household mortgage debt reached its maximum point on June 30, 2008, and began to fall the following quarter.

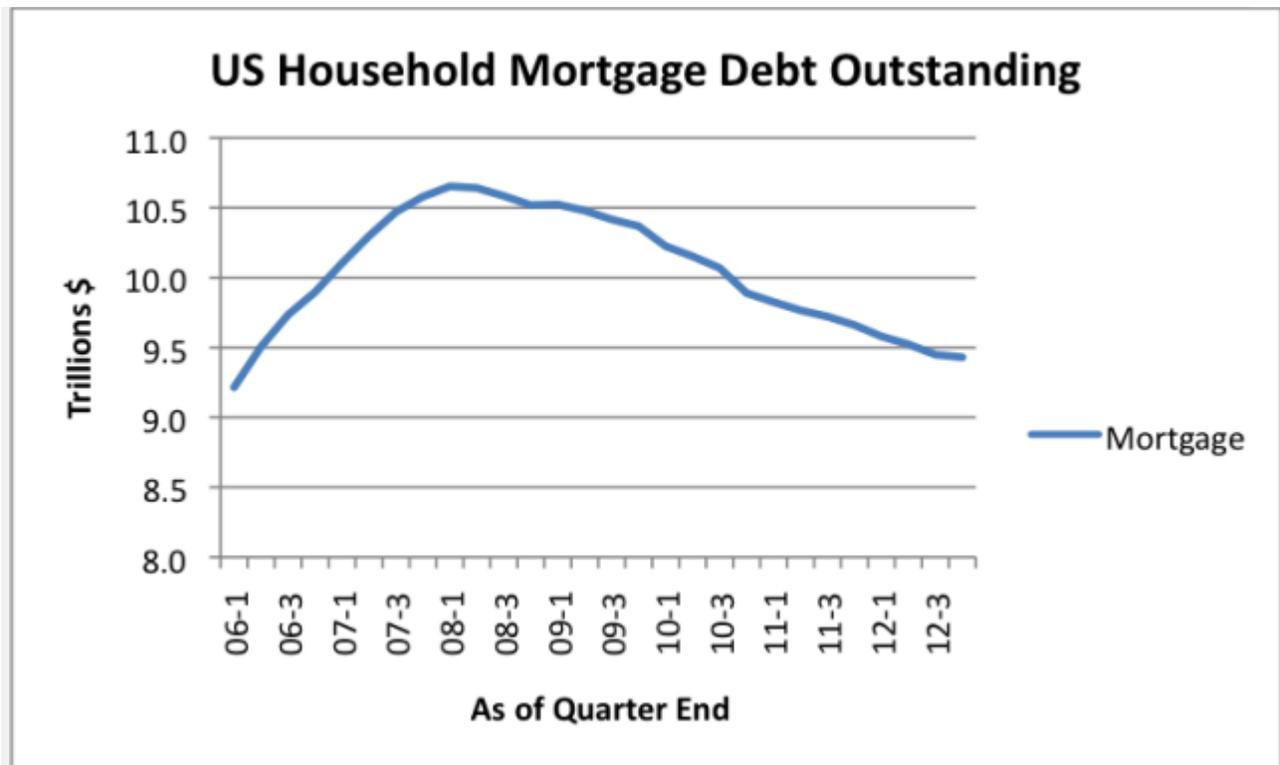


Figure 6. US Mortgage Debt Outstanding, based on Federal Reserve Z1 Report.

By July 2008, the financial problems of consumers in response to high oil prices and falling housing prices had transferred to other credit markets as well. Revolving credit outstanding (mostly credit card debt), hit a maximum in July 2008, and has not recovered (Figure 7 below). (**July 2008 is exactly the same month as oil prices began to fall!**) Non-revolving credit, such as auto loans, hit a maximum in the same month.

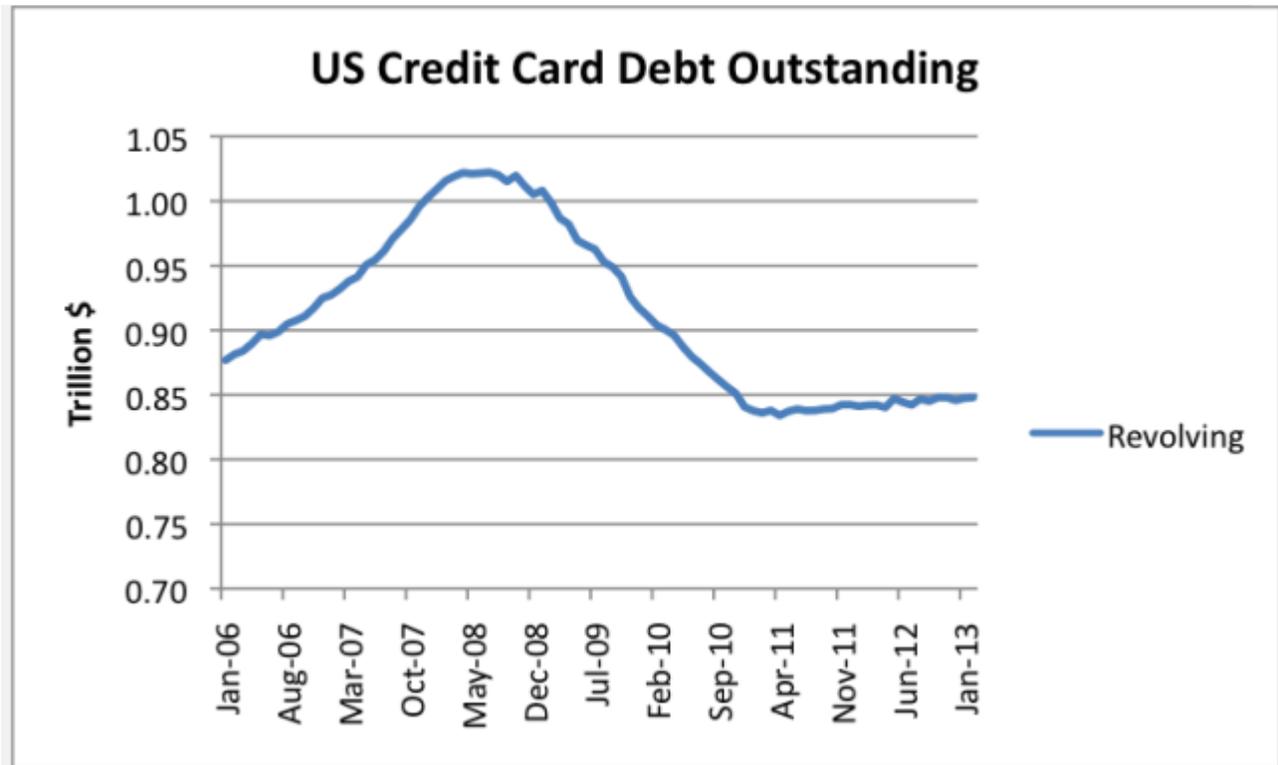


Figure 7. US Revolving Debt Outstanding (mostly credit card debt) based on monthly data of the Federal Reserve.

Credit issues kept getting worse. The Federal takeover of Fannie Mae and Freddie Mac took place in September 2008, as did the bankruptcy of Lehman Brothers. By late 2008, cutbacks in credit had spread to businesses including all sectors of the energy industry. I wrote an article on December 1, 2008, documenting that credit issues led to lower prices not only for oil, but for coal, natural gas, nuclear, and renewables as well.

The reason why a cutback in credit availability is a problem is because it is very difficult to buy a new car or home, or to finance a new business operation, if credit isn't available. In fact, the amount a business or family can spend depends on the sum of their income during a period, plus the amount of **additional debt** they take on during that period. If the amount of debt outstanding is going down, then, for example, old credit card debt is being paid down faster than new credit card is being added, and the amount currently spent is lower.

The Federal Government tried to fix the situation by running larger deficits (Figure 8), starting the very next quarter after oil prices hit a peak and started declining.

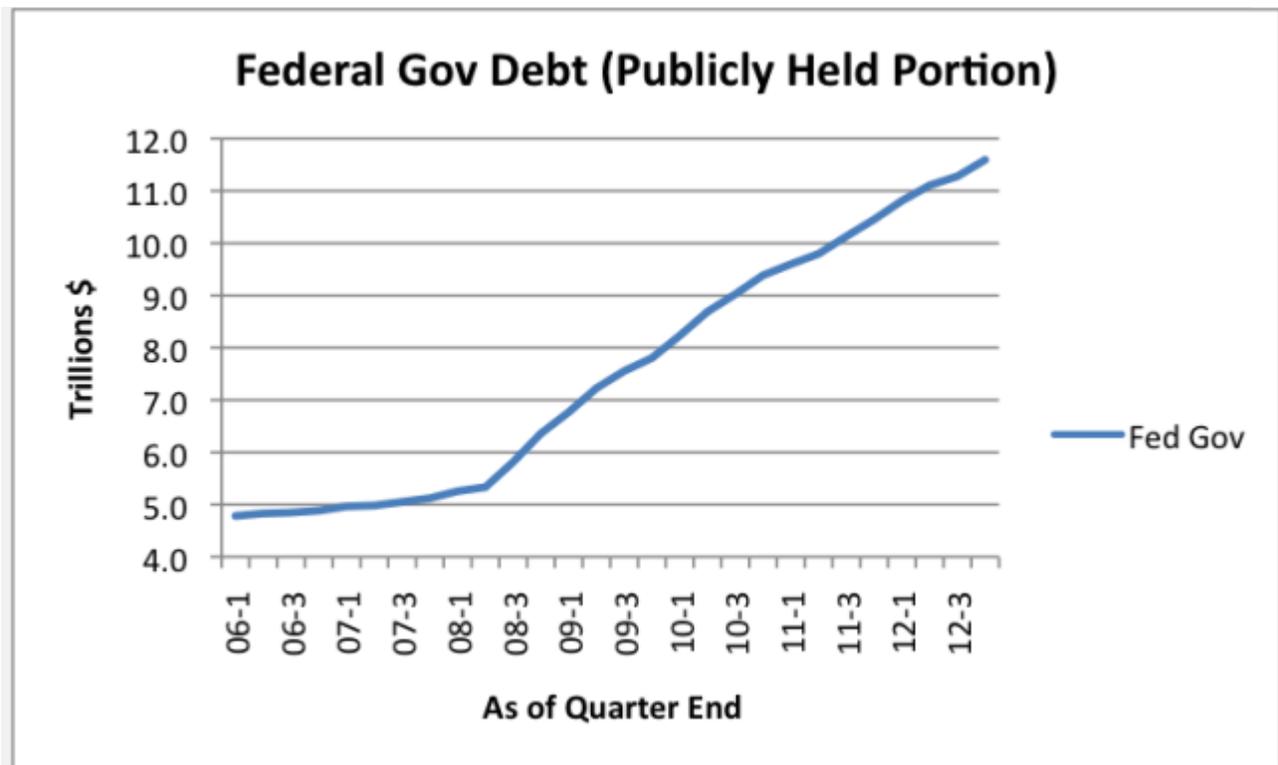


Figure 8. US Federal Debt, from Federal Reserve Z-1 Report. (Excludes debt owed to Social Security and other Federal programs.)

Oil prices rose again starting in 2009 as demand outside the US, Europe, and Japan continued to grow. By 2011, high oil prices were back. The economies of US, Europe and Japan did not bounce back to the kind of economic growth most expected, because at high oil prices, their products were not competitive in a world marketplace that relied on an energy mix that was slanted more toward coal (which is cheaper), and also offered lower wages.

**In 2013, world oil supply is still constrained.**

It is easy to get the idea from news reports that everything is rosy, but the story presented to us is painted to look much better than it really is. Production from existing sites is constantly depleting. In order to replace declining production, huge investment must be made in new productive capacity. It is as if oil producers must keep running, just to stay in place.

Part of the problem is that the cost of new capacity keeps escalating. I have called this the Investment Sinkhole Problem. The Financial Times describes the problem as Energy: More Buck, Less Bang.

Cash flow has historically financed much investment. Now we read, Energy Industry Struggling to Generate Free Cash Flow.

Many naive people believe Saudi Arabia's stories about their "productive capacity" of 12.5 million barrels a day, but their maximum crude and condensate production in recent years has been only been 10,040,000, according to the EIA. Their recent production has been only a little over 9 million barrels a day in recent months, according to OPEC Monthly Oil Market Report.

Iraq is supposed to be the great hope for future oil production, yet it increasingly seems to be stumbling toward civil war.

Russia is now the largest oil producer in the world, with a little over 10.0 million barrels a day of crude and condensate production. According to a Russian analyst, "Gas condensate production is the real driver behind the [recent] growth. Crude oil output is falling and organic growth currently is impossible."

What we tend to hear a lot about is US tight oil possibilities (Figure 9).

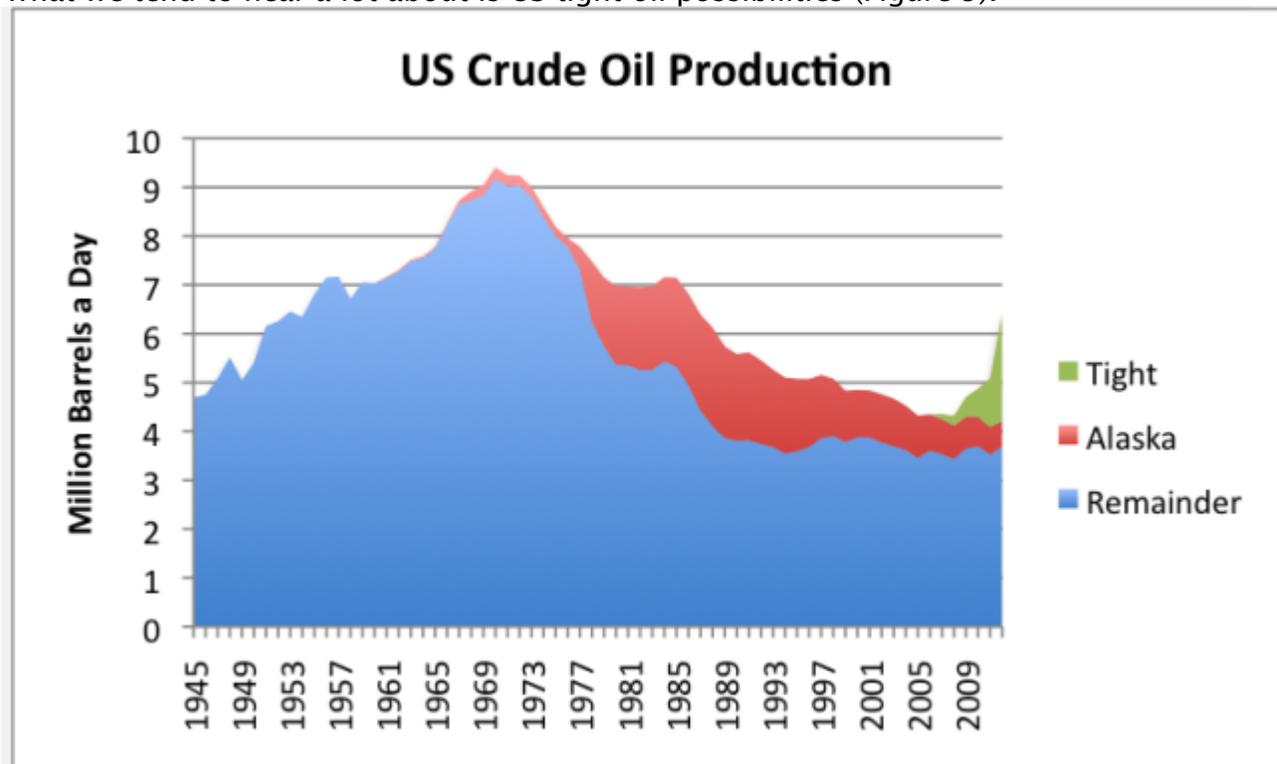


Figure 9. US crude oil production, based on EIA data. 2012 data estimated based on partial year data. Tight oil split is author's estimate based on state distribution of oil supply increases.

Admittedly, tight oil production has ramped up quickly. But it is an expensive technology, that requires a high oil price, and lots upfront investment. There is evidence that such oil is concentrated in "sweet spots" and these get tapped out quickly. In North Dakota, the earliest area for US tight oil extraction, rig count is down from 203 at the beginning of June, 2012, to 176 at April 19, 2013, according to Baker

Hughes. Lynn Helms, Director of the North Dakota Department of Mineral Services gave this explanation, “Rapidly escalating costs have consumed capital spending budgets faster than many companies anticipated and uncertainty surrounding future federal policies on hydraulic fracturing is impacting capital investment decisions.” Meanwhile, North Dakota oil production has recently been flat—perhaps because of weather; perhaps because of other issues as well.

The ramp-up in US crude oil production amounted to 812,000 barrels a day in 2012—very small in comparison to world crude oil needs. World oil production, shown in Figures 1 and 2, is barely affected. In a world with 7 billion people, most of whom would like vehicles, the amount of oil supply being added is tiny.

**In 2013, the financial problems of the United States, the Euro-zone, and Japan haven’t gone away.**

Current high oil prices make the big oil-importing countries less competitive. It is hard to compete with countries with lower average fuel costs, thanks a mix that is much heavier on coal, and lighter on oil. A graph of oil consumption shows that oil is increasingly going to the Rest of the World, rather than the US, EU, and Japan (Figure 10).

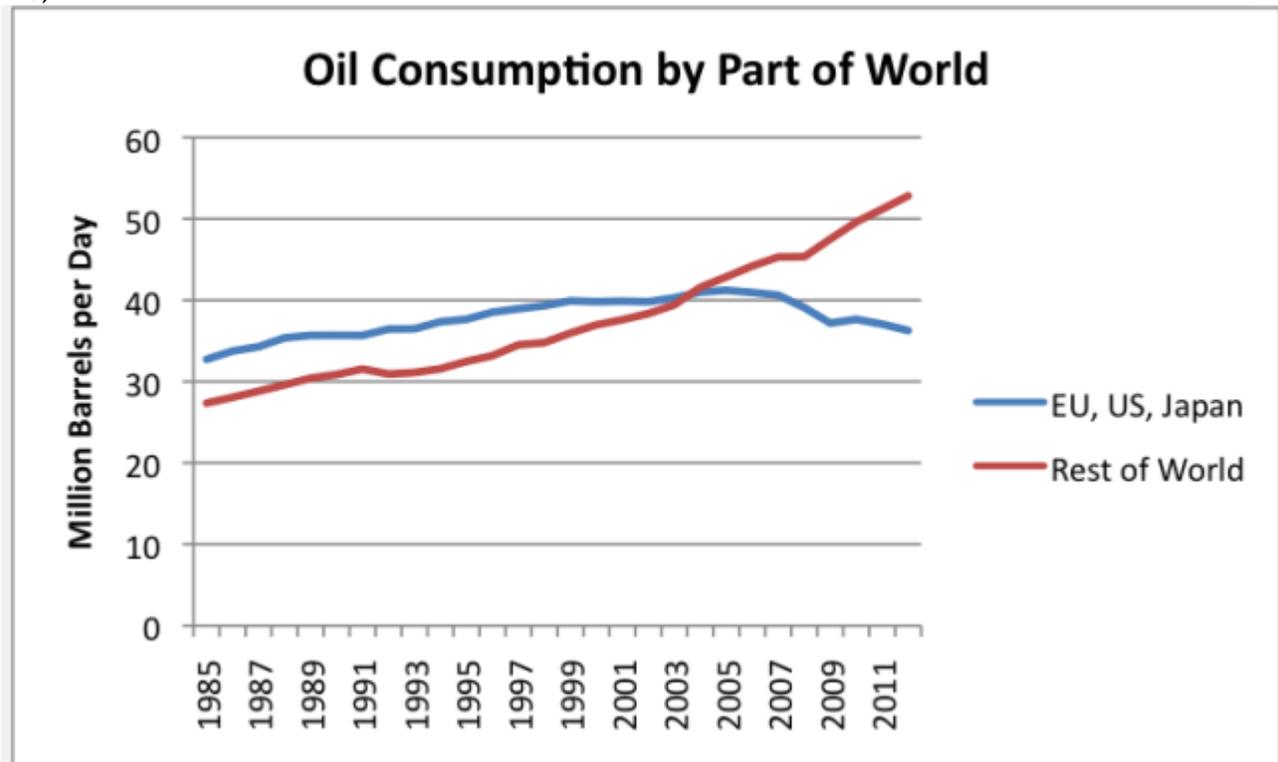


Figure 10. Oil consumption by part of the world, based on EIA data. 2012 world consumption data estimated based on world “all liquids” production amounts.

The countries that see little growth in oil consumption are the same ones struggling with low economic growth. Low economic growth makes debt very difficult to repay. Governments are tempted to add more debt, to try to fix their problems.

### **Tackling government debt problems in 2013 tends to bring recession back.**

The big problem when oil prices rise is that workers' discretionary income is squeezed, because their wages don't rise at the same time. This problem can somewhat be offset by deficit spending of governments for programs to help the unemployed, and for stimulus.

Once taxes are raised, or benefits are cut, the old problem of lower discretionary income for workers reappears. Thus, the recession that governments so cleverly found a way around previously, re-emerges.

In 2005, there was a very sharp impact to oil prices when high oil prices indirectly affected the credit system. This time, a big issue is rising government taxes and lower benefits. These are staggered in their implementation, so the effect feeds in more slowly. Greece and Spain started their cut-backs early. The US raised Social Security taxes by 2% of wages, as of January 1, 2013. Later it added sequester cuts. All of these effects feed in slowly, and add up.

### **With respect to debt, in 2013 we are rapidly approaching the time when this time truly is different.**

There has been a great deal in the press about a mistake Reinhart and Rogoff recently made in their book, This Time Is Different. I think Reinhart and Rogoff, as well as economists in general, have missed an issue that is much more basic: In a finite world, debt, like anything else, cannot keep growing. The economy (whether economists realize it or not) depends on physical resources, and these are in limited supply. One piece of evidence with respect to the limited supply of oil is the fact that the cost of its extraction keeps rising. This means that fewer resources are available to be used for making other goods and services.

I show in my paper, Oil Supply Limits and the Continuing Financial Crisis, that lower economic growth rates make debt harder to repay. Reinhart and Rogoff seem to confirm this relationship works in practice. In their NBER paper, "This Time is Different: A Panoramic View of Eight Centuries of Financial Crises," they make the observation, "It is notable that the non-defaulters, by and large, are all hugely successful growth stories." (They did not seem to understand why, though!)

The 2007–2009 recession partially brought the level of debt down, outside the government sector. Government debt has been ramping up rapidly because tax revenues are down and benefits are up (Figure 8).

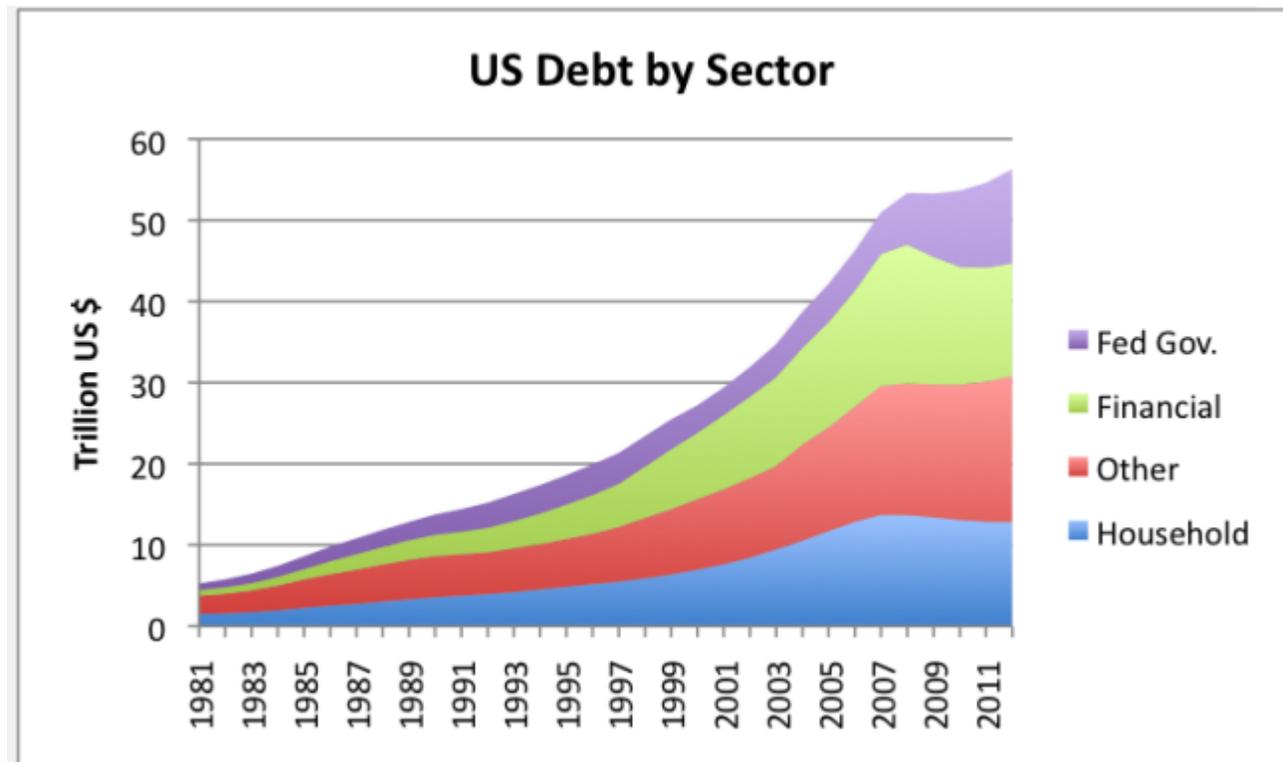


Figure 11. US Debt by Sector, based on Federal Reserve Z.1 data. (Amounts shown exclude government debt that is not publicly held.)

Government debt helps take the place of “missing” debt from other sectors (at least in theory). Now government debt is above acceptable levels. US debt is around 100% of GDP, and growing each quarter.

Without rapid economic growth, only a small portion of the debt that remains can be repaid. If increases in taxes/cutback in benefits leave more without work, a new round of debt defaults can be expected. Student loans are particularly at risk. Business loans maybe a problem as well, especially in discretionary industries. Government debt is likely to be a problem, especially for states and municipalities. Banks may again have financial problems, especially if they have exposure to debt from other countries, or student loans.

I am not certain what will happen to the huge amount of US government debt, if Quantitative Easing ever stops. The same might be said of the debt of all of the other countries doing quantitative easing. Who will buy the debt? And at what interest rate? If

the interest rate rises, there will be a huge problem, because suddenly loans of all types will have higher interest rates. Governments will need higher taxes yet, to pay their debts. It will be hard to sell cars with higher interest rates on debt. Home prices will likely drop, because fewer people can afford to buy homes with higher interest rates.

I showed in [Reaching Debt Limits](#) what a big difference increases in household debt can make to per capita income (Figure 12).

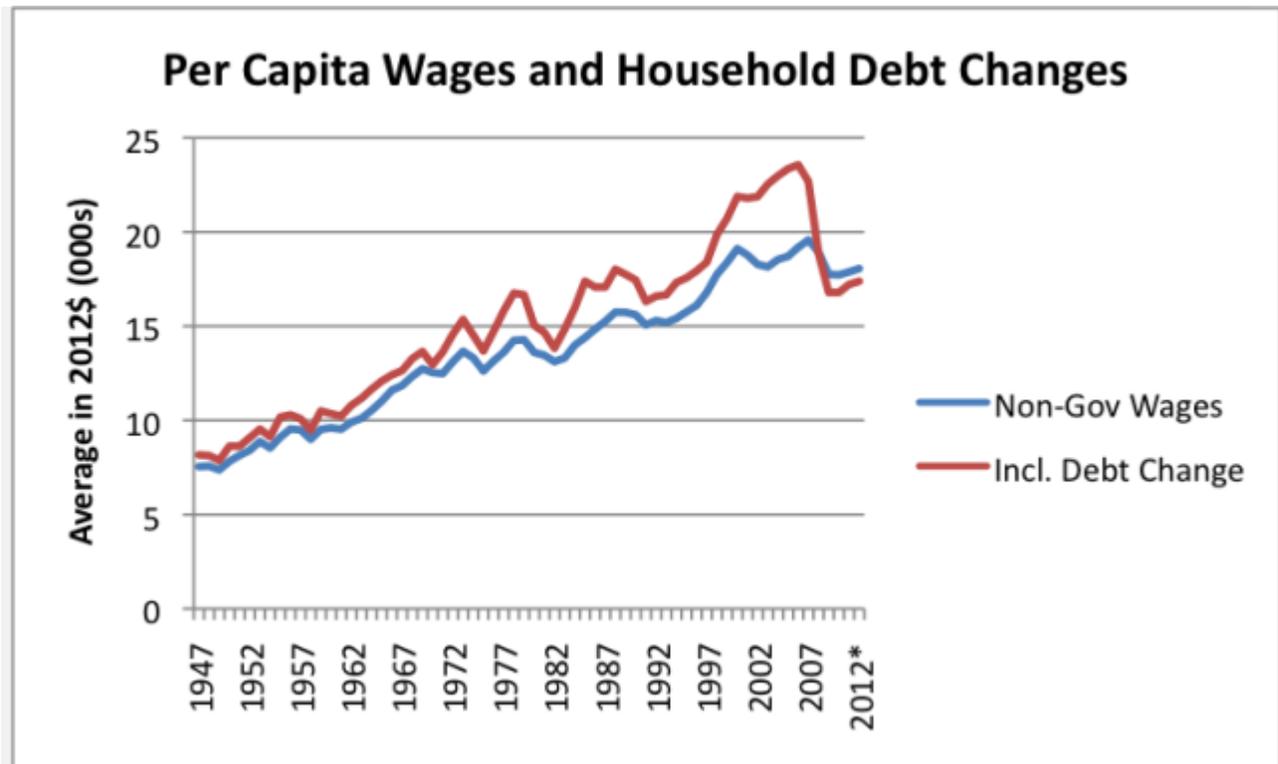


Figure 12. Per capita wages (excluding government wages) similar to Figure 5. Also, the sum of per capita wages and the **increase** in household debt, also on a per-capita basis, and also increased to 2012\$ level using the CPI-Urban. Amounts from US BEA Table 2.1 and Federal Reserve Z1 Report.

If debt starts long-term contraction, we will truly have a mess on our hands. Businesses will have a hard time investing. Individuals will have a hard time buying big-ticket items, like cars, furniture, and houses. Demand for all types of goods and services will fall. I showed in my post [Why Malthus Got His Forecast Wrong](#) that increasing debt was what allowed rapid growth in fossil fuel use. If debt stops growing and starts shrinking, we will get to see the reverse of this phenomenon.

**What is Ahead?**

Lower oil prices indicate that demand is declining. (The cost of extraction is not lower!) Lower oil demand seems to be related to poorer earnings reports for the first quarter of 2013, which in turn is at least partly related to the increase in US Social Security taxes withheld, starting January 1, 2013. Nothing will necessarily happen quickly, but by next quarter's earnings reports, some of the "sequester" cuts will be added to the cuts. Businesses with poor earnings are likely to lay off workers, and those workers will file for unemployment benefits. Gradually, we will see increasing evidence of recession.

It is not clear that this time will necessarily lead to the "all time" switch to long-term debt contraction, but it will bring us one step closer, at least in US, and probably in Europe and Japan as well. Oil supply may not drop very much, very quickly. If we are lucky, demand will bounce back and bring prices back up, as in 2009–2010. But with all of the debt problems around the world, it is possible that a contagion will begin, and defaults in one country will spread to other countries. This is what is truly frightening.

Source: <http://ourfiniteworld.com/2013/04/21/low-oil-prices-lead-to-economic-peak-oil/>