

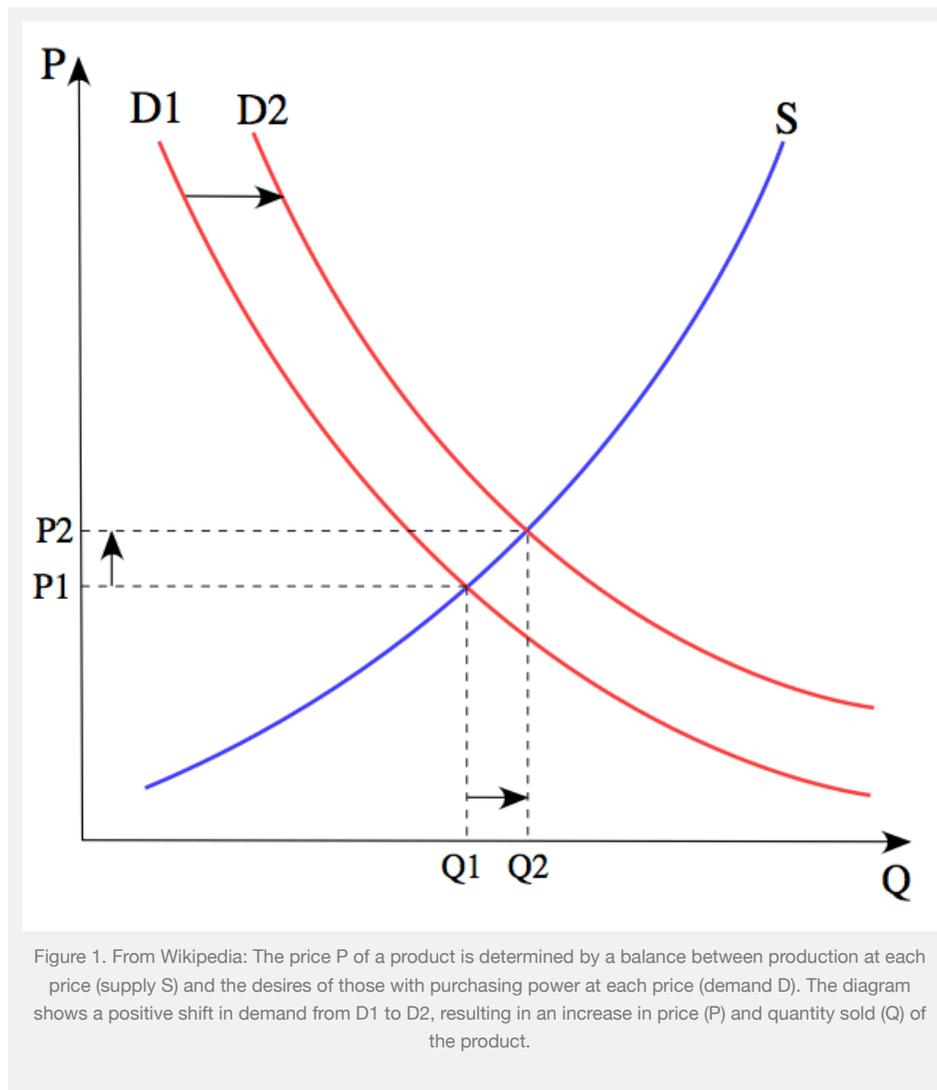
## Our Finite World

Exploring how oil limits affect the economy

### Why "supply and demand" doesn't work for oil

Posted on November 23, 2015 by Gail Tverberg

The traditional understanding of supply and demand works in some limited cases—will a manufacturer make red dresses or blue dresses? The manufacturer's choice doesn't make much difference to the economic system as a whole, except perhaps in the amount of red and blue dye sold, so it is easy to accommodate.



A gradual switch in consumer preferences from beef to chicken is also fairly easy to accommodate within the system, as more chicken producers are added and the number of beef producers is reduced. The transition is generally helped by the fact that it takes fewer resources to produce a pound of chicken meat than a pound of

beef, so that the spendable income of consumers tends to go farther. Thus, while supply and demand are not independent in this example, a rising percentage of chicken consumption tends to be helpful in increasing the "quantity demanded," because chicken is more affordable than beef. The lack of independence between supply and demand is in the "helpful" direction. It would be different if chicken were a lot more expensive to produce than beef. Then the quantity demanded would tend to decrease as the shift was increasingly made, putting a fairly quick end to the transition to the higher-priced substitute.

A gradual switch to higher-cost energy products, in a sense, works in the opposite direction to a switch from beef to chicken. Instead of taking fewer resources, it takes more resources, because we extracted the cheapest-to-extract energy products first. It takes more and more humans working in these industries to produce a given number of barrels of oil equivalent, or Btus of energy. The workers are becoming less efficient, but not because of any fault of their own. It is really the processes that are being used that are becoming less efficient—deeper wells, locations in the Arctic and other inhospitable climates, use of new procedures like hydraulic fracturing, use of chemicals for extraction that wouldn't have been used in the past. The workers may be becoming more efficient at drilling one foot of pipe used for extraction; the problem is that so many more feet need to be drilled for extraction to take place. In addition, so many other steps need to take place that the overall process is becoming less efficient. The return on any kind of investment (human labor, US dollars of investment, steel invested, energy invested) is falling.

For a time, these increasing inefficiencies can be hidden from the system, and the prices of commodities can rise. At some point, however, the price rise becomes too great, and the system can no longer accommodate it. This is the situation we have been running into, most severely since mid-2014 for oil, but also for other commodities, dating back to 2011.



**The higher cost of producing oil and other energy products affects the economy more than a**

**shift from chicken to beef.**

The economy is in a sense more dependent on energy products than it is on our decision whether to eat chicken or beef. If the cost of producing oil rises, and that higher cost is carried through to prices, it affects the prices of many things. It affects the cost of food production because oil is used in the production and transport of food. The higher cost of oil also affects nearly all transported goods, since oil is our primary transportation fuel.

**Some of the impacts of higher oil prices are clearly adverse for the economy.**

If higher oil costs are passed on to consumers as higher prices, these higher prices make goods less affordable for consumers. As a result, they cut back on purchases, often [leading to layoffs in discretionary sectors, and recession.](#)

The higher cost of oil products (or of other energy products) also tends to reduce profits for businesses, unless they can find workarounds to keep costs down. Otherwise, businesses find themselves in a situation where customers cut back on purchasing their products. As we will discuss in a later section, this tends to lead to reduced wages.

**Some of the impacts of higher oil prices are somewhat positive.**

Rising oil prices clearly encourage rising oil production. With this, more jobs are added, both in the United States and elsewhere. More debt is added to extract this oil, and more equipment is purchased, thus stimulating industries that support oil production. The value of oil leases and oil properties tends to rise.

As noted previously, the cost of food supply depends on oil prices. The cost of producing metals also depends on oil prices, because oil is used in extracting metal ores. As the prices of metals and foods rise, these industries are stimulated as well. Values of mines rise, as do values of agricultural land. More debt is taken out, and more workers are hired. More equipment is purchased for producing these products, adding yet more stimulation to the economy.

The higher price of oil also favorably affects the many countries that extract oil. Part of this effect comes from the wages that the workers receive, and the impact these wages have, as they cycle through the economy. For example, workers will often want new homes, and the purchase of these new homes will add jobs as well. Part of the effect comes through taxes on oil production. Oil production tends to be very highly taxed, especially in parts of the world where oil extraction can be performed cheaply. This tax money can be put to work in public works programs, providing better schools and hospitals, and more jobs for citizens.

**It is inevitable that the *price* of oil must stop rising at some point because of the adverse impact on spendable income of consumers.**

The adverse impact of higher oil prices on the spendable income of consumers comes in many ways. Perhaps

one of the biggest impacts, but the least obvious, is the “push” the higher cost of oil gives to moving manufacturing to locations with lower costs (cheaper fuel, such as coal, and lower wages), because without such a change, higher oil prices tend to lead to lower profits for many makers of goods and services, as mentioned previously.

The competition with lower-wage areas tends to reduce wages in the US and parts of Europe. This push is especially great for jobs that are easily transferred to other countries, such as jobs in manufacturing, “call-centers,” and computer tech support.

Another way businesses can maintain their profit levels, despite higher oil costs, is through greater automation. This automation reduces the number of jobs directly. Automation may use some oil, but because the cost of human labor is so high, it still reduces costs overall.

All of these effects lead to fewer jobs and lower wages, especially in the traditionally higher-wage countries. In a sense, what we are seeing is lower productivity of human labor feeding back as lower wages, if we think of the distribution of wages as being a worldwide wage distribution, including workers in places such as China and India.

Normally, greater productivity feeds back as higher wages, and higher wages help stimulate higher economic growth. Lower wages unfortunately seem to feed back in the reverse direction—less demand for goods that use energy in their production, such as new homes and cars. Ultimately, this seems to lead to economic contraction, and lower commodity prices. This is especially the case in the countries with the most wage loss.

### **The drop in oil prices doesn’t do very much to stop oil production.**

Oil exporting countries typically have relatively low costs of production, but very high taxes. These taxes are necessary, because governments of oil exporters tend to be very dependent on oil companies for tax revenue. If the price of oil drops, the most adverse impact may be on tax revenue. As long as the price is high enough that it leads to the collection of *some* tax revenue, production will take place—in fact, production may even be increased. The government desperately needs the tax revenue.

Even oil companies in oil-importing countries have a need for revenue to pay back debt and to continue to pay their trained workers. Thus, these companies will continue to extract oil to the best of their ability. They will aim for the “sweet spots”—places that have better than average prospects for production. In some cases, companies will have derivative contracts that assure them of a high oil price for several months after the price drops, so there is no need to reduce production very quickly.

### **The drop in oil prices, and of commodity prices in general, makes debt harder to repay and discourages adding new debt.**

We earlier noted that a rise in the price of commodities tends to make asset prices rise, making it easier to take

out more debt, and thus stimulates the economy. A drop in the price of oil or other commodities does the opposite: it reduces asset prices, such as the price of the property containing the oil, or the farmland now producing less-expensive food. The amount of outstanding debt does not decline. Because of this mismatch, companies quickly find themselves with debt problems, especially if they need to take out additional loans for production to continue.

Another part of the problem is that on the way up, rising prices of oil and other commodities helped lift inflation rates, making debt easier to repay. On the way down, we get exactly the opposite effect—falling oil and other commodity prices lead to falling inflation rates, making debt more difficult to repay. Commodity prices in general have been falling since early 2011, leading to the situation where [interest rates are now negative](#) in some European countries.

The costs of producing commodities continue to rise, as a result of diminishing returns, so this fall in prices is clearly a problem. Low prices make future production unprofitable; it also leads to an increasing number of debt defaults. There are many examples of companies in financial difficulty; [Chesapeake Energy is an example](#) in the oil and gas industry.

### **Where oil supply and demand goes from here**

The traditional view of the impact of low oil prices seems to be, “It is just another cycle.” Or, “The cure for low prices is low prices.”

I am doubtful that either of these views is right. Falling prices have been a problem for a wide range of commodities since 2011 (Figure 2, above). The [Wall Street Journal reported](#) that as early as 2013, when oil prices were still above \$100 per barrel, none of the world’s “super major” oil companies covered its dividends with cash flow. Thus, if prices are to be sufficiently high that oil companies don’t need to keep going deeper into debt, a price of well over \$100 per barrel is needed. We would need an oil price close to triple its current level. This would be a major challenge, especially if prices of other commodities also need to rise because production costs are higher than current prices.

We are familiar with illnesses: sometimes people bounce back; sometimes they don’t. Instead of expecting oil prices to bounce back, we should think of the current cycle as being different from past cycles because it relates to diminishing returns—in other words, the rising cost of production, because we extracted the cheapest-to-extract oil first. Trying to substitute oil that is high in cost to produce, for oil that is low in cost to produce, seems to bring on a fatal illness for the economy.

Because of the differing underlying cause compared to prior low-price cycles, we should expect oil prices to fall, perhaps to \$20 per barrel or below, without much of a price recovery. We are now encountering the feared “Peak Oil,” because much of the cheap oil has already been extracted. Peak Oil doesn’t behave the way most people expected, though. The economy is a networked system, with high oil prices adversely affecting both wages and economic growth. Because of this, the symptoms of Peak Oil are the opposite of what most people

have imagined: they are falling demand and prices below the cost of production.

If low prices don't rise sufficiently, they can cut off oil production quite quickly—more quickly than high prices. The strategy of selling assets at depressed prices to new operators will have limited success, because much higher prices are needed to allow new operators to be successful.

Perhaps the most serious near-term problem from continued low prices is the likelihood of rising debt defaults. These debt defaults can be expected to have a very adverse impact on banks, pension plans, and insurance companies. Governments would likely have little ability to bail out these organizations because of the widespread nature of the problem and also because of their own high debt levels. As a result, the losses incurred by financial institutions seem likely be passed on to businesses and individual citizens, in one way or another.

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**About Gail Tverberg**

My name is Gail Tverberg. I am an actuary interested in finite world issues - oil depletion, natural gas depletion, water shortages, and climate change. Oil limits look very different from what most expect, with high prices leading to recession, and low prices leading to inadequate supply.

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