The Oil Drum
DISCUSSIONS ABOUT ENERGY AND OUR FUTURE

Is the Economy Less Sensitive to an Oil Shock?

Posted by Stuart Staniford on October 19, 2005 - 2:44am
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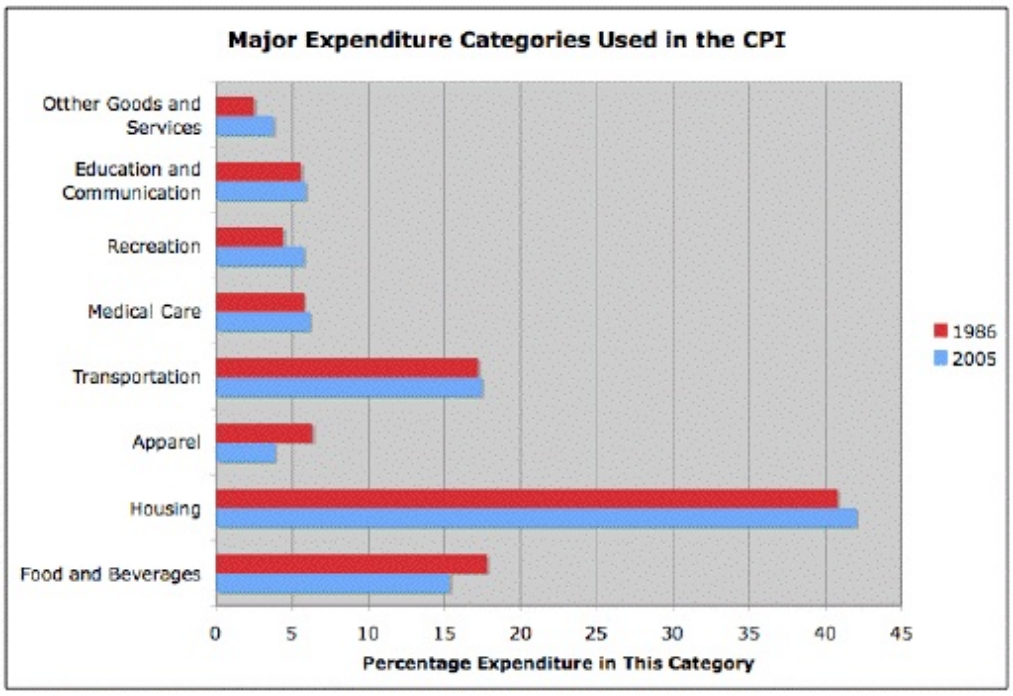
Tags: gas prices, hubbert peak, hurricanes, oil prices, peak oil [list all tags]

Economists are fond of saying that the economy is changing and becoming more about high-tech low-energy materials and advanced services, not heavy matter-and-energy stuff, and therefore those nasty old 1970s style oil shocks wouldn't cause so much of a problem today. This has never made any sense to me, so I decided to investigate more carefully.



Firstly, the evidence that economists really do say things like this. Exhibit A is the esteemed Chairman Greenspan's remarks yesterday:

> Much of the decline in the ratio of oil use to real GDP in the United States has resulted from growth in the proportion of GDP composed of services, high-tech goods, and other presumably less oil-intensive industries. Additionally, part of the decline in this ratio is due to improved energy conservation for a given set of economic activities, including greater home insulation, better gasoline mileage, more efficient machinery, and streamlined production processes. These trends have been ongoing but have likely intensified of late with the sharp, recent increases in oil prices.

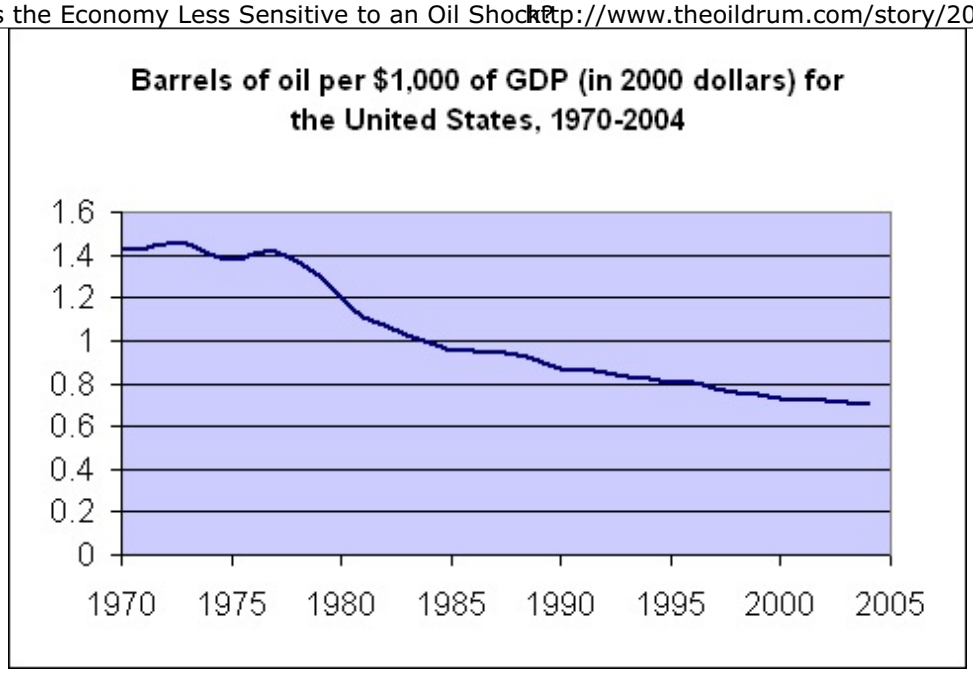
which leads him to his later conclusion that

> Today, the average price of crude oil, despite its recent surge, is still in real terms below the price peak of February 1981. Moreover, since oil use, as I noted, is only two-thirds as important an input into world GDP as it was three decades ago, the effect of the current surge in oil prices, though noticeable, is likely to prove significantly less consequential to economic growth and inflation than the surge in the 1970s.

Exhibit B comes from the Oil Drum's favorite economist, Professor Hamilton of Econbrowser, who in an earlier debate with me wrote:

> Although I agree with his physics, I don't agree that the level of economic activity has any necessary connection to the amount of force being thrown around. Consider two of the areas in which we've seen the greatest economic growth over the last twenty years, computing and medical care. Today you can perform something like 50 billion floating point operations per second for 5 watts of electricity. Stuart could do a much better job than I could of coming up with a graph of FLOPS per watt as a function of time, but I have no doubt that it would exhibit a spectacular rising trend. The reason is that the nature of technical progress here has been to make the physical dimensions of what is being moved around smaller and smaller-- today's computers are better precisely because they're trying to move electrons over shorter and shorter distances.
>
> Or consider medical advances. Antibiotics, immunization, pharmaceuticals, and improved surgical methods have produced profound economic advances. We stand on the verge of almost inconceivable progress over the next century as we put into practical use our ability to read the genetic code of ourselves and our diseases. Here again what we actually need physically to induce are tiny events at the molecular level. Economic progress consists entirely of getting smarter at knowing exactly how to do that.
>
> Nor are computers and health care all that exceptional. The graph at the right plots the ratio of the number of barrels of oil that the U.S. uses each year to real GDP (measured in year 2000 dollars). Year after year, economic activity has consistently grown at a faster rate than our physical consumption of oil.

And then he gives some nice data for the relationship of oil to GDP:



So, here's the point of agreement: yes, the economy undoubtedly creates more value in constant $$ GDP per barrel of oil than it did 30 years ago. However, there are two possible explanations, or contributions to the explanation, which Chairman Greenspan refers to above.

1. The mix of goods and services in the economy is shifting to different things that do not require so much oil to create them per $$ of value .
2. Oil is being used more efficiently to create any given mix of goods and services in the economy.

The difference is critical. If 1) were the main factor, then indeed oil shocks would hurt less - ok, it would be harder to produce the oil-heavy parts of the goods-and-service mix, but they are less important anyway and the oil-light part would be less impacted. However, if 2) were the important factor then oil shocks would be just as bad as they've always been. The fact that you use oil more efficiently throughout the economy than 30 years ago doesn't mean that losing 10% of the oil hurts any less as long as oil is still just as important to the goods and services required. If anything it might hurt more, since some of the low hanging fruit in efficiency gains have already been done, and it's a little harder to become more efficient again in response to the oil shock.

Now, Chairman Greenspan subtly suggests, without coming out and saying it, that 1) is probably more important. He does this by placing it first, prefacing it with "Much of" versus, "additionally, part of". Likewise, Econbrowser chooses to spend most of his space on anecdotes about factors of type 1), rather than factors of type 2), again suggesting the same thing. Especially when he generalizes from his examples and argues that is what explains the trend-line in his graph.

But is this really true?

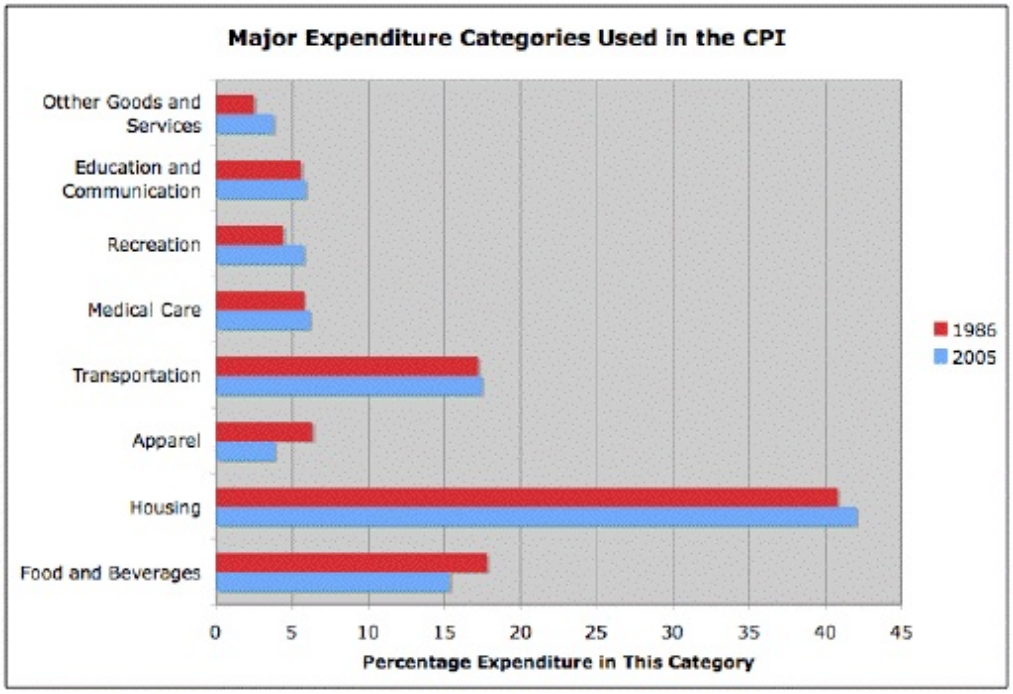
So I argue that a pretty decent way to get at the question is to look at consumer spending. Firstly, consumer spending is 2/3 of the GDP anyway, so we've got the lion's share of what's going on.

Secondly, it is likely the case that some oil-intensive production has moved offshore and we now import those products to satisfy our consumer demands. While this may (possibly) make the oil-intensiveness of our production look a little better, it's not going to actually help us in an oil shock, since we will have to pay the hurting producers in Asia more, rather than paying the hurting producers in Milwaukee more, and the experience in the economy is not going to be that different.

But most importantly, it is consumer demand (expressed via their spending) that drives everything else in the economy. Producers are never doing things for the hell of it, but only in service of getting products and services to consumers. Eg a farmer buying fertilizer is not a consumer transaction. But the farmer wouldn't be buying any fertilizer if there weren't consumers anxious to eat his food, and in the aggregate, farmers will buy more or less fertilizer according to whether consumers want more-or-less fertilizer-intensive food. So the nature of consumer spending organizes the economy into sectors that are all just upstream ways of managing things to supply the consumers downstream. And the amount of money the producers in any sector have to spend on goodies from other producers will be pretty much proportional to what that sector gets from consumer spending. And so looking at consumer spending will give us a pretty decent idea of what goes on in the whole economy.

Now the Bureau of Labor Statistics, in order to figure out how to estimate the inflation rate, helpfully surveys what consumers spend money on. They revise these numbers regularly. So this lets us see what the economy is all about. I plotted the major categories in the current statistics, and also in 1986, which is the earliest year they have the data accessible on the Internet (I'd have preferred to look at 1975, but still twenty years ought to give us a decent idea of the general trend of things).

So that's the picture that I led the piece with, repeated here for the convenience of those of you with small screens:



Now, to me, the overwhelming first impression here is: stasis. What the consumer economy is about didn't change a whole lot. A little less food and beverage, a little more housing, a notch more transportation, less clothing (but it was small anyway), a tad more recreation. But really, the same things that were the mainstays of consumer spending twenty years ago are exactly the mainstays today and the relative importance has shifted only slightly.

Not only that, but the bulk of spending is going on three big categories: housing, transportation, and food and beverages. Between them, they account for 80% of consumer spending in both years I looked at. And they are all, well, sort of old-economy oil-intensive things. Housing in the CPI

consists mostly of the cost of using the house itself, with smaller roughly equal amounts for the fuels/utilities to power it and the consumer durables that stock it. So this category is about large (and ever larger) piles of raw materials, mined, clear-cut, milled, machined, and transported great distances to be assembled into houses. The amount of high-tech nano-materials in the typical house is pretty miniscule. The service of housekeepers and gardeners barely shows up (presumably being buried in household operations: 0.707%). Insurance is down at 0.387%.

Likewise transportation. This consists almost entirely of private vehicles and the fuel for them (if you don't believe me, go check yourself). The only thing I would call a service component is a measly 1.3% on maintenance and repair.

And then food and beverages. The sustainability folks will already be foaming at the mouth about how the US agricultural system requires 10 fossil fuel calories to create 1 calorie of food. No, nothing oil-independent about that category.

So I claim that the amount of explanation 1) in this data is, to a decent approximation, zero. It is just not the case that the consumer economy has shifted to using less oil intensive things to any significant degree. Certainly, there is **no way** that this is an explanation for any substantial part of that factor of 2 change in going from 1.4 barrels of oil/$1000 dollars of GDP in 1970 to 0.7 barrels today shown in Econbrowser's picture. That must be coming almost entirely from improved efficiency - we like the same oil-intensive things, but we are creating more of the the stuff we like per unit of oil than we used to.

(There is of course a third possibility - that the constant dollars in his picture are not as constant as we might hope, but that's a subject for another day).

The only reason current events have had far less impact on the economy than the events of the 1970s is that there has been **no reduction in supply!** The effects of the hurricanes on the global oil supply are miniscule (0.3%-0.5%), and 2005 liquids production is almost certain to exceed 2004 production despite them. By contrast, past oil shocks involved real 7%-10% reductions in oil supply. However, if the current tightness persists, and if we then get some similar percentage point shock (say that Saudi revolution Governor Schweitzer is predicting), the economy will be no more proof now than it was in the 70s.