



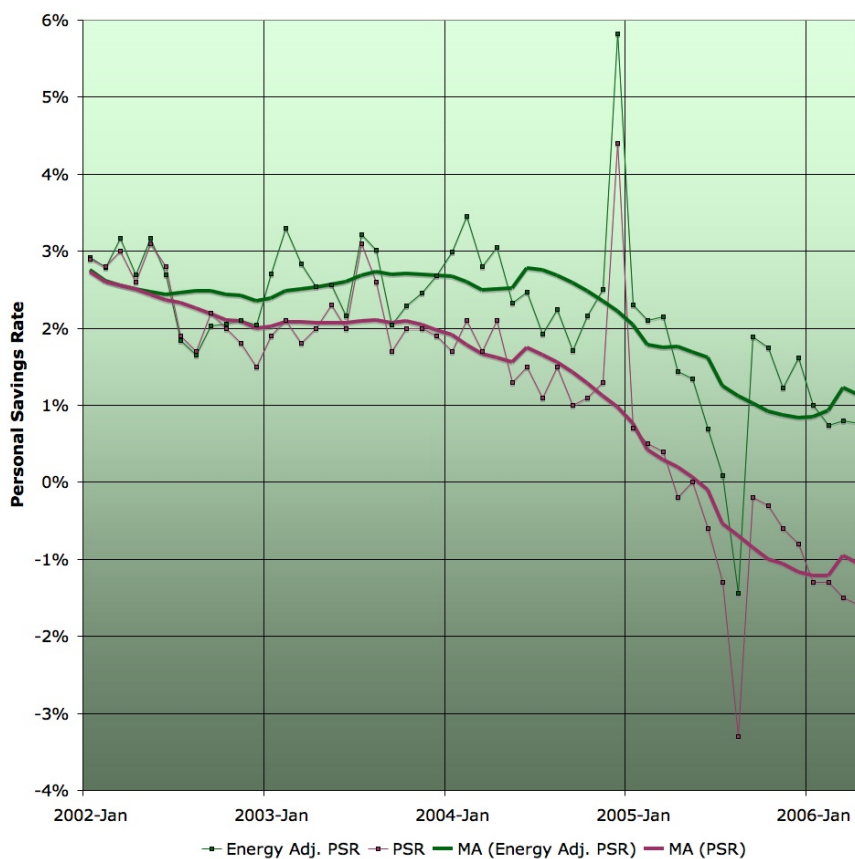
Energy Prices, Inflation, and Personal Savings

Posted by [Stuart Staniford](#) on July 5, 2006 - 3:47pm

Topic: [Economics/Finance](#)

Tags: [deflation](#), [inflation](#), [peak oil](#) [[list all tags](#)]

Annual income twenty pounds, annual expenditure nineteen six, result happiness. Annual income twenty pounds, annual expenditure twenty pound ought and six, result misery. --- Charles Dickens.

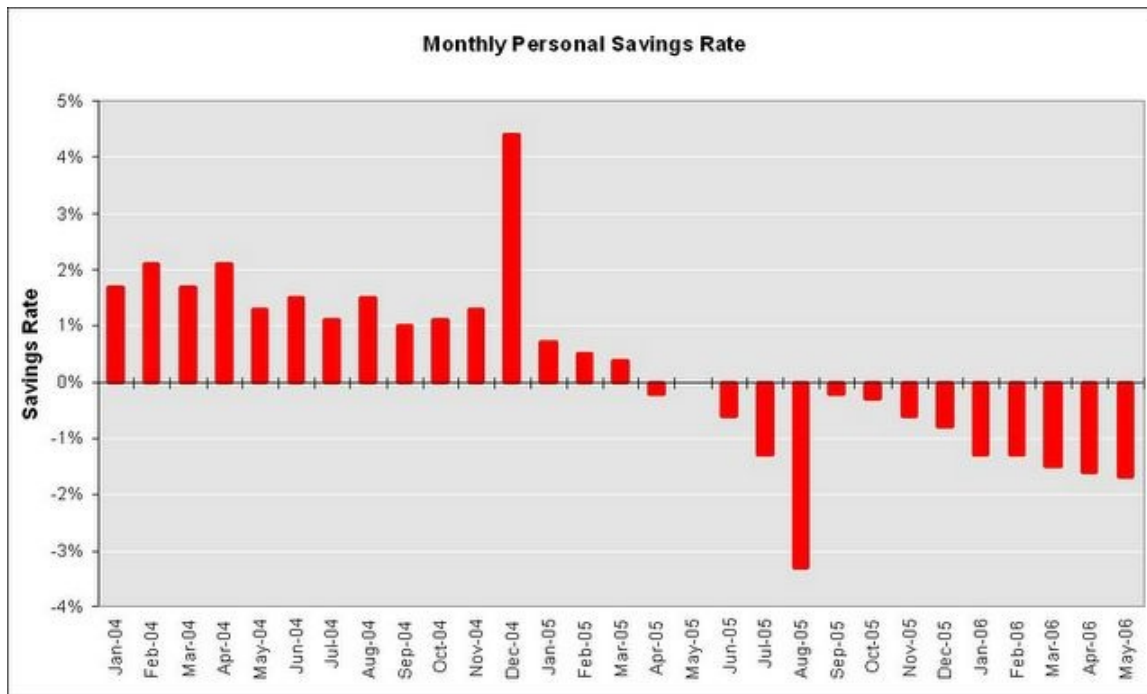


Monthly savings rate for January 2002-May 2006 (plum), together with a version that assumed prices of gasoline and natural gas had not changed (green). Click to enlarge. The fine lines are the monthly figures, and the heavy lines are a 13 month centered moving average. Graph is not zero scaled, and x-axis is not at zero. Source: [BEA NIPA Table 2.6](#) for personal savings data, and EIA for gasoline [consumption](#), gasoline [prices](#), natural gas [residential consumption](#), and [prices](#).

As readers may have noticed, I've held the view that the post-peak era is likely to be more inflation-prone than the pre-peak era. The reason for this is the strong correlation between inflation rates in the past and oil shocks. I even had a mechanism in mind: that in an oil shock, there is less aggregate supply of goods and services, since just about any good or service requires

energy to make and deliver, and so if there's unexpectedly less energy, there's going to be less goods and services. I further assumed that people would respond to this by borrowing and/or liquidating assets in an attempt to maintain their lifestyle. This "bidding war" for the unexpectedly reduced goods and services would in effect raise the velocity of money and cause a rise in the price level.

I was over today at Calculated Risk, and he had a post on the [personal savings rate](#), which had this graph:



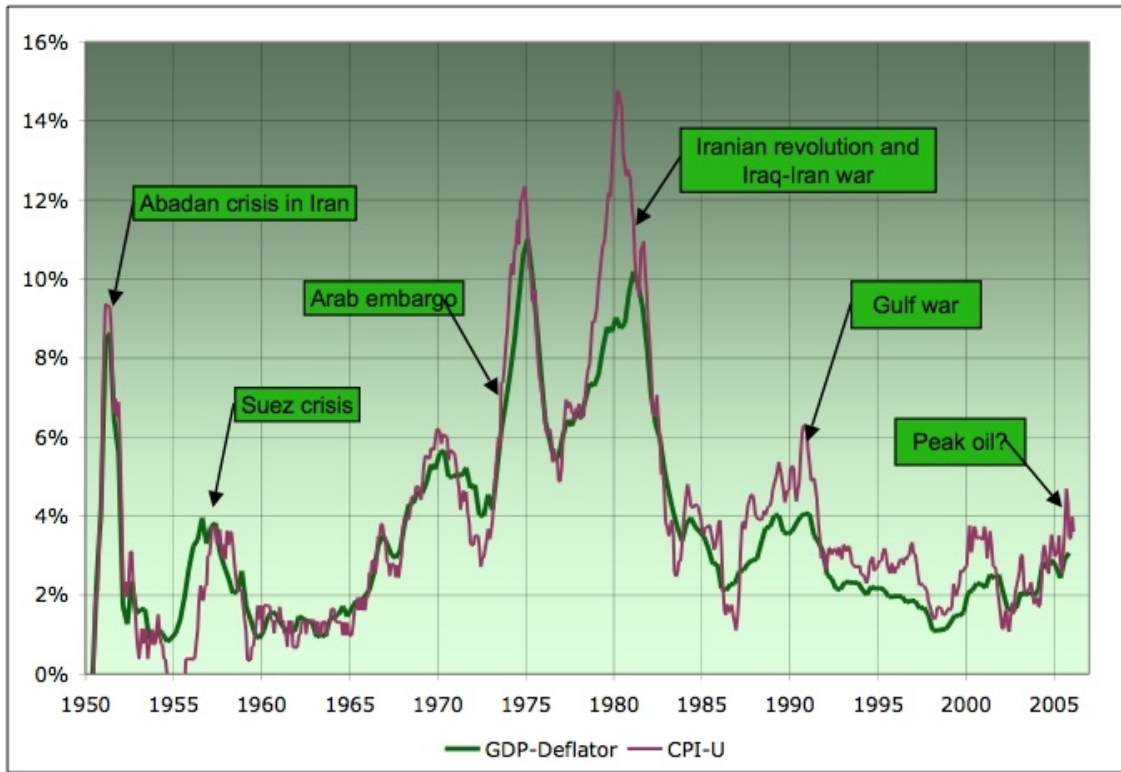
Personal savings rate Jan 2004-May 2006. Source: [BEA via Calculated Risk](#).

It occurred to me that the personal savings rate is a way to test my mental model of what's going on, so I investigated further. The idea is that if my model is correct that during a resource-constraint people are borrowing and/or liquidating assets in order to bid for the remaining goods and services, that ought to show up as a drop in the personal savings rate. To summarize the punchline, I discovered that there's some evidence that things are working according to my model at present, but no evidence that things worked that way in past oil shocks. So I am suitably mystified.

First off, given the controversy this tends to cause with various folks of the Austrian persuasion, I should say that what I mean by inflation is a change in the average price level in the economy, causing currency to be worth less relative to goods and services. This is measured by things like the CPI-U, the GDP deflator, etc (and to the extent they differ, I view that as an estimate of the measurement error in observing inflation). One can have short bursts of inflation, or large sustained amounts of inflation. (The US has not really experienced the latter at any time, but various developing countries have and do.) I'm not a fan of throwing away parts of the data under various pretexts (as "core" inflation does). You're welcome to use some other definition of inflation in your writings, but in my posts, that's what I mean by the term.

Firstly, why do I think there's this connection between inflation and oil shocks. Well, as I [observed a few months ago](#), there have been six more-or-less significant oil shocks in the last 55 years (including the current plateau as a very mild one so far), and eight noticeable peaks in the US

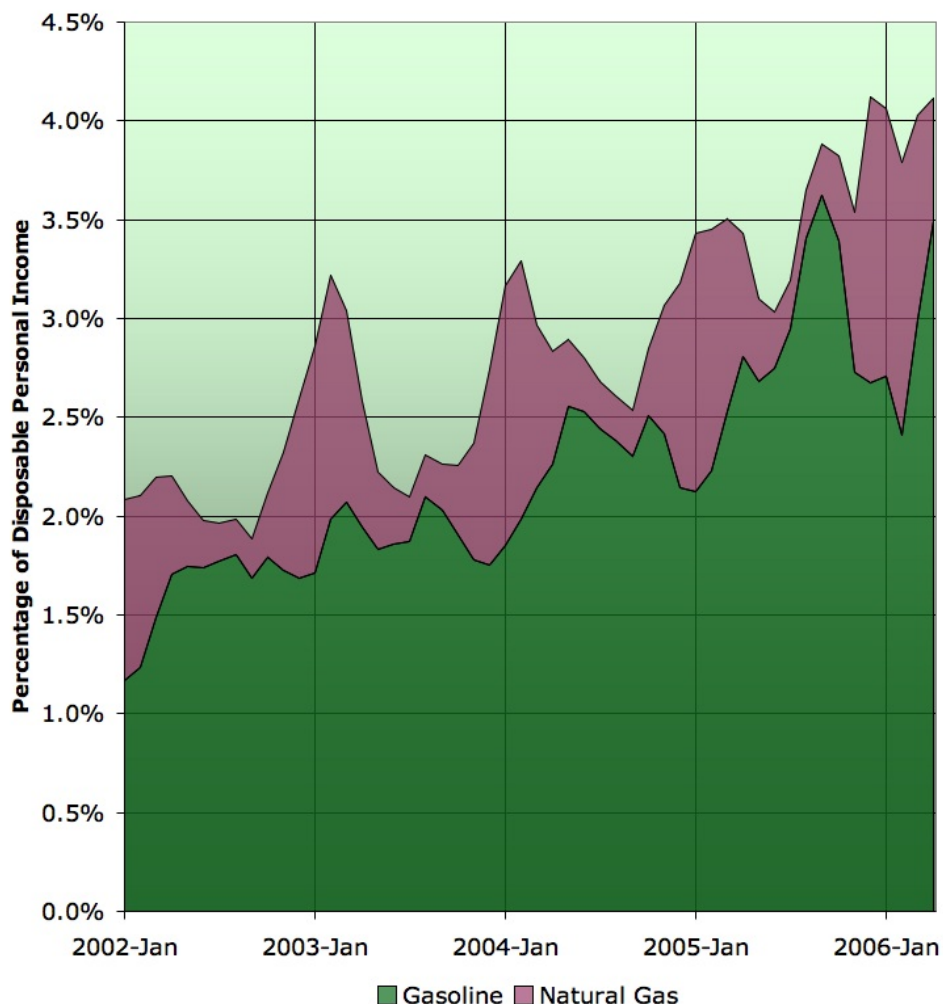
inflation rates. All six oil shocks coincide with one of the significant peaks, and the three largest inflation peaks are associated with severe oil shocks. The odds of that happening in the absence of a strong causal connection of some kind are miniscule, and it's sure hard to see how inflation could cause the oil shocks, rather than the other way around.



US inflation rate (calculated two ways) since 1950 with various oil shocks labeled. The green line is inflation calculated from the quarterly GDP deflator numbers (percentage change from four quarters earlier). Source: [Bureau of Economic Affairs](#). The purple line is calculated from the monthly CPI-U index (percentage change from 12 months earlier). Source: [Bureau of Labor Statistics](#).

Anyway, I began by looking at the recent situation. The personal income data are available from the Bureau of Economic Analysis (eg see [the most recent release](#), or [go here for raw data](#)). I was mostly working from Table 2.6 for monthly statistics, and Table 2.1 for longer-term quarterly and annual stats. The data cover the total amount of personal income Americans received (with some breakdown), the amount they spent, and computes personal savings as the difference. It's a nice series because it goes back a very long way.

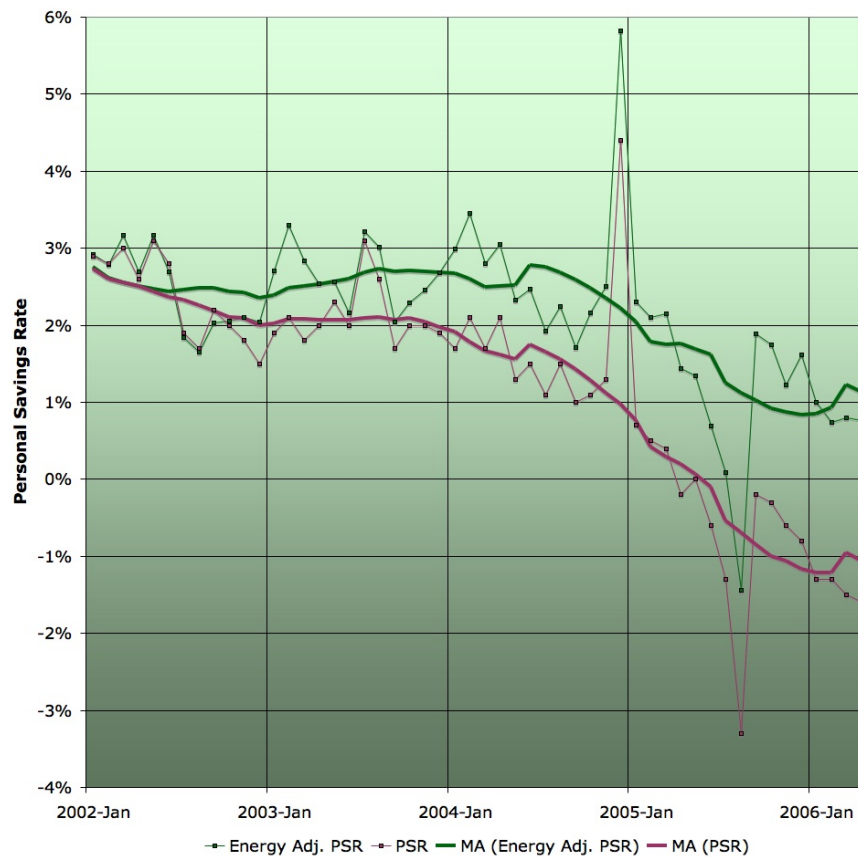
I also went to the EIA, and dragged out numbers for gasoline [consumption](#), gasoline [prices](#), natural gas [residential consumption](#), and [prices](#). That allowed me to compute the proportion of personal disposable income (income after taxes and other payroll contributions) being spent on gasoline and natural gas:



Proportion of personal disposable income being spent on gasoline and natural gas Jan 2002-April 2006.
 Source: [BEA NIPA Table 2.6](#) for personal savings data, and EIA for gasoline [consumption](#), gasoline [prices](#), natural gas [residential consumption](#), and [prices](#).

As you can see, the proportion of income going on these has roughly doubled in four years. The gasoline calculation is a bit crude because it neglects both taxes (which would increase it) and the fact that some gasoline is bought by commercial and industrial customers (which would decrease it). Hopefully the residual error is fairly small. In addition to gasoline and natural gas, households spend a couple of percent of PDI on electricity but [electricity prices](#) have been fairly stable. There's also heating oil and diesel but these are a much smaller contribution to household expenses (on average - they are important regionally).

So given that the personal savings rate is the difference between income and expenses for the aggregate of US households -- their profitability if you will -- to the extent they hadn't had to spend money unexpectedly on energy, they might have saved more and borrowed less. Hence this graph which takes out the money spent on natural gas and gasoline over the January 2002 level, and puts it back into the personal savings rate:

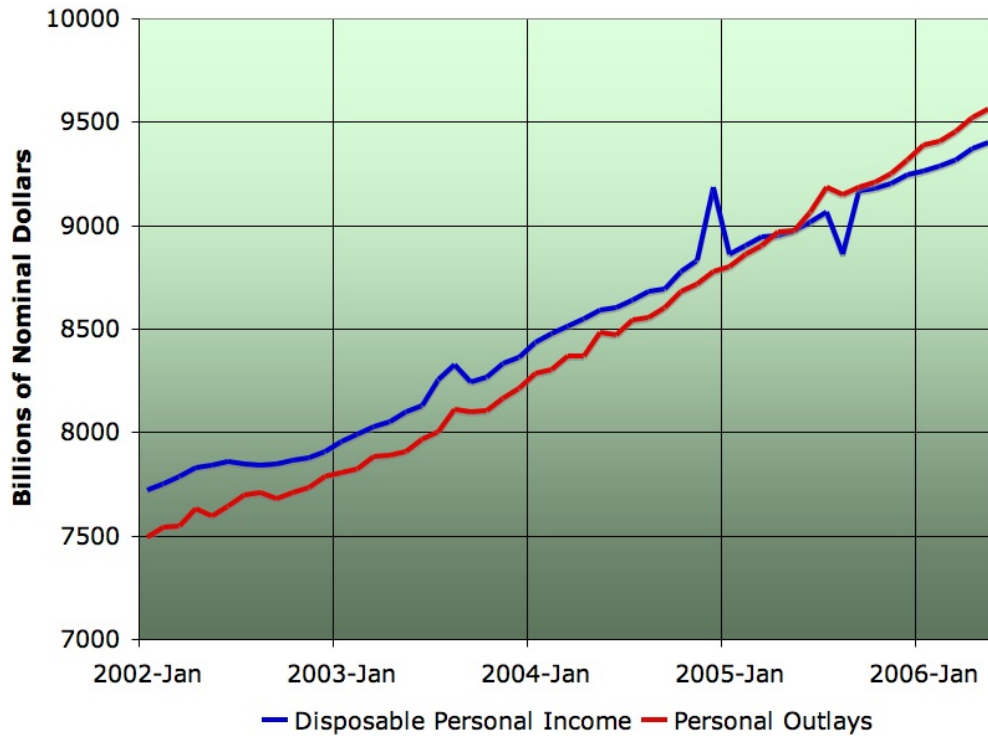


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Source: [BEA NIPA Table 2.6](#) for personal savings data, and EIA for gasoline [consumption](#), gasoline [prices](#), natural gas [residential consumption](#), and [prices](#).

(The spike up at the end of 2004 is due to Microsoft's special dividend, and the spike down in summer 2005 is due to hurricanes). As you can see, personal savings would have been fairly flat until the beginning of 2005 but for energy cost increases. And one might imagine that, now energy prices are starting to bleed through into core inflation, if we took into account the indirect effects of energy in the same way, personal savings might have been completely flat.

Of course, this isn't proof that there's a causal connection - it's just consistent with it and an interesting piece of evidence. Let's now look at the separate components of the personal savings rates: the after-income and the personal outlays:



Monthly disposable income and personal outlays for January 2002-May 2006 (nominal dollars). Graph is not zero-scaled. Click to enlarge. Source: [BEA NIPA Table 2.6](#).

As you can see, the problem is not that income wasn't increasing fairly briskly, it's just that we felt a need to increase expenses faster again.

Let's pull back for a broader view:



Quarterly personal savings rate from 1950-I to 2006-I. Graph is not zero-scaled. Click to enlarge. Source: [BEA NIPA Table 2.1](#).

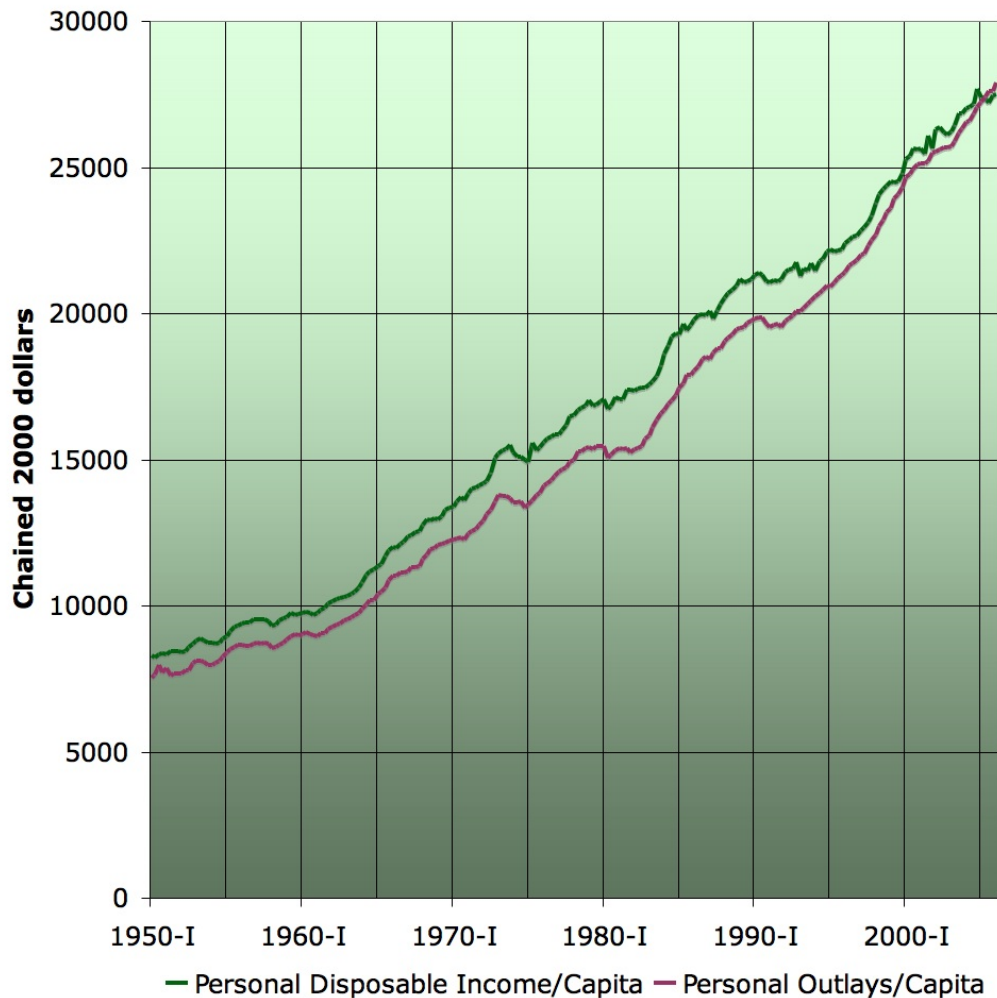
Well! Is it that we are moral degenerates who live on credit cards instead of saving like our virtuous parents? Or that it's getting harder and harder to make a surplus, indeed even get by, now that globalization is moving our jobs to Outer Mongolia for the low wages? Or that all our jobs and heavy industry is moving somewhere they still have cheap energy since the peak of US oil and natural gas in the seventies? All of the above?

Whatever it was, around 1985, the rot sets in and things have been getting steadily worse ever since.

Anyway, we mustn't get too distracted by the big secular trends; our main mission here is a hunt for oil shocks. Let's start at the lower right. That giant dive in the personal savings rate in 2005 sure looks like it matches my model for oil-shock induced profligacy. However, I'm clearly in big trouble in the earlier cases.

For example, the Abadan crisis (where the British blockaded Iranian oil after Mossadegh nationalized the Iranian oil industry) began in mid 1951. It gives a huge (if brief) inflation spike immediately. But the PSR had dropped in 1950, and rises again through the oil shock. Likewise 1973 or 1979 are completely not there as big spikes downward from the prevailing rate. In

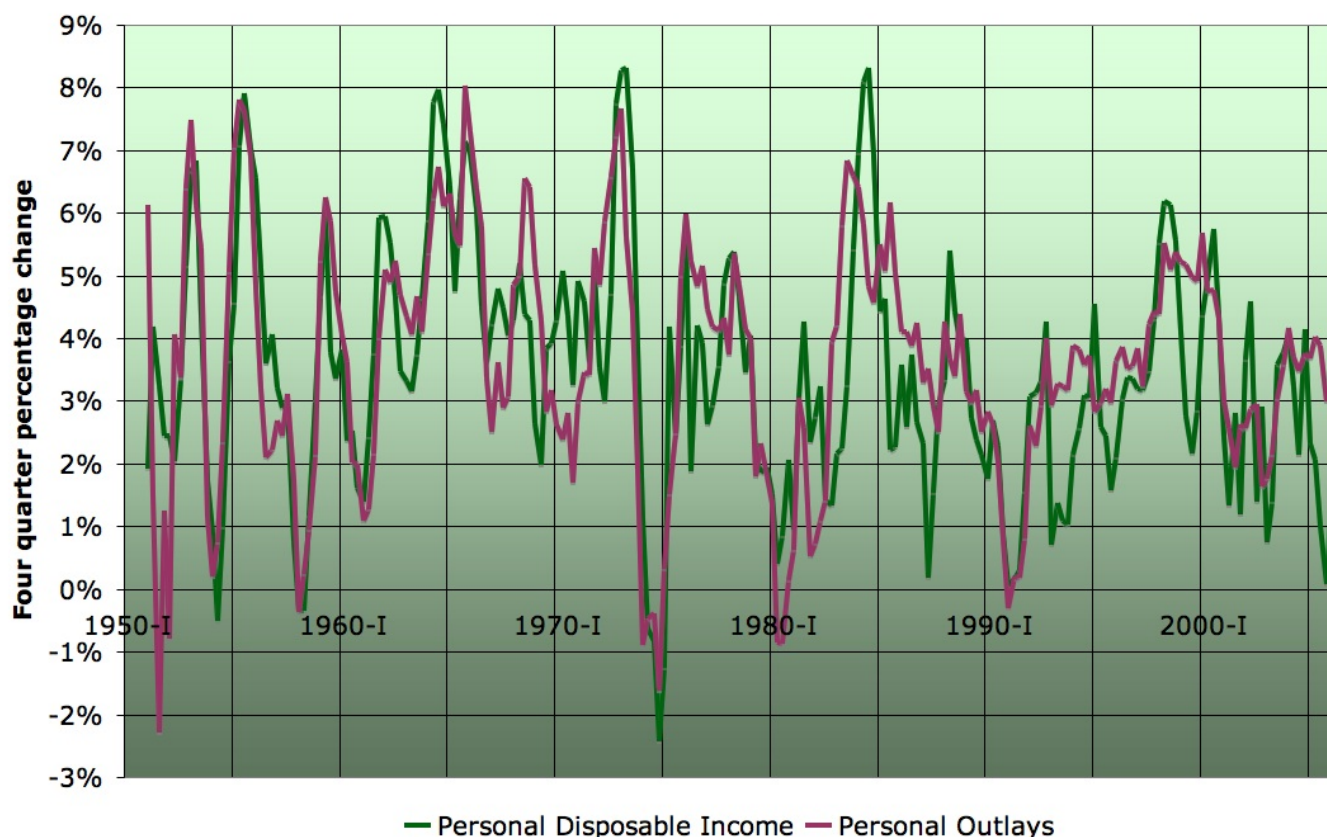
Here's per capita PDI and personal outlays in chained 2000 dollars (ie this is real, not nominal, dollars).



Real personal disposable income and personal outlays per capita 1950-I to 2006-I. Numbers are chained 2000 dollars deflated by the personal income deflator. Click to enlarge. Source: [BEA NIPA Table 2.1](#).

Hmmm. Are we really 3 1/2 times better off than our grandparents? Sure houses are somewhat bigger (though somebody's probably still living in Granny's house), cars accelerate faster, stereos sounds better, and kids have more toys. Computers and the Internet are really cool. But somehow it doesn't seem like a 3.5x improvement. I'd give it 1.5x maybe. How much would you pay, or need to be paid, to go back and live in 1950 instead of 2006? The furniture and clothing is nowhere near the quality of Granny's, we don't get to go to the symphony as often, and TV is execrable. But I digress again. The point I really wanted to make is that before about 1980, the two curves (income and expenditure) were almost exactly the same shape - every little wiggle in income was reproduced in outlays. But since then, they have increasingly diverged with the outlay curve getting smoother (including smoothly blasting through the flattening in income in 2005).

This next graph gives us a more precise look at the situation, at the expense of being more difficult to read. It shows the four quarter percentage change in both personal disposable income and personal outlays (economy-wide totals) so that we can see how both income and spending respond to shocks.



Percentage change from four quarters earlier for real personal disposable income and personal outlays 1951-I to 2006-I. Click to enlarge. Source: [BEA NIPA Table 2.1](#).

We can at least see the shocks now - remember in approximate severity order they are 1973, 1979, 1951, 1955, 1990, 2005. Each caused a sharp dive in income (though they are by no means the only things to do so). However, prior to this most recent one, all caused at least as large a dive in the personal outlay line. In some cases outlays fell more than income. But as you can see, since 1980, it's increasingly the case that when income stops growing, spending doesn't follow suit - we just borrow our way through it. Not always though - but obviously often enough that the personal savings rate is tanking.

So I think while my theory may have some value in the near term (as long as we remain such credit hungry spendthrifts) it doesn't appear to have much merit as an explanation in the past.

And that begs the question what does mediate an oil shock into such big spikes in the inflation rate?

My new hypothesis is as follows. When there's an energy shock, there's less energy (or at least less energy than households and businesses were planning on based on recent trends). Since it's very hard for anyone to use energy more efficiently in the very short term (before capital investments in more efficient equipment can be made), this means that someone is going to have to engage in less economic activity. The firms and households whose energy use will be dropped will presumably be those whose energy use is large compared to the amount of value they create with that energy. However, this process involves bidding up the price of energy (or it's most relevant subform: oil), and that affects the income statement for **all** businesses and **all** households, even those who win the bidding war to keep using as much energy as they were using.

Let's focus on the businesses for a moment; I now suspect they might be the more important actors. If 5% of a business's costs are oil and the price of oil doubled, and the business cannot use less in the short term, then expenses just went up by 5% over what was expected. Since pre-tax net margins are typically only in the range of 0-10%, that is a huge potential impact on net profits. Since shareholders hate that kind of thing, the business is now under huge pressure to either reduce expenses or increase revenues to increase profits.

Since all businesses are in variants of this dilemma, there isn't really an opportunity to increase real revenues on an economy-wide basis, so the only choices are to cut costs (which promotes a recession), or increase prices (which promotes inflation). The degree to which one or other occurs is going to depend on how much spare capacity there is. If the economy is already in recession, pricing power will be poor, and the effect of the oil shock will go more to deepening the recession. If the economy is strong entering the shock, pricing power might be good and firms will strive to maintain their profitability by raising prices. Households will tend to follow suit to the extent they have pricing power for their labor (demanding wage increases to compensate them for their increased cost of living).

If everyone does raise prices, and thereby spark a spike in inflation, the Fed is likely to notice (with some lag), and respond by increasing interest rates. This will then trigger a recession with some delay (if the initial shock was strong enough), and also bring the inflation level back down.

I'll check this storyline out in more detail in future posts at some time...



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