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Thoughts on Demand Destruction: Where Is It?

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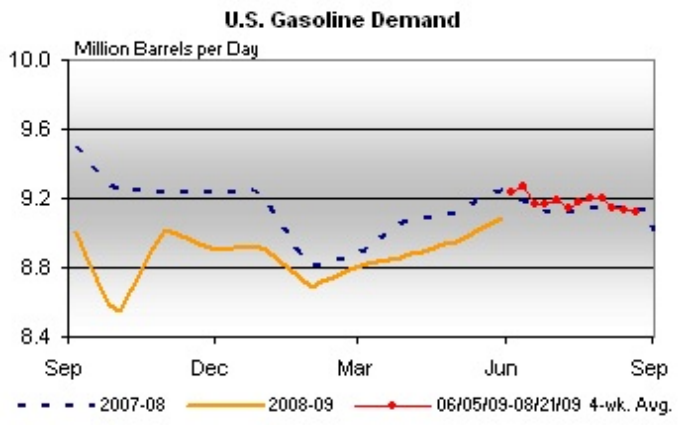

Where's the Demand Destruction?

Oil is close to $120/barrel, "peak oil" is everywhere you look, so where's the demand destruction? The latest EIA figures actually show a 0.57% increase in US gasoline demand year on year over the last week. The week prior also showed an increase in gasoline demand, but the 4-week average still shows a 0.5% decrease because of lower demand in 2008 for the weeks ending 4/4/08 and 3/21/08. Regardless of which statistic one chooses, this is hardly a convincing case for demand destruction. Admittedly, historical demand growth has been near 1.5%, and the per capita gasoline use is slightly lower since the US grew roughly 0.883% last year. At best, this is not significant "demand destruction." Take a look for yourselves: here are the EIA's full historical tables for gasoline demand, both week ending and 4-week average. With statistics available to show both minor increases or decreases, recent reports in the press and blogosphere consistently publish reports of declining demand. Other articles, also consistent in claiming that we're driving less, rely on entirely different sources: Businessweek recently claimed that "traffic" as measured by the Federal Highway Administration is down 1.4% last year, and MasterCard claims that purchases at the pump are down 6.8% since last year. If EIA statistics are even vaguely accurate, then MasterCard's figure seems untenable--what is happening to all the additional gasoline being purchased? Gasoline stocks are up from a year ago, but nowhere near enough to make up for these discrepancies. And, of course, it is possible that EIA data is off--there are even internal discrepancies in the EIA's reporting, with this week's Weekly Petroleum Status Report highlights (.pdf) claiming that the 4 week average for gasoline demand *rose* by 0.9% over last year, directly contradicting the EIA's data tables (referenced above) that show a 0.5% *decline* in the exact same statistic. Amidst this confusion, the consistency of reporting about a decline in gasoline demand seems like cherrypicking.

With this uncertainty surrounding the concept of "demand destruction," it's time to take a deeper look at the mechanics behind how demand destruction occurs. Specifically, this essay will limit its focus to two components of demand destruction in gasoline: the time-lag between high prices and reduced demand, and the need to price alternatives to each gallon of gasoline we consume. Does a lack of demand destruction when oil is well over $110/barrel mean that prices must go even higher to destroy demand? How much higher? Or is it enough that prices hold at this level for long enough to cause people to gradually make long-term purchases with this price in mind, and thereby destroy demand? How long? Finally, how much of current US demand destruction (to whatever degree it exists—even if only as a decrease in growth of demand) is due to current economic conditions, and how much can be attributed directly to the price of oil?

Time-Lag in Demand Destruction: Major Purchases Drive Energy Consumption

One way that demand destruction occurs is that, when making major energy-consuming purchases such as a car or a house, people choose more energy efficient alternatives when the price of energy is higher. These choices happen over time—everyone won't (and couldn't) rush out tomorrow to buy a more fuel efficient car, even if gas suddenly hit $10/gallon. How long is the time lag in these choices? Moody's says that the average time between car purchases in the US is 4.33 years. Even if we could figure out a magic number at which every consumer will pick a new car based on improved fuel efficiency, it would take at least 4 years to affect this transition. In reality, however, no one knows what percent of people would change to a more efficient car, and how much more efficient that new car would be, based on a given price of gas. The latest data does show that sales of SUVs and pickups were down 27% and 14% respectively, compared with a general automotive sales decline of only 8% for the first quarter of '08. This suggests that current oil prices are already significantly impacting consumer car choice *when they decide to purchase a new car*, but that this transition will take a long time--remember, the 4 year figure to change to a higher fuel-economy automotive fleet is only valid if *every* new car purchase is more fuel efficient. These numbers suggest that we're moving toward greater efficiency, but not in a great hurry. The decline in overall sales also suggests that an increasing number of people are financially stuck with their present vehicle, even if it gets poor gas mileage.

What about houses? Americans move houses on average every 5 years. Well, at least they did when they were upwardly mobile in a growing economy and sub-prime credit was easy to come by. It is yet to be seen how the current economic situation will change this figure, but it seems likely that our rate of moving will slow. In theory, when we move homes, we could choose more energy-efficient homes (better insulated, better solar design), or, more germane to a discussion of gasoline demand, we could choose homes that require less driving to commute to work, shopping, etc. However, the massive sunk-cost in suburbia must be taken into account. While these homes may go down in value because of the commuting difference, they will likely remain largely occupied because, while the cost of commuting may skyrocket, the cost of ownership in the suburbs may decline to even this out. If a family currently consumes 50 gallons of gasoline per month in suburbia, and could cut this to 20 gallons per month by moving to a more central location, then at $10/gallon this would save them $300/month. If ownership costs (or rent) in the suburban location declined by more than $300/month, then (ignoring many other factors) it is more financially viable to remain in the suburbs. Additionally, when Americans make the average, once-in-5-year move, they don't all move to a newly constructed house. The average American home is about 30 years old, and despite the promise of "New Urbanism" or downtown condo living to reduce gas consumption via commuting, the turnover of America's housing infrastructure will take time.

ROI: Pricing Alternatives to Marginal Gasoline Consumption

Demand destruction happens in other ways than buying a more efficient car or moving to a house closer to work. It is also possible to reduce demand by choosing a less convenient, less pleasurable, or a slower option over another that consumes more gasoline. Take carpooling, for example. The passenger-miles-per-gallon of any car immediately doubles when a single commuter adds another commuter as a passenger. Four adults in a Honda Civic hybrid would average about 200 passenger-miles-per-gallon. Even four adults in a Hummer would get respectable mileage per passenger! If this is so simple, then why don't we all do this? Because carpooling costs time, both in the time required daily to pick-up and drop off the additional passenger, time required to set-up the carpool system, and time in the form of inconvenience of people unexpectedly needing to work late, not being ready for pick-up on time, etc. How do we value this? There are no statistics that I'm aware of that track % of people who commute with one or more commuting passenger, or that track something similar, nor do I have any statistics for average "inconvenience time" per additional carpool passenger. However, at some gasoline price level, it makes sense for any given person to arrange to carpool instead of commute by themselves. At $4/gallon, however, my impression is that most Americans will still value the time saved more than cutting their gasoline bill in half. The calculations for riding the bus, light rail, walking, riding a bike, etc. are essentially the same—how do you balance the money saved on gas with value of added inconvenience and additional time? For some people the decision clearly makes sense, it may even be more convenient and save time—but those are the people most likely to already carpool, ride the bus, etc. New demand destruction doesn't occur until the price of gasoline changes the calculus, where it didn't make sense for a given individual at $3/gallon, but it now does makes sense at $X/gallon. How high would gas prices have to be for it to "make sense" for 50% of suburban commuters to carpool or ride the bus?

Economic Cycles and Demand Destruction

Ultimately, the kind of calculus suggested above is inextricably linked to the health of the broader economy. Rich consumers with large and growing disposable incomes are likely to value their time and potential inconveniences at a much higher rate than those struggling to buy groceries (notably, those with high disposable income are also the most able to pay now to upgrade to more efficient homes or cars, but least incentivised to do so). Another point to consider in evaluating demand destruction is the cause of economic problems. If economic problems are caused by high energy prices, then it seems accurate to consider demand destruction attributable to these economic problems as demand destruction caused by high energy prices. However, to the extent that economic problems are the result of an economic cycle, and not due to high energy prices, then the energy demand destruction that results does not seem accurately attributable to high energy prices. Our current economic troubles seem to be a function of both issues, but in my opinion more a short-term cyclical issue (inaccurate pricing of credit risk and the resultant correction, as I argued a few weeks ago). At least some of the decrease in US oil demand can be attributed to economic cycles, and not to high oil prices, but we probably cannot separate these causes and isolate the portion of demand destruction caused by economic cycles. Can we even say whether or not demand would actually continue increasing at $120/barrel IF there was no "Credit Crunch"? Does a statistic like GDP/barrel of oil consumed allow us to see through this fog? It might if we had a very accurate measure of inflation, but in my opinion the CPI certainly doesn't qualify. For that reason, comparing the 2006 GDP/barrel consumed vs. the 2007 GDP/barrel consumed is also problematic. Furthermore, it does not necessarily follow that, in a cycle-driven recession, GDP will shift to more energy efficient paths.

Conclusion

With gasoline well over $3/gallon, and oil well over $110/barrel, there does not seem to be any significant demand destruction in the US. Reasonable people can argue that demand is up about 1% or down about 1% since this time last year, but I am defining this entire range as "not significant." What is the boundary of "significant" demand destruction? By significant, I mean significant impact on the supply-demand equilibrium for oil. Per-capita gasoline consumption, while important from a standard-of-living perspective, at most impacts elasticity of demand, and does not fundamentally change the supply-demand equilibrium (growing populations don't impact geology), so I am focusing on absolute demand for this analysis. If a low-end estimate of the decline rate for oil production post-peak (or net oil exports at present) is 5% per year, then I think that is the boundary for "significant" demand destruction. Demand destruction of 1% per year on an ongoing basis, compared with oil production decline of 5% per year, won't have a significant impact on the supply-demand equilibrium. Conversely, a year-on-year demand destruction of 5% compared with an oil production decline of 5% does have a significant impact on the supply-demand equilibrium because it negates the impact of the production decline rate—this is effectively what Richard Heinberg suggests in his Oil Depletion Protocol.

If this analysis tells us anything, it is that there is no easy way to calculate exactly what price point will cause demand destruction of X%. I remember when many proclaimed that $3/gallon gasoline would cause huge demand destruction. Now many of these same people proclaim that demand destruction will explode at $4/gallon or $5/gallon gasoline. Europeans, though admittedly in a very different situation, don't seem to be driving significantly less at $8/gallon. In the end, we simply cannot know how demand destruction will unfold, and I think that is highly significant for calculating the economic impacts of rising oil prices—we have no empirical basis to either prove or disprove propositions as opposite as 1) present prices, if maintained indefinitely, will cause sufficient demand destruction to keep prices from rising significantly higher, or 2) prices will be able to at least triple before demand destruction begins to keep pace with supply declines. I know that there are nearly endless opinions on this point, but the significance of this analysis is that we cannot prove either point of view to be right or wrong.

It's also important to highlight that this essay only considers demand destruction within the United States, while the global oil market is inherently global. What will it take (both psychologically and economically) to see 5% demand destruction per year in the US? What are the prospects for global demand destruction of 5% per year? Even if we aren't currently witnessing a decline in global production of 5%, evidence suggests that net exports are declining at least that fast...

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