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# Oil Demand Destruction & Brittle Systems

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I've seen a number of comments, both at TheOilDrum and elsewhere, suggesting that the US is now less susceptible to supply disruptions because we have reduced our demand for oil by several hundred thousand barrels per day over the past year. In general, I get the sense that people think we can insulate ourselves from supply disruptions, from our dependence on potentially unreliable foreign sources of oil, by improving our efficiency and eliminating "unnecessary" oil consumption. In my opinion, this is backward. In this post, I will argue that, because the demand that is destroyed first in a free market is the demand that is easiest to eliminate, the resulting consumptive system is more inelastic, more brittle, and more susceptible to systemic shock from supply disruption. I will approach this argument by outlining what makes a system either resilient or brittle and why market-driven demand destruction creates a more brittle system. I will conclude with a few thoughts on how we can increase the resiliency of our energy-driven economy in a future environment of declining energy supplies.

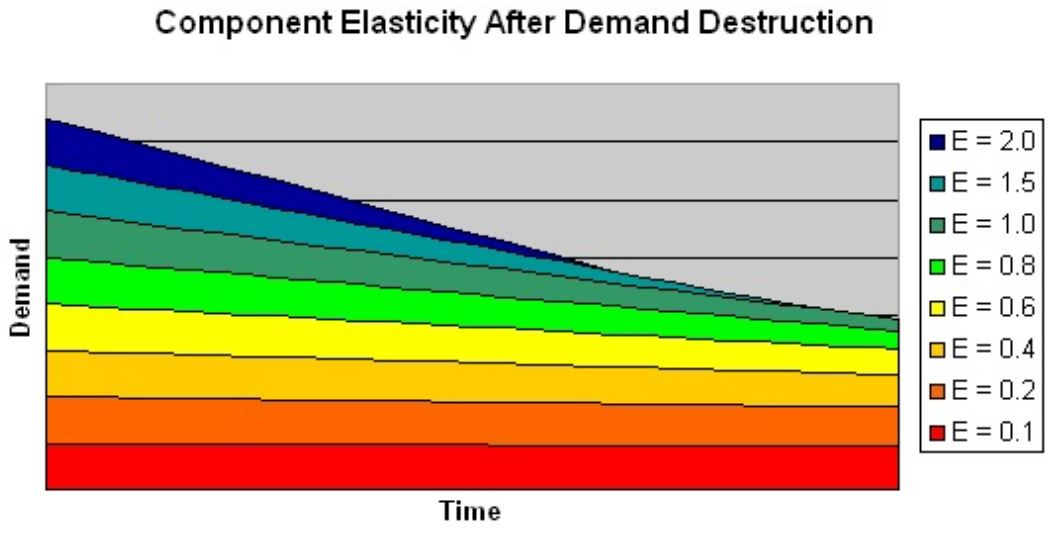


**Figure 1: A hypothetical model of market-driven demand destruction illustrates the theory that the highest elasticity demand is destroyed first. This results in the remaining demand being, in aggregate, more inelastic. "E" figures are meant only as relative measures of demand elasticity and are not meant as actual values for price elasticity of demand.**

### What Makes Systems Resilient or Brittle?

A system is brittle if it is unable to effectively absorb shock. Consider a plate glass window in comparison to a trampoline net. The plate glass window can take a significant shock without budging, but at some point it can no longer absorb an impact and fractures. It is brittle. The trampoline net, on the other hand, will be moved by even a minor impact, but because of its ability to deform and stretch, it will not fracture (or tear) until far greater stress is applied then is needed to break the glass window. The trampoline is resilient. These same qualities of "brittle" and "resilient" apply to economies and financial markets.

### The Problem with Brittle Systems

When an economic or financial system is brittle, it is less able to absorb the impact of a shock or ongoing stress--say, a geopolitical disruption to oil supplies, or the ongoing, grinding problem of geological peak oil. When a system is resilient it tends to be able to absorb such impacts, giving the underlying system time to reorganize to eliminate or mitigate the stress event. When a system is brittle, however, it is more likely to shatter, after which point it can no longer bounce back to its original shape. When an economic system shatters, we call it "collapse"--the system enters a downward spiral into depression and dissolution. This is one of the "worst case scenarios" for the impact of peak oil--that it will overstress a brittle global economic system and act as the catalyst for economic, even societal collapse.

For this reason, it is important to understand what makes our economic system brittle or resilient, and how our personal economic choices and political/policy choices can influence the character of the system. In this post, I will look specifically at the how crude oil demand destruction changes the systemic elasticity of demand for oil, and how this makes our economic system more brittle.

### Why Demand Destruction Makes a System More Brittle

The basic mechanism underlying this theory is that, when forced to eliminate consumption of oil, individuals, and the market in aggregate, will eliminate the most discretionary consumption first. As a result, the remaining consumption will be more valuable to the individual, firm, or economy in terms of GDP or quality of life produced per barrel of oil consumed. This remaining demand is more inelastic. When the oil demand--whether it is for a family, industry, or nation--becomes more inelastic there is greater exposure to supply disruptions.

For example, the US economy that consumed roughly 20 million barrels of oil per day in 2007 was less vulnerable to a theoretical geopolitical disruption removing 5 million barrels of oil per day from the world market (say, war with Iran) than a future US economy that only consumes 10 million barrels per day due to market-driven demand destruction. The reason is that, presumably, that future US economy cut the least valuable, most discretionary 10 million barrels per day of consumption, and the remaining 10 million barrels per day of demand is far more inelastic.

### Is Market-Driven Demand Destruction an Example of a Market Failure?

The tendency of a free market to cut the most elastic demand first seems to be an example of market failure--that is, where the market action produces a long-term result that runs counter to

the goals of the market mechanism. One of the classic causes of market failure is where the market acts to optimize short-term benefit, but in the process creates significant long-term problems that aren't adequately accounted for due to inability to incorporate these long term costs in the analysis of present decisions.

We saw exactly this in the rush to extend credit to increasingly low income home buyers resulting in today's "credit crunch," and I predict that we are currently seeing a similar market failure in the market's destruction of the most elastic demand first. The result will be an increasing vulnerability to future supply disruptions--unfortunately, this will come exactly as the likelihood of more severe supply disruptions increases, as I discussed in my recent article on Geopolitical Feedback Loops.

**Measuring Inelasticity: Is it Purely a Price Issue?**

The standard measure of demand elasticity is as a function of price. Unfortunately, this is not necessarily a good measure of the impact on systemic resiliency. Even if prices are going down, demand inelasticity can be increasing if the cause for the price drop is that high prices have caused an economic downturn that is eliminating the most elastic oil demand. There are indications that this is exactly what is happening at present--high prices are creating demand destruction, at least in the US, but the demand that is being eliminated appears to be the most elastic consumption. A better measure of the impact of demand inelasticity on systemic resiliency may be price as a percentage of median disposable income.

**Comparing the Credit Default Swap system to Demand Destruction**

It is useful to compare the process of increasing inelasticity of demand due to market-driven demand destruction with the systemic brittleness created by the mushrooming market for credit default swaps. I've written a brief explanation of this shadowy corner of the financial world in Financial Wizardry & Collapse. In brief, by spreading the risk of default on corporate bonds very thinly and widely, the global financial system becomes superficially more resilient as it is better able to absorb a handful of major failures. However, because the system is so interconnected, at some tipping point of numerous defaults, the entire system would crash at once. The result is a system that is actually far more brittle.

The credit default swap (CDS) system is in some ways useful in understanding how to reduce the brittleness caused by market-driven oil demand destruction. In the CDS system, individual corporations or issuers essentially bet on the viability of corporate bonds--they have the power to choose their level of exposure. Of course, in seeking to maximize profits, there is a trend to maximizing revenues by maximizing exposure to systemic default. Participants can, however, participate in the system while maintaining a safe, low level of overall exposure--a level where they could absorb the impact of simultaneous default of every position they hold. The lesson, roughly applied to energy demand inelasticity, seems to be to minimize the exposure to supply disruptions of the most inelastic sources of consumption.

For example, if winter heating by heating oil is a very "important" (and thereby inelastic), source of consumption, it would make sense to move that use to a more reliable source of energy (say, passive solar design and added insulation) before converting gas-powered commuter cars to plug-in electric. This also applies to electricity and natural gas use--for example, the electricity used to pump water out of aquifers for a farmhouse is likely a very inelastic source of demand; replacing this source of energy consumption with rainwater harvesting would improve the aggregate elasticity of demand.

This seems to run counter to what the market and non-market incentives (subsidies & R&D funding) are pushing for--one reason why I think this process demonstrates a market failure--and may be a good candidate for a centrally-planned policy push. This is just one example of how the US could actually increase systemic resiliency by substituting renewable, domestic, alternative energy sources and conservation measures for the most inelastic sources of oil demand (the red section of the Figure 1, above), while retaining the more elastic and discretionary sources of oil consumption to buffer supply shocks.

**What About Efficiency?**

Do improvements in efficiency have the same effect as involuntary, market-driven demand destruction? Maybe. If the pace of efficiency measures decreases the scarcity of oil, then the result will be a less brittle system. However, this tends to act as a negative feedback loop, as the exact stimulus that drives investment in efficiency (high prices & scarcity) will also be eliminated by efficiency gains rapid enough to decrease the overall scarcity of oil.

**Conclusion**

As a result of recent demand destruction, the US economy is becoming increasingly susceptible to shocks caused by supply disruptions. The global economy appears to be following suit to some degree, though the process of demand destruction in the growing economies of China, India, Russia, and elsewhere in the developing world is currently less clear than the picture in the US. It appears that the process of demand destruction in the US is a classic example of market failure--not that it is a failure to reduce apparently "unnecessary" or frivolous consumption, but rather that by relying on market signals alone we are increasing the inelasticity of remaining demand and setting ourselves up for catastrophic system failure. While anathema to the orthodoxy (though certainly not orthopraxy) of American capitalism, it is time to consider how we must use non-market mechanisms to plan for increasing our systemic resiliency.

While this may be unlikely to happen at a national level, the need to increase resiliency is scale-free: individuals, communities, bioregions, and nations can all benefit by the increase of resiliency at any level. I have previously addressed one way to increase resiliency--by addressing the Problem of Growth that tends to "eat up" systemic resiliency. In this post I also recommended policy programs that would first transition our most inelastic demand to reliable, domestic, and renewable sources of energy.

If there is a "so what?" point to this post, that is it: rather than work to create viable, stable, renewable substitutes to the more elastic components of oil demand, we would be better served by focusing subsidies and research grants on replacing our most inelastic demand first. Implement policy and subsidy as necessary to replace or eliminate the most inelastic sources of demand first--the exact opposite of what the market would do, but the best way to increase systemic resiliency.