

Why new car buyers generally undervalue fuel economy.

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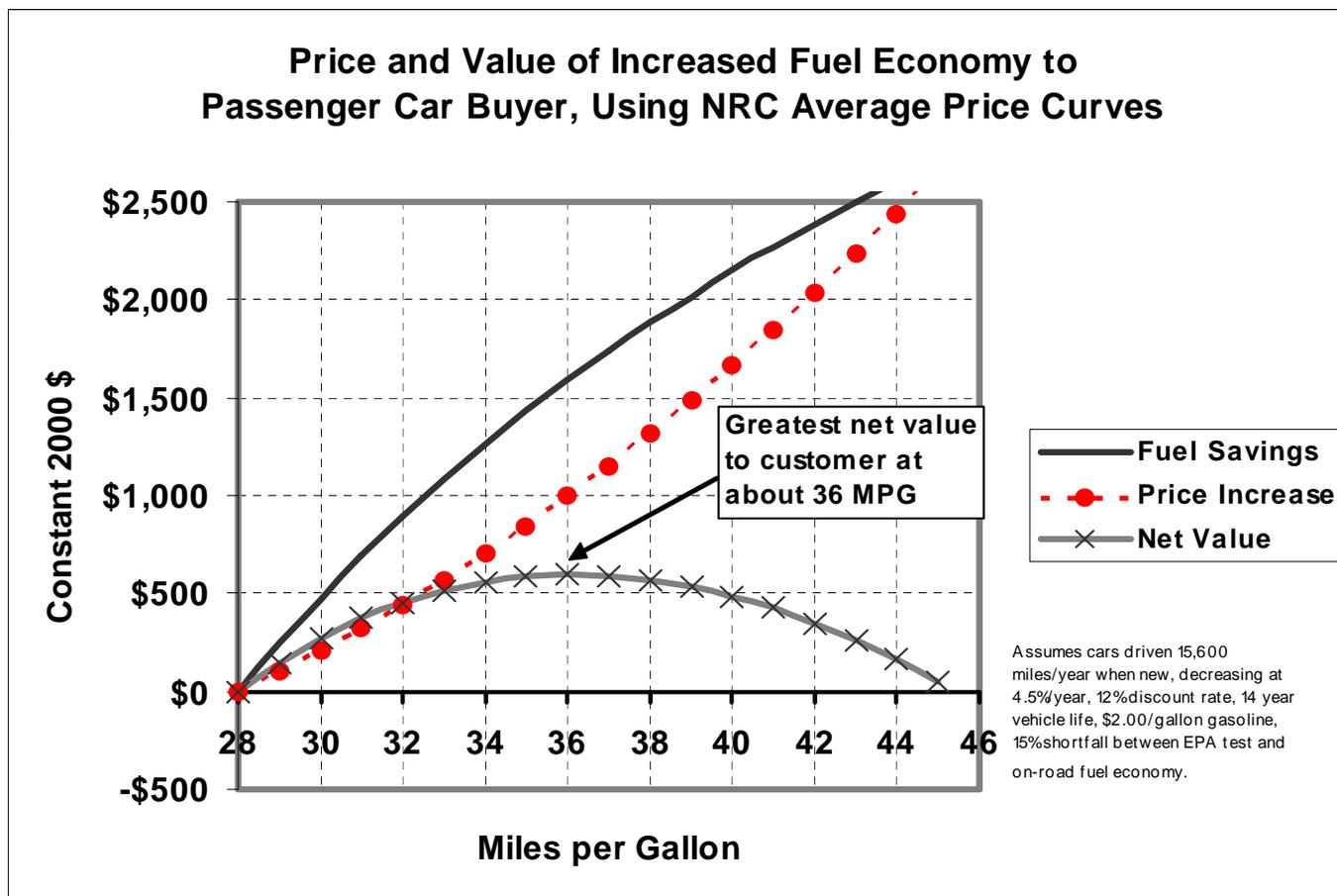
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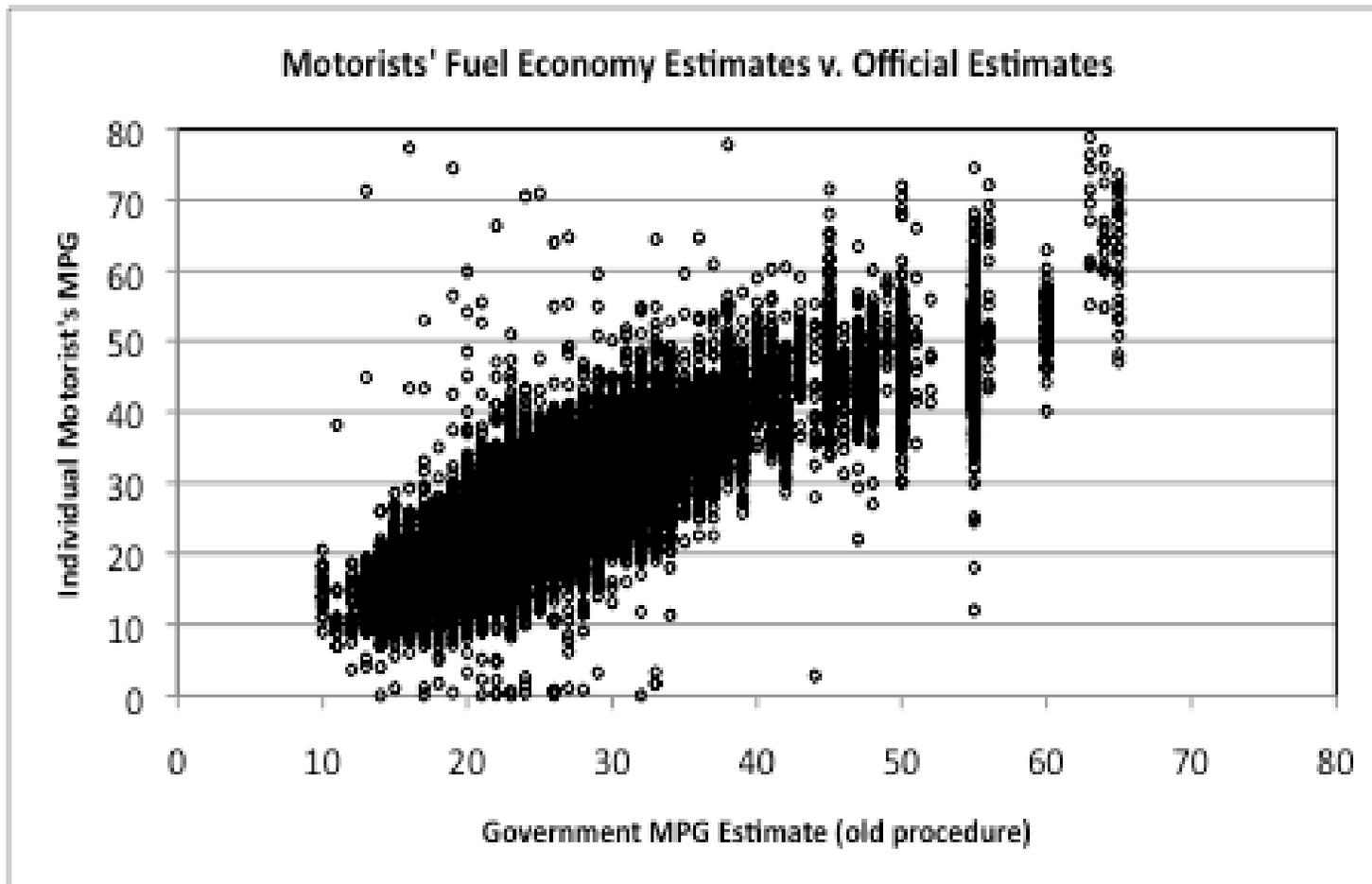
Unless prospect theory (loss aversion) is wrong or does not apply to the market for energy efficiency, consumers will significantly undervalue fuel economy (by a factor of more than two) relative to its *expected value*. Therefore,

- Public policies will be necessary to cost-effectively mitigate GHG emissions.
- The benefit of “correcting” the market may well exceed the value of avoided external costs.
- Standards or feebates will have greater leverage than carbon or fuel taxes.
- Appropriate policies can have negative costs, depending on a variety of factors (especially the size of fuel taxes).

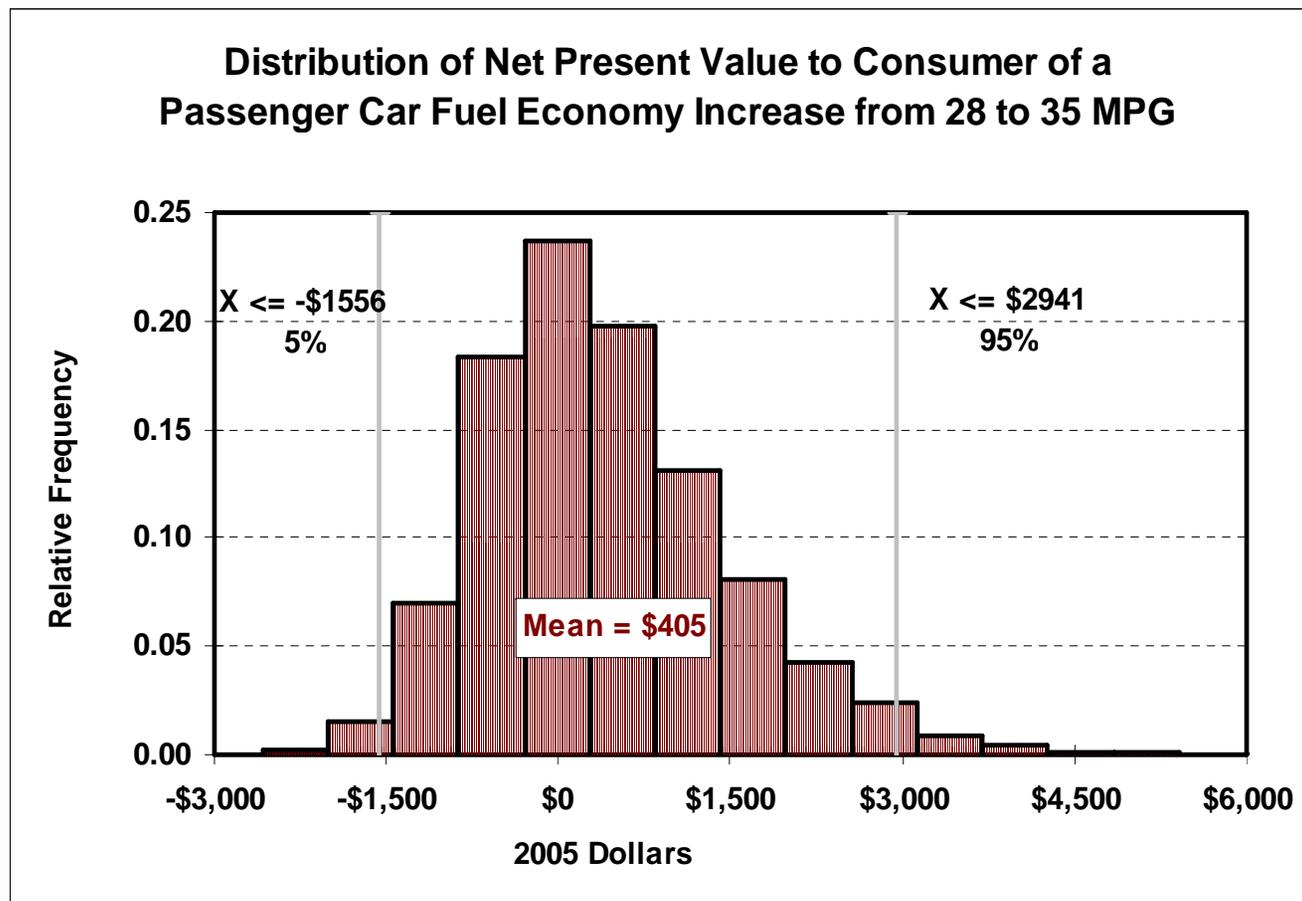
Absent uncertainty, the net present value of improved fuel economy is the **difference** between the present value of future fuel savings and the price increase.



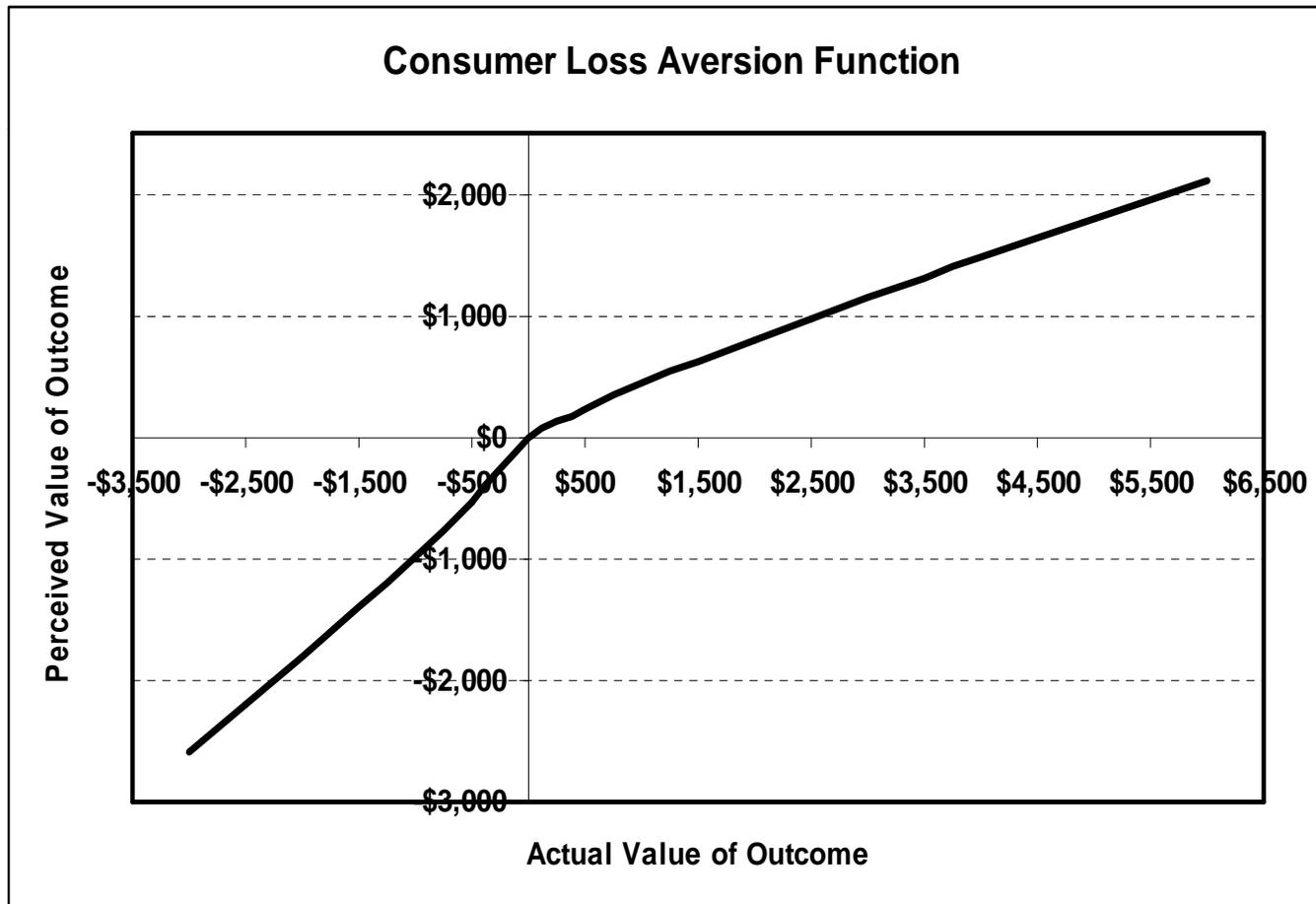
However, the present value of future fuel savings is inherently uncertain. Oil prices?



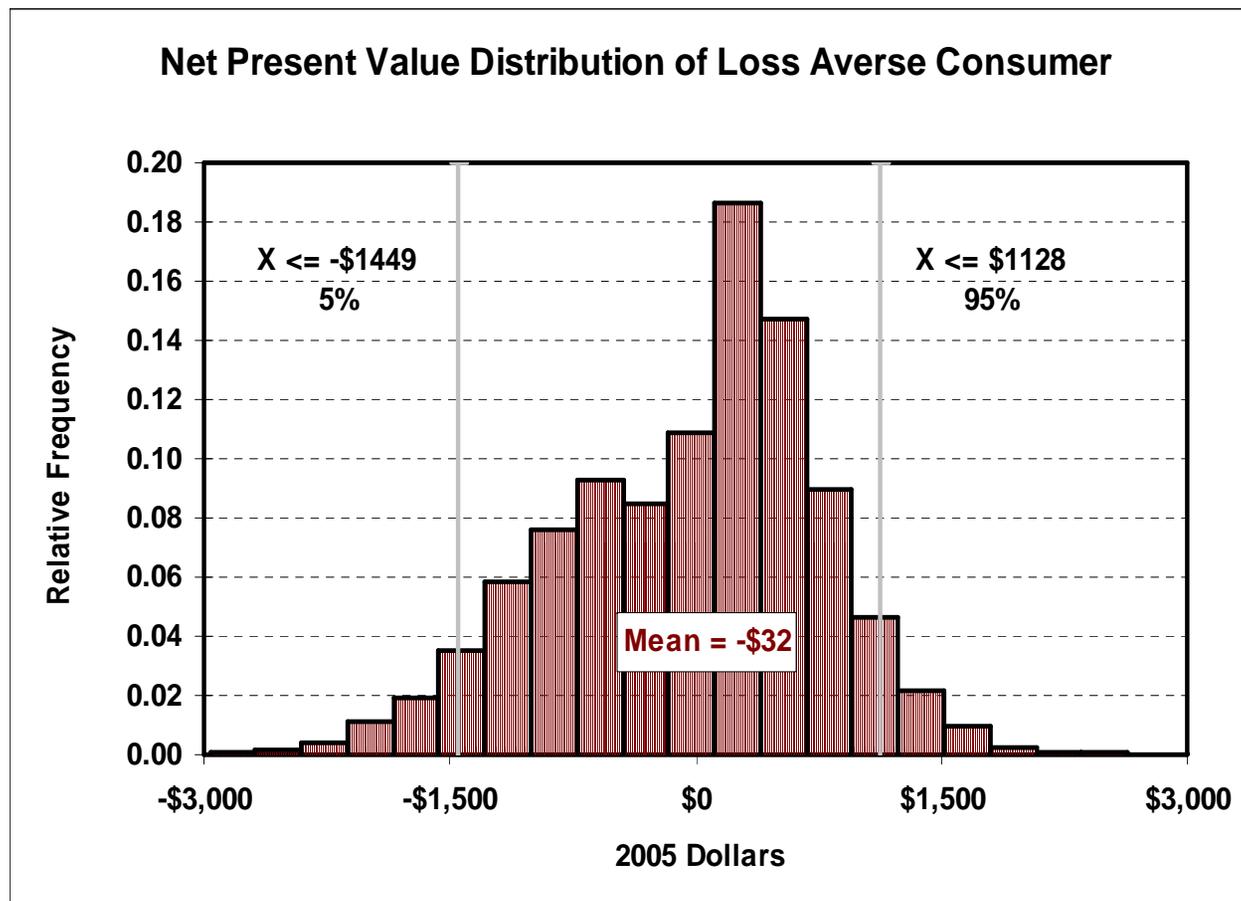
Reasonably quantifying uncertainties about fuel prices, realized fuel economy, vehicle use and vehicle life produces a probability distribution of NPV.



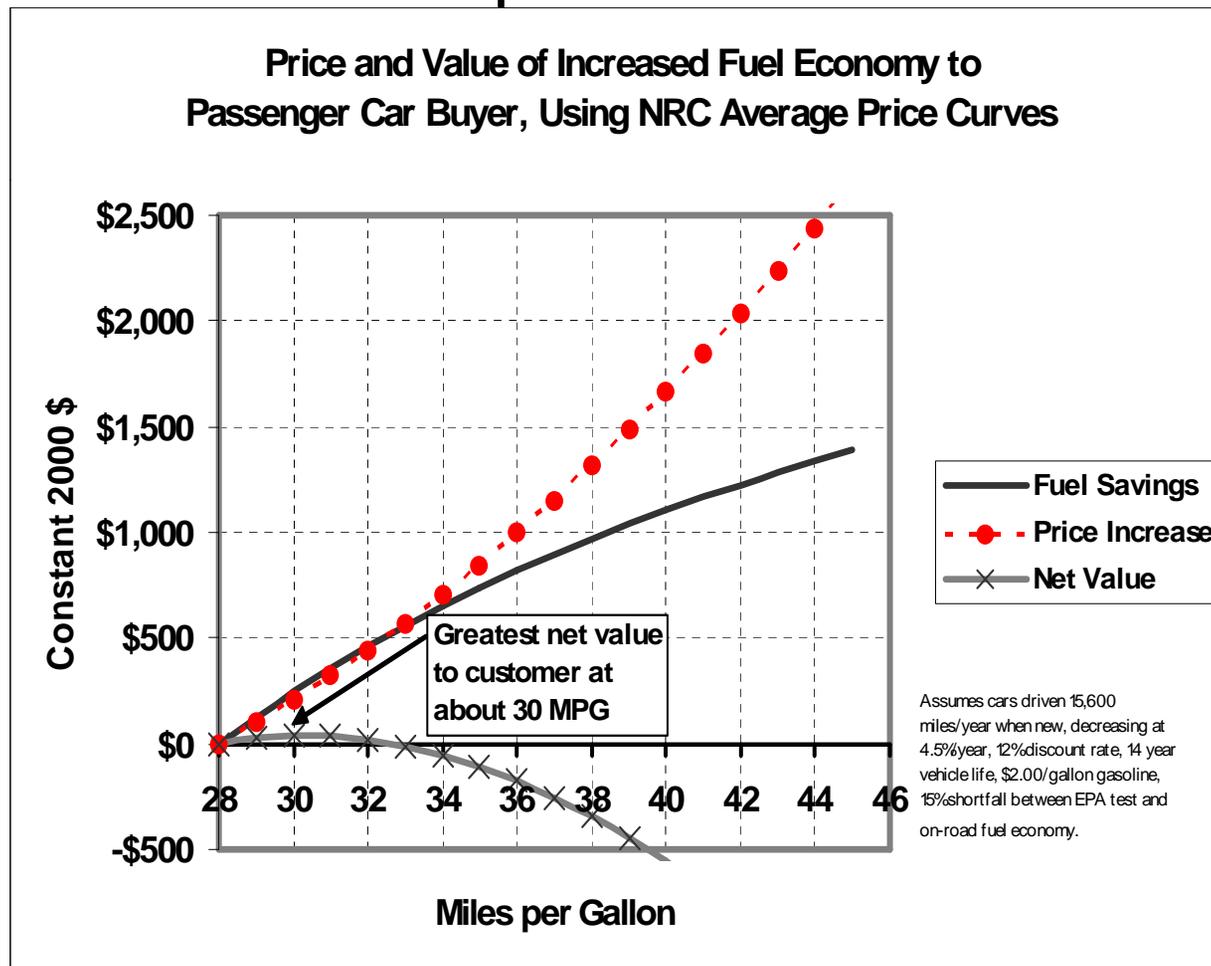
According to prospect theory, typical consumers magnify potential losses relative to gains and exaggerate the probability of loss. A bird in the hand...



Integrating the loss aversion function with the probability distribution of NPV causes the benefit to disappear.
“There’s no there, there.”



Quantitatively, uncertainty + loss aversion produces a result similar to a short payback period.



Do real consumers think like this?

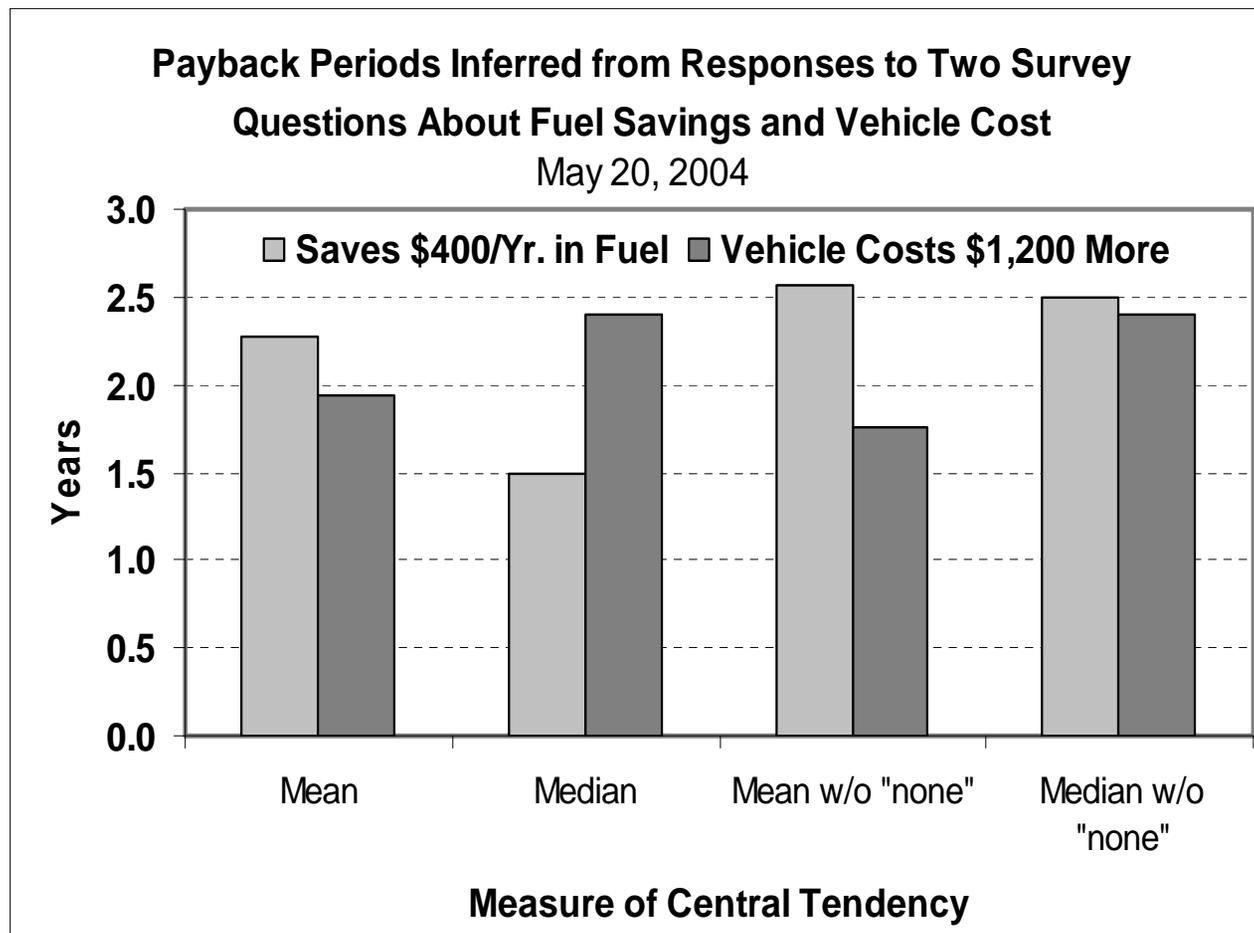
Yes and no.

What are consumers willing to pay for fuel economy? #1

“In eight interviews in which we did ask the question, the household could not or would not offer a value. Ten other households offered a range, e.d., ‘\$2000 to \$4000’ or ‘\$5000 to \$7000.’ Sometimes this range conveyed obvious uncertainty; sometimes these ranges represented disagreement between household members who were unable to agree on an amount in the course of the interview. Among households who offered specific dollar amounts (or answers in a range less than \$1000), values ranged between zero and \$10,000. Even excluding the eight households from whom we did not solicit a value, half the households are unable or unwilling to offer a numeric answer.”

(Turrentine and Kurani, 2007, p. 1219)

A rule of thumb given by many manufacturers is that consumers are willing to pay for 2-4 years of fuel savings (simple, undiscounted payback).





What are consumers willing to pay for fuel economy? #2 Econometric evidence.

- Greene 1983, 8 studies: implicit discount rates between 4% and 40%.
- Train 1985: 2% to 41%
- Greene 2010, 22 studies: ratio of willingness to expected present value ranges from 1% to 400%
- Van Biesebroeck and Leuven 2010:
“First, while there are many demand estimates that characterize consumers’ willingness to pay for fuel efficiency improvements in this industry, the point estimates vary widely and their exact values matter in the counterfactuals.” p. 25

Conclusion: Manufacturers (as consumers' agents) design vehicles with approximately the levels of fuel economy for which they are willing to pay.

- But this is much less than would be justified based on *expected* present value.
- Relative to energy efficiency, the market oversupplies with size, weight and performance (also depends on fuel tax levels).
- Welfare implications of such policies in the **context-dependent utility** paradigm of prospect theory are unclear.
- Given the importance of this market for addressing climate change, we must understand it better.

Merci.
Thank you.