Incorporating experience curves in appliance standards analysis

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[1]The opinions expressed in this talk are those of the author. While this presentation is believed to contain accurate information, the presenter is solely responsible for any errors and omissions.

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For technical information detail

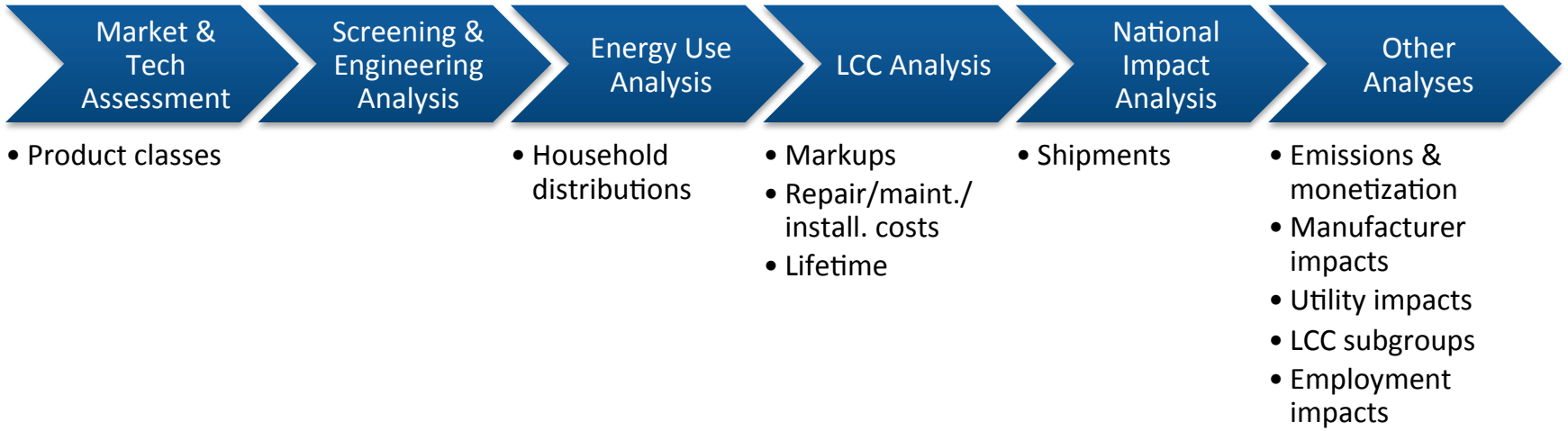
See:

Desroches, L., Garbesi, K., Kantner, C., Van Buskirk, R., and Yang, H. (2013), ***Energy Policy*** 52, pp. 402-416

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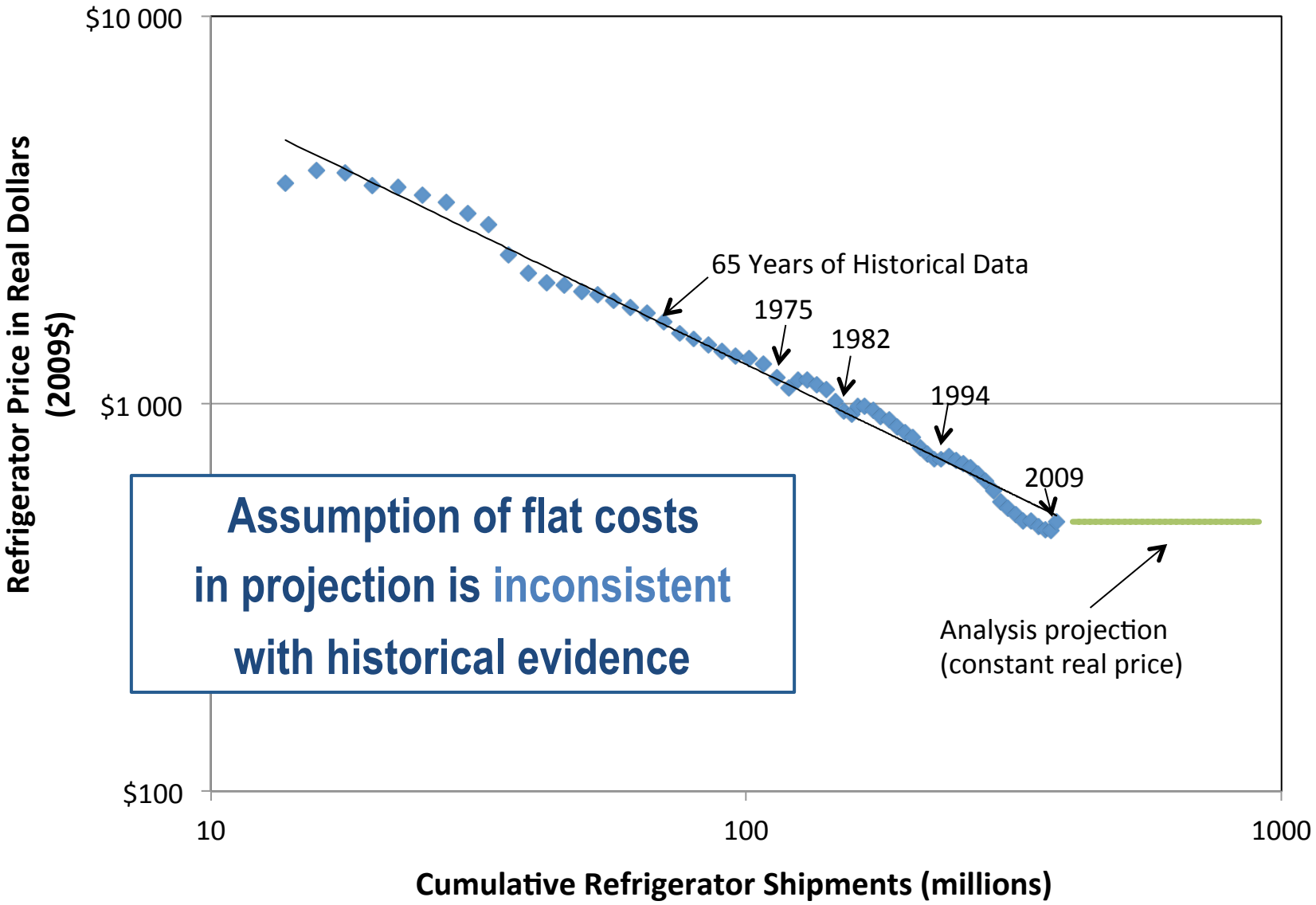
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U.S. Appliance Standards Analysis



- Evolution of methodology over last 20+ years
- Stakeholders heavily involved
- Burden of proof is high, thus analysis is data-heavy

Motivation


$10 000
$1 000
$100
10
100
1000
Refrigerator Price in Real Dollars (2009$)
Cumulative Refrigerator Shipments (millions)
65 Years of Historical Data
1975
1982
1994
2009
Analysis projection
(constant real price)
Assumption of flat costs in projection is inconsistent with historical evidence

Motivation

"(…) each agency is directed to use the best available techniques to quantify anticipated present and future benefits and costs as accurately as possible."

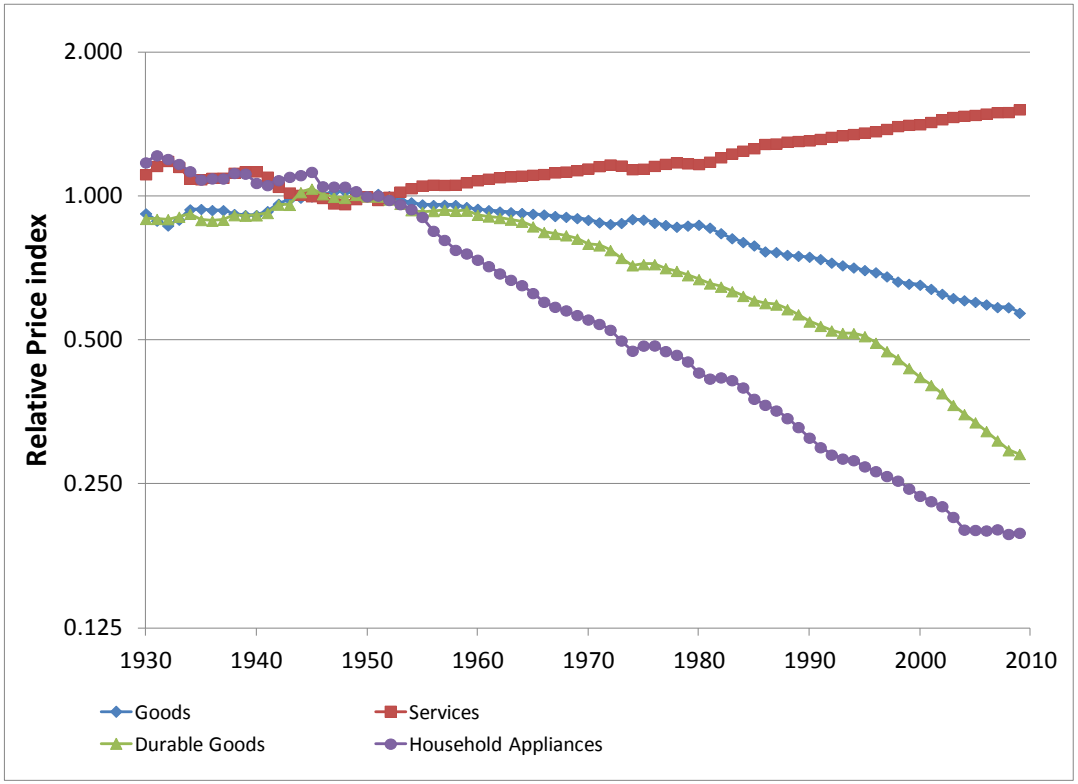
Improving Regulation and Regulatory Review

Jan. 18, 2011

Theories of Differential Price Trends

Baumol (1965): Theory of unbalanced growth

Many authors: Learning and experience curves



Data Source: U.S. Bureau of Economic Analysis

Two Price Extrapolation Equations

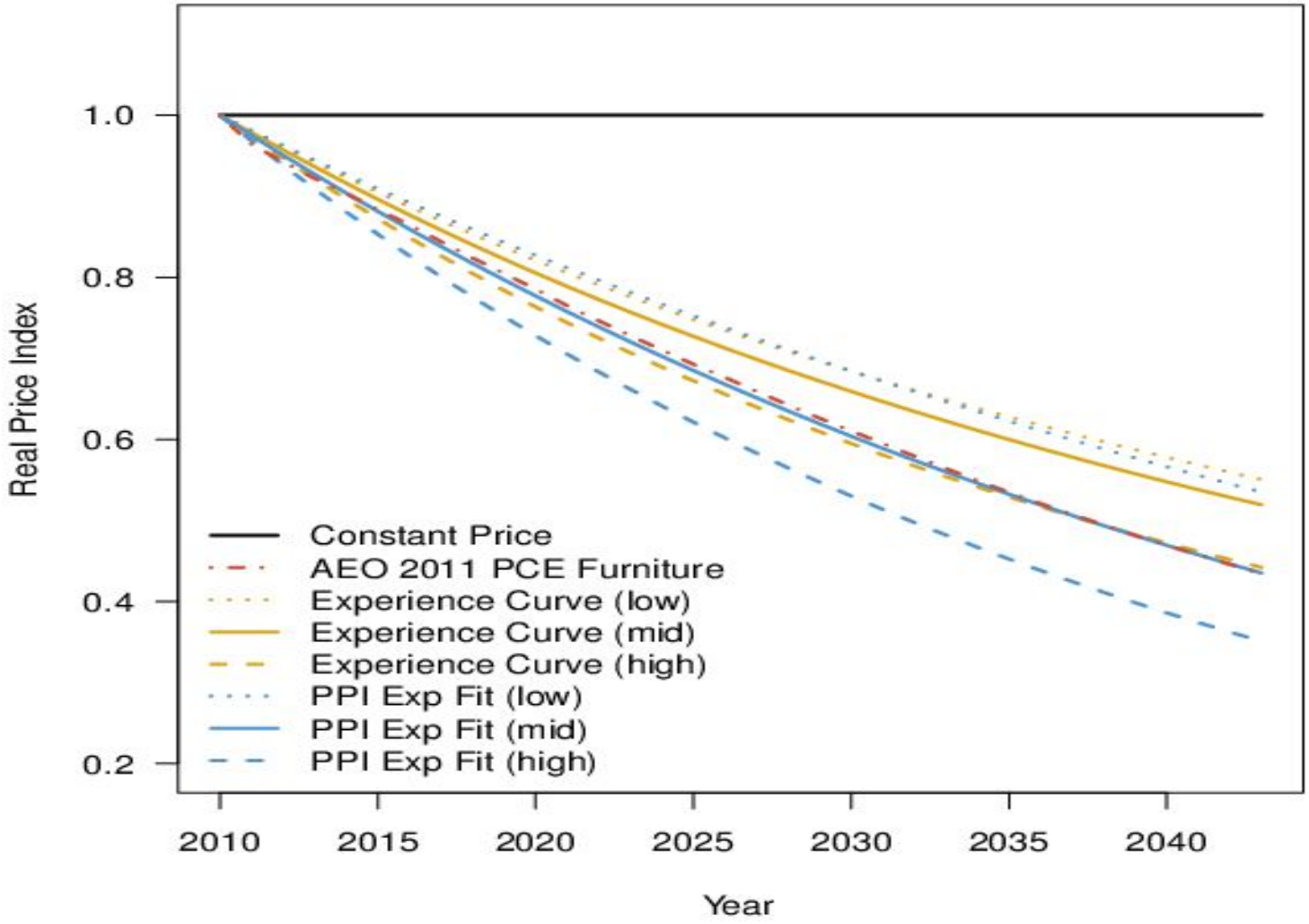
Experience/Learning Curve:

$$P(X) = P_0 \left(\frac{X}{X_0} \right)^{-b}$$

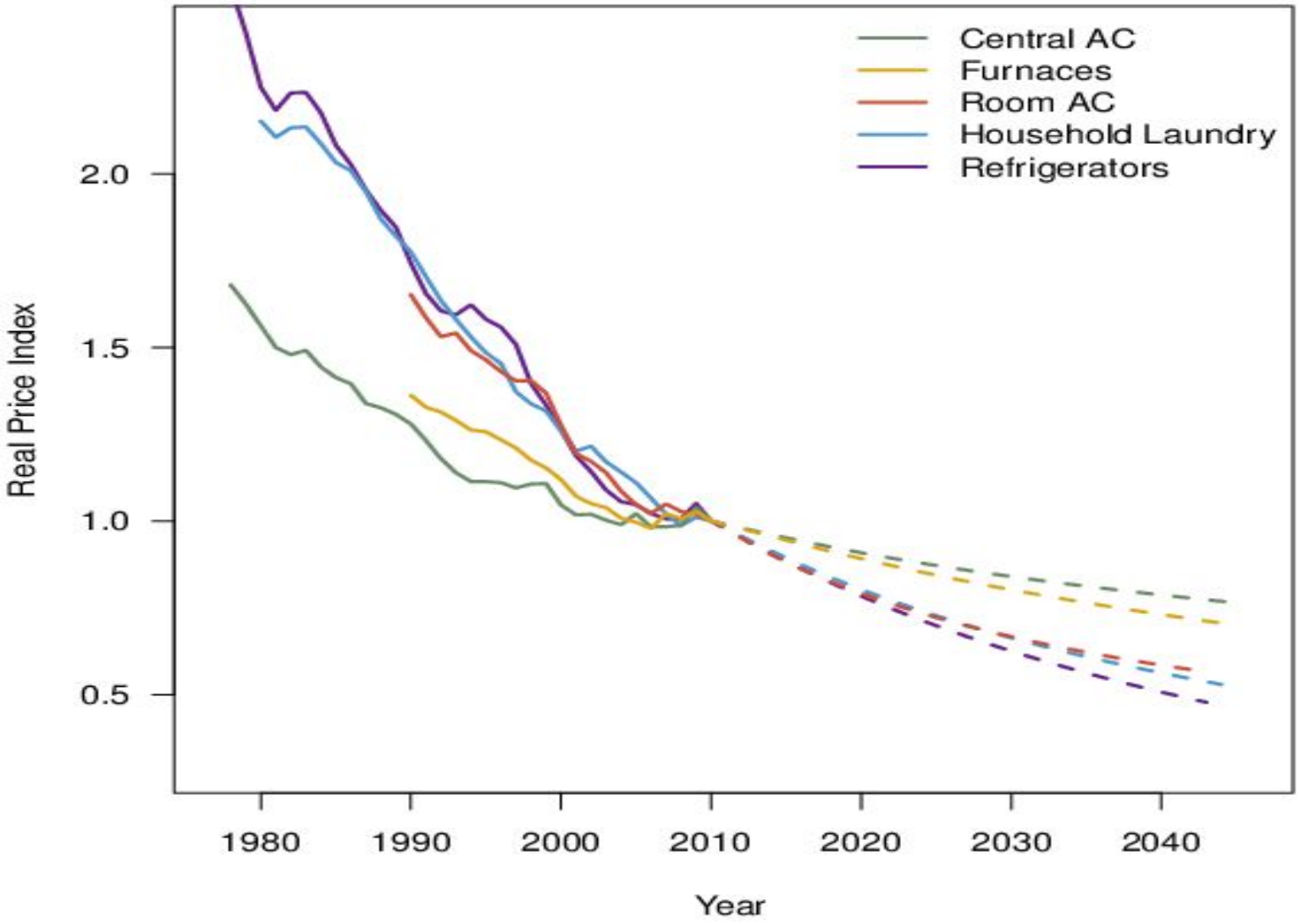
Exponential Trend (*Moore & Baumol*):

$$P(X) = P_0 \cdot e^{-\alpha t}$$

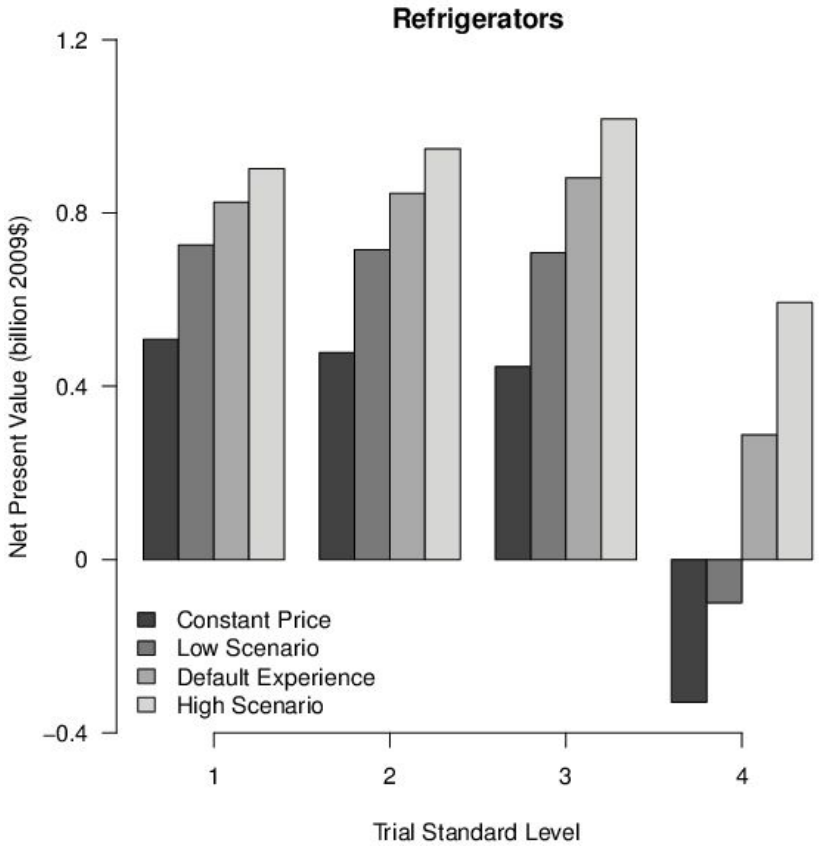
Range of Trends for One Appliance

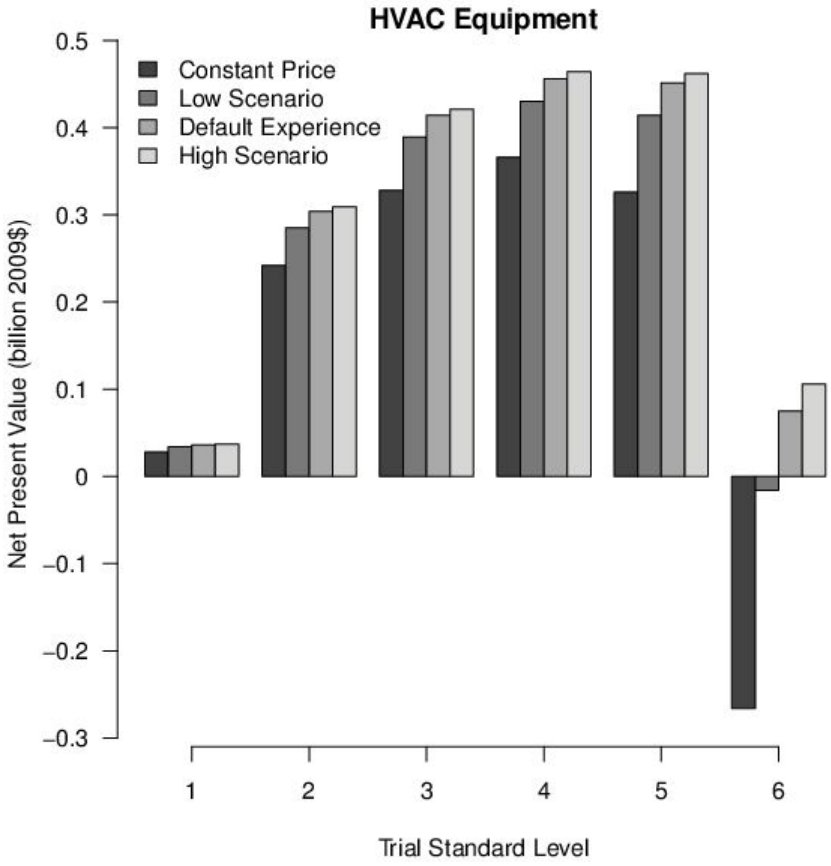


Trends for Range of Appliances

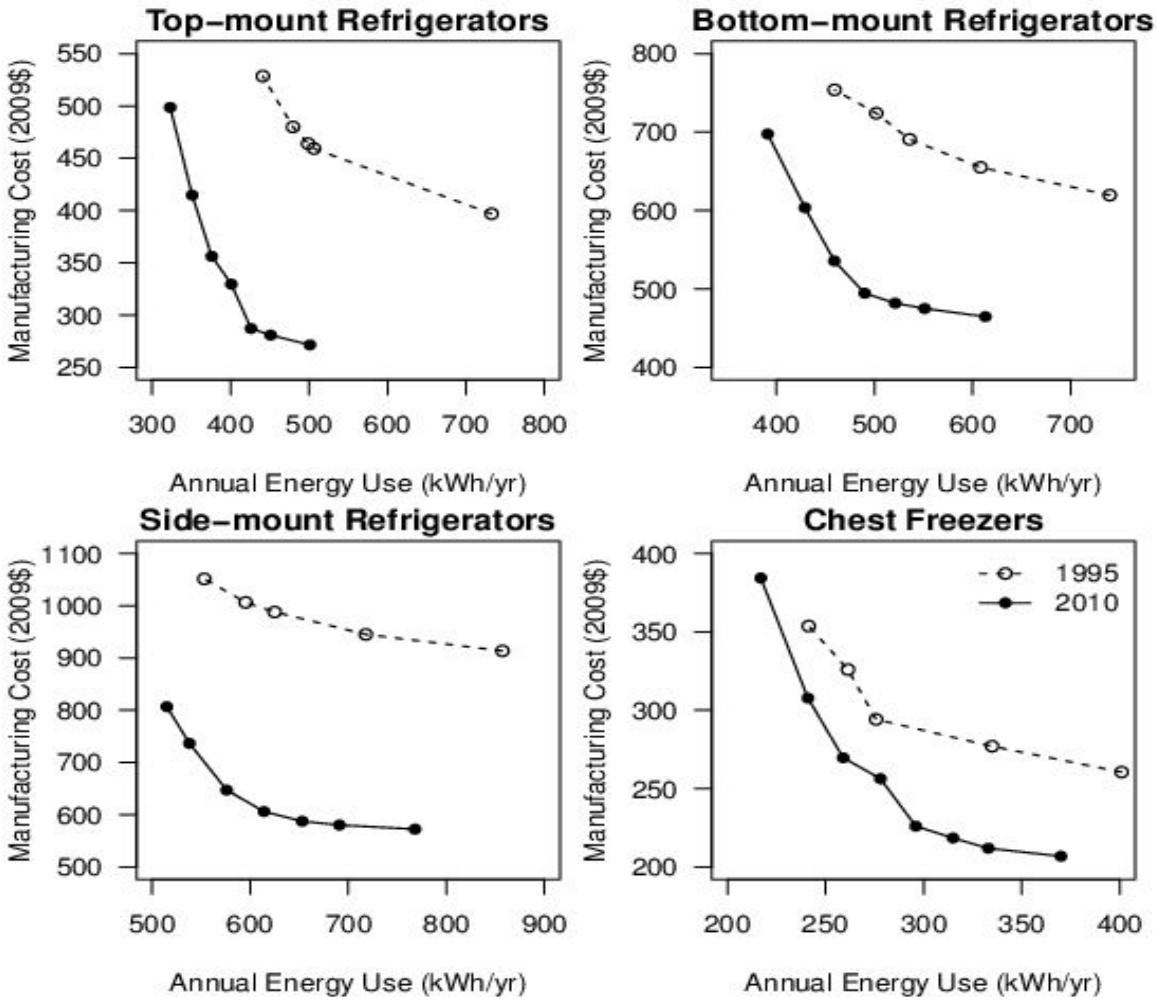


Impact on Net Benefits Calculation





Next Research Challenge:
Incremental Cost Innovation Rates



Summary

- Experience curves (price trends) are now part of appliance standards methodology
- Extensive literature supporting its use
- Previous analyses without price trends may have undervalued consumer benefits
- Analysis is data-driven
- Price trend estimates are likely conservative, and include sensitivities
- Collecting more detailed data where available
- Future work on improving methodology