

# Resolving the Porter Hypothesis Debate: Empirics on Cost and Quality with Regulatory Compliance

June 12, 2018

# Overview


- Project in cooperation with master's thesis of Carolyn Fischer's student at Vrije Universiteit Amsterdam
  - Link patents, manuals, *Consumer Reports* data on clothes washers, focusing on innovation patterns
- Extends existing work in LBNL-1000576

# Existing Data


	<b>Consumer Reports – Rating</b>	<b>Consumer Reports – Brand Reliability</b>	<b>FTC Energy Data</b>	<b>CEC</b>	<b>ENERGY STAR</b>	<b>User Manual Data</b>
Clothes Washers	1989, 1991-1993, 1995-1997, 1999-2002, 2004-2012	1989, 1991-1993, 1995-1997, 1999-2002, 2004-2008, 2011	2003-2012	1993-2013	2001-2013	✓



Quality and reliability metrics



Energy use data



Detailed product feature data

# Federal Policy Events

Year	Clothes Washers	Clothes Dryers
1987		
1988	<i>1st NAECA</i>	<i>1st NAECA</i>
1989		
1990		
1991		
1993		
1994	2nd NAECA	2nd NAECA
1997		
2000		
2001		
2003		
2004	3rd NAECA Tier 1	
2005		
2007	3rd NAECA Tier 2	
2008		
2009		
2010		
2011	<i>1st EISA</i>	
2012		
2013		
2014		

# Organization of Basic Findings in Existing Work

- Outcomes vs. expectations of analysts at time of RIA analysis re:
  1. Product price
  2. Product energy use
  3. Product market share
- Outcomes vs. concerns re:
  4. Product quality
    - a. At the time of purchase
    - b. After the purchase

# Basic Findings (1)

Outcomes vs. analyst expectations re: PRODUCT PRICE

- Basic finding: For clothes washers and clothes dryers, sales-weighted average prices were **lower than projected** during our study period
  - Held for products as a whole
  - Held for products as broken down by product class
  - Held for products as broken down by efficiency levels

# Basic Findings (2)

Outcomes vs. analyst expectations re: ENERGY USE

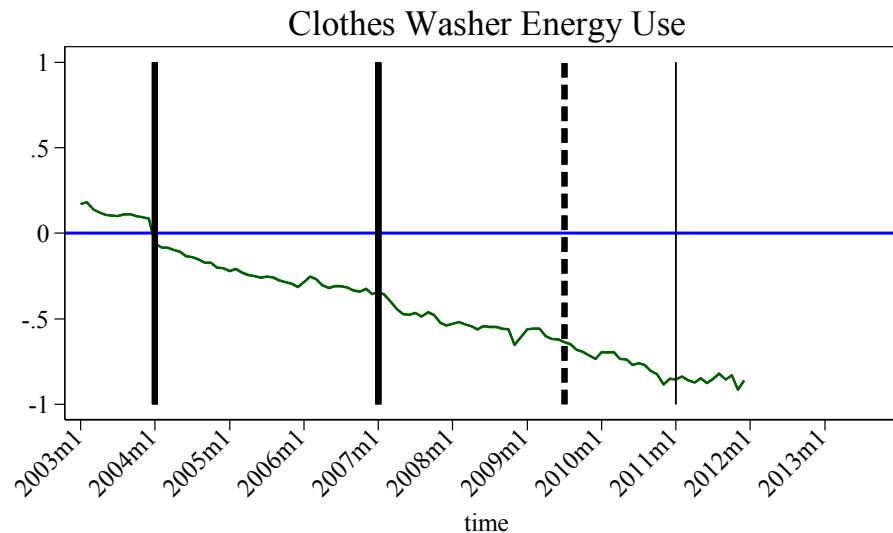
Basic finding: In clothes washers, energy efficiency of products was **better than the standard**

Expected energy use:

Sales-weighted average of diff b/t MEPs and actual energy eff:

MEPs

ENERGY STAR







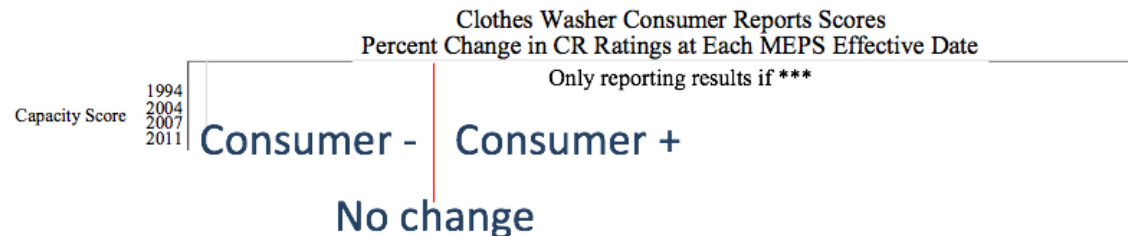
# Basic Findings (4a)

## Outcomes vs. concerns re: QUALITY AT TIME OF PURCHASE

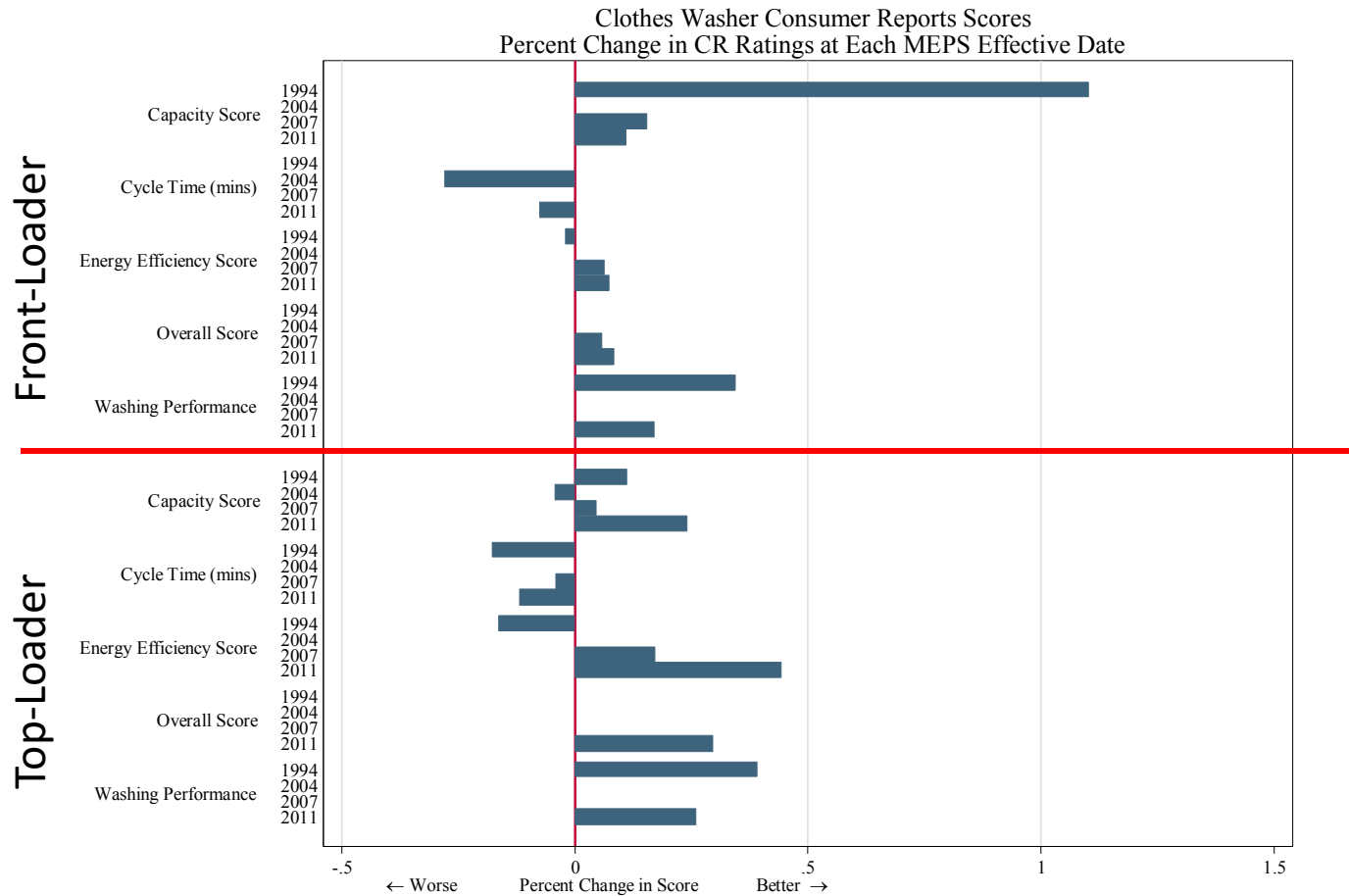
Basic finding: clothes washers show **improvements in quality** attributes consumers care about at the time the MEPs come into effect.

TO READ THE NEXT TWO SLIDES:

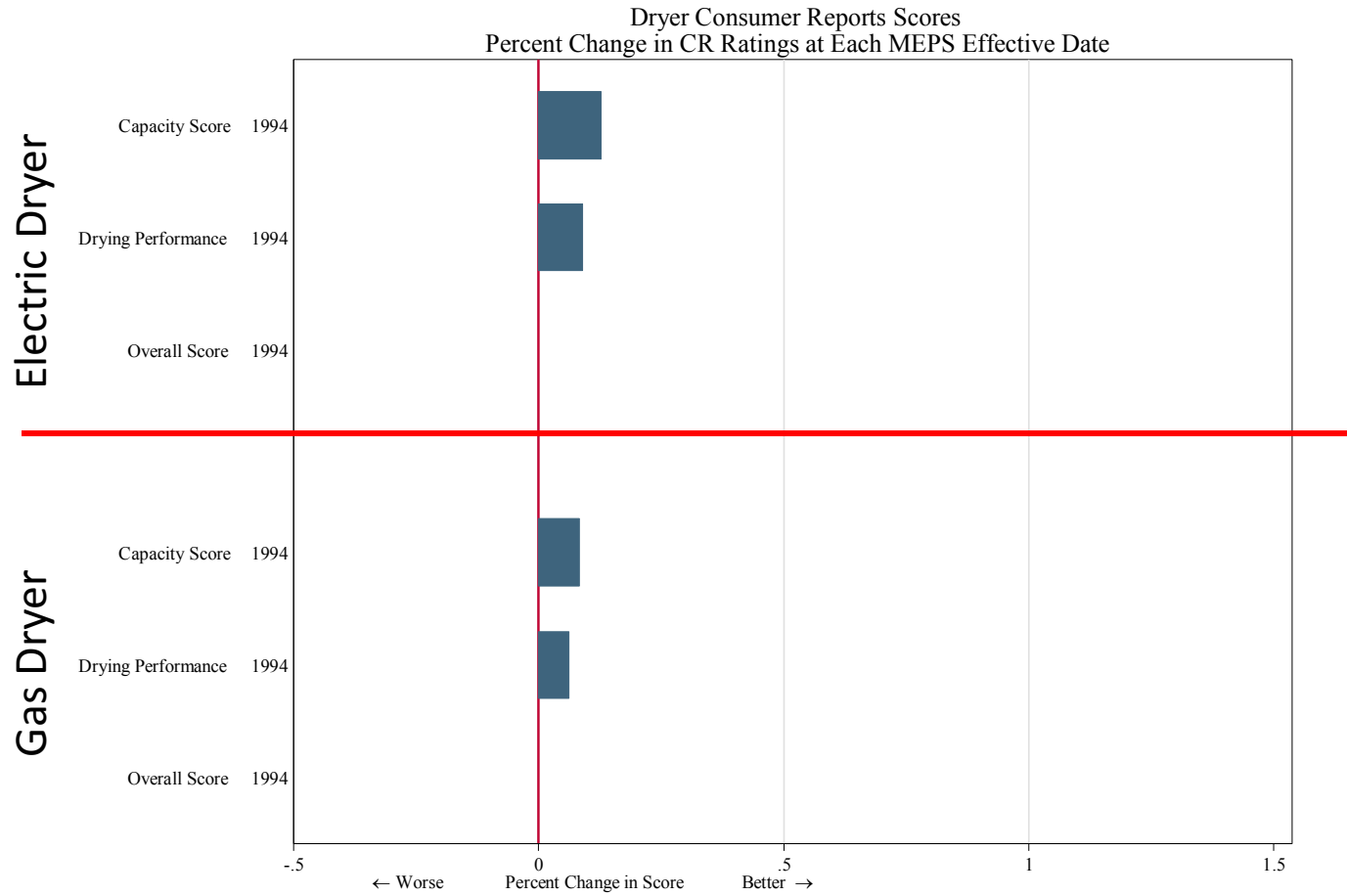
## Quality by Design Type: Visual Cues



# Quality: Clothes Washers



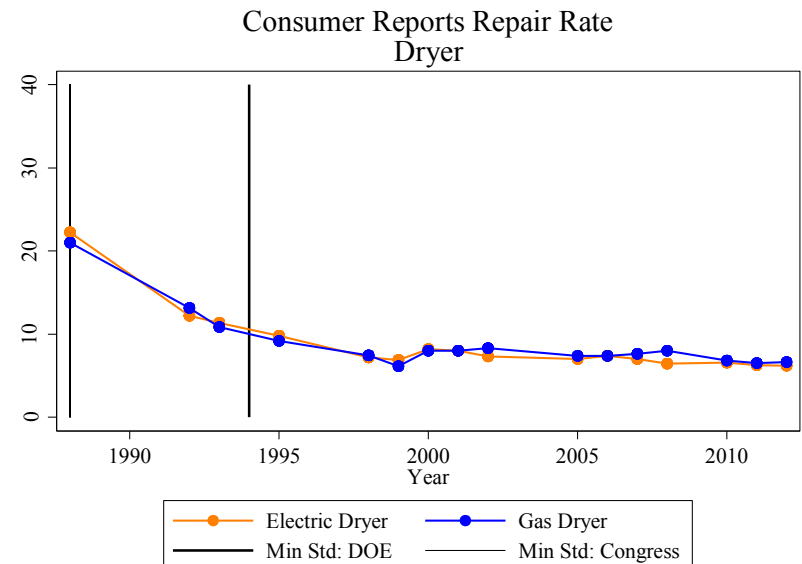
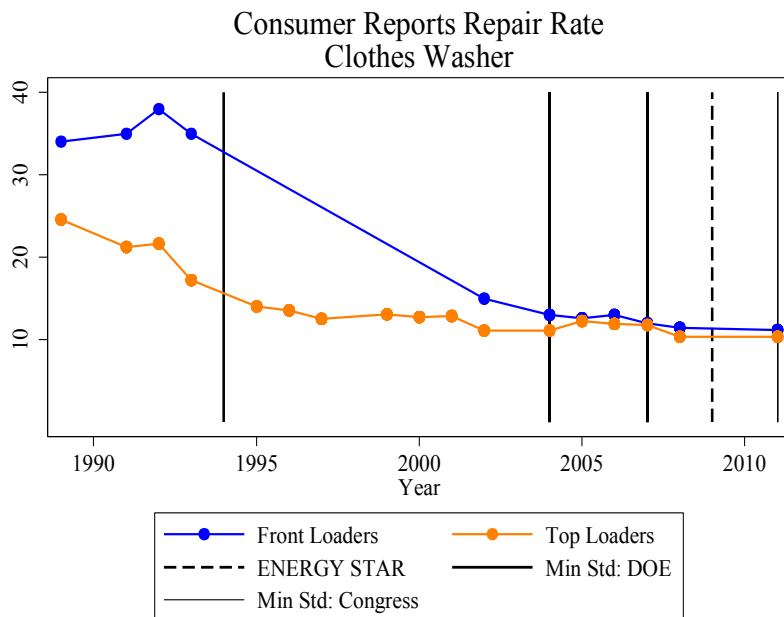
# Quality: Clothes Dryers



# Basic Findings (4b)

## Outcomes vs. concerns re: QUALITY AFTER THE PURCHASE

Basic finding: **Quality after five years generally improves** for clothes washers and clothes dryers over our study period, according to declines in significant repairs reported by CR readers

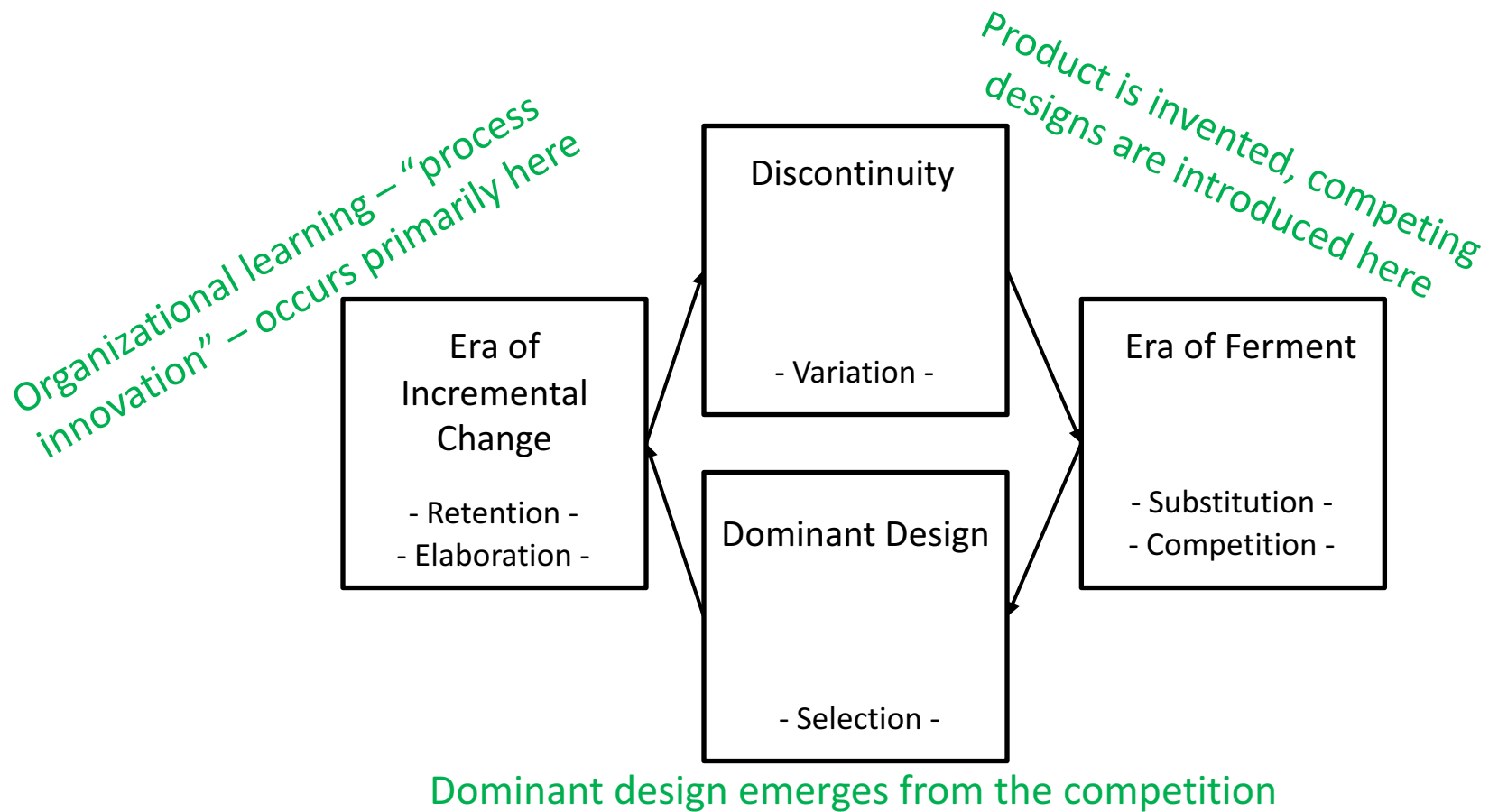


# Where does this leave us?

- Summarizing the basic findings:
  - Prices are lower than expected
  - Product energy efficiency better than the standards
  - Product quality does not appear to have been significantly adversely affected
- Evidence of technological change in the marketplace
- Consistent with conjecture that inability to account for outcomes of innovation contributes to RIA estimation errors

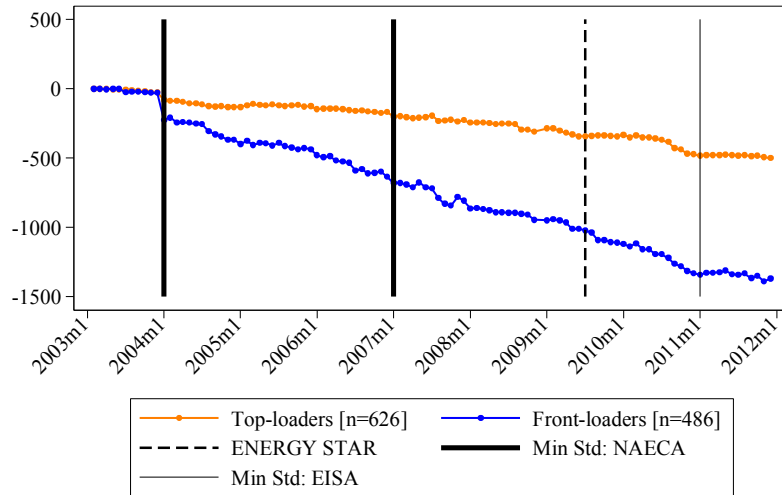
# Innovation Findings in Existing Work

# Technology Cycles and Dominant Designs

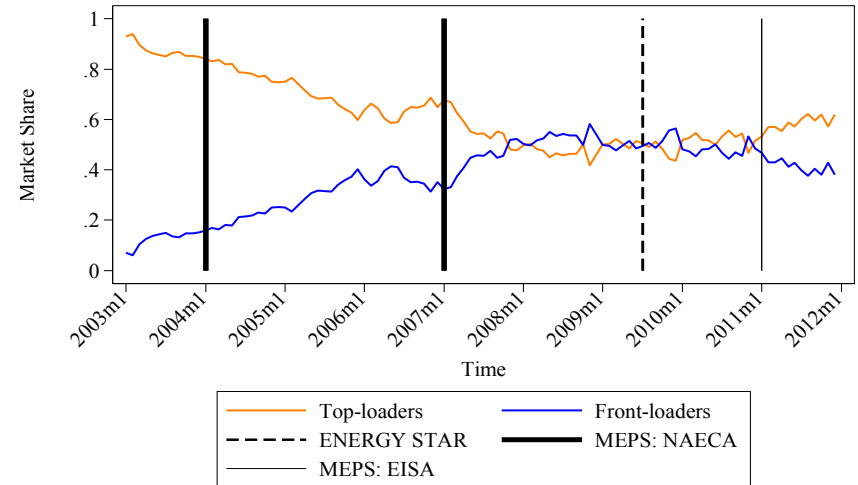


# Dominant Design Competition

Sales-Weighted Within-Model Price Trends  
Clothes Washers



Market Shares by Product Type  
Clothes Washers



Price trend of front-loaders started trending downward significantly faster after the 2004 standard effective date (significant relative to a counterfactual)



# Innovation in Dominant Design Competition

