

# Overview of recent RFF research related to CAFE

## ➤ What are the implications of falling gasoline prices?

*“Fuel Prices, New Vehicle Fuel Economy, and Implications for Attribute-Based Standards”*

Leard, Linn and McConnell, RFF Discussion Paper forthcoming

## ➤ How has compliance credit trading evolved?

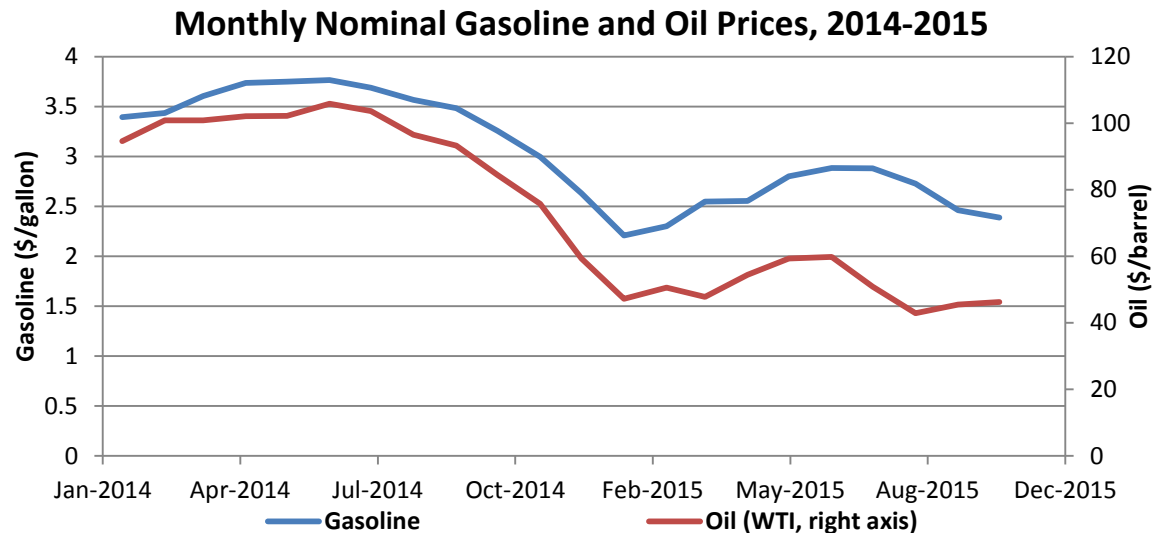
*“New Markets for Pollution and Energy Efficiency: Credit Trading under Automobile Greenhouse Gas and Fuel Economy Standards”*

Leard and McConnell, RFF Discussion Paper 15-16

<http://www.rff.org/files/sharepoint/WorkImages/Download/RFF-DP-15-16.pdf>

# What are the implications of low gasoline prices?

- Background: oil prices fell in half between mid-2014 and mid-2015, coinciding with a drop in gasoline prices
- Plenty of news stories about the new vehicles market: falling fuel economy and rising SUV market shares
- In the new CAFE regime, how much do gas prices affect fuel economy in the short and long run?

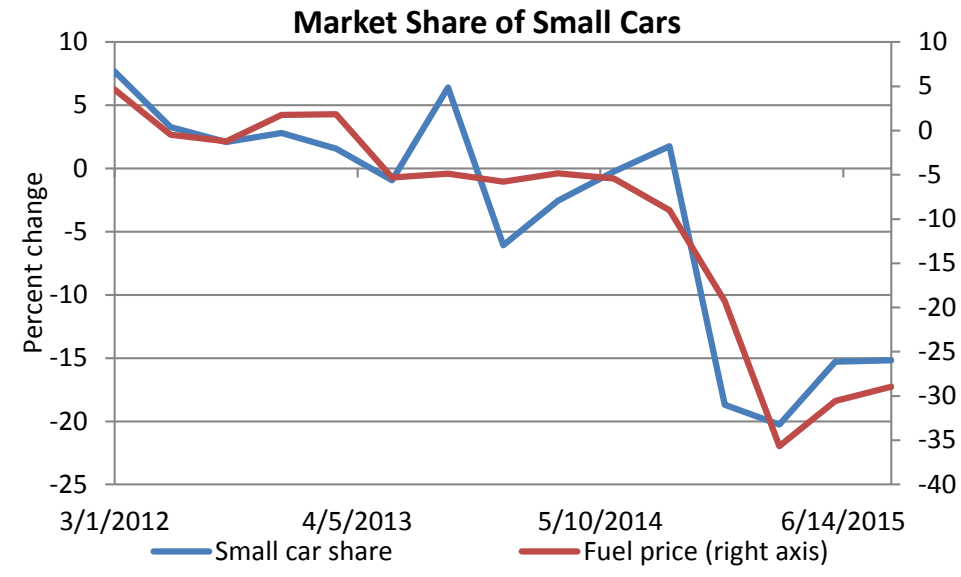
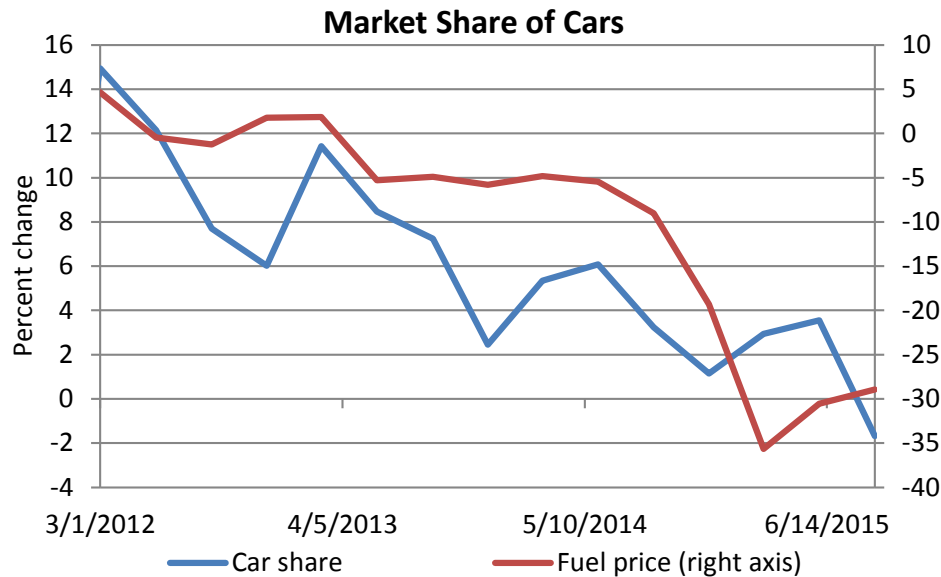


# What do we expect to find?

- Recent research (such as Klier and Linn 2010 and Busse et al. 2013) concludes that rising gas prices had a large effect on market shares and fuel economy in the early/mid 2000s
  - These studies imply that falling gas prices reduce average fuel economy, but are market shares as responsive when prices are falling?
  - Aggregated data suggest a response in recent years
- In the long run, does CAFE create a lower bound for fuel economy?
  - Fuel economy requirement depends on footprint (area between the four wheels)
  - Larger vehicles have a lower requirement
  - If lower fuel prices cause a shift to larger vehicles, fuel economy requirement could fall



# Suggestive evidence from aggregate data and fuel prices, 2012-2015



Source: Wards Auto and Bureau of Labor Statistics

# What do we find?

- Use monthly sales by model and power type to examine the short-run effect of fuel prices on new vehicle market shares
  - Control for other vehicle attributes and aggregate demand shocks
  - Compare effects across time periods
- Effect of gas prices on market shares is statistically significant but half as large from 2008-2015 as from 2003-2007
  - 2014/2015 fuel price decrease caused SUV market share to increase 7 percent rather than decrease 3 percent if prices had remained high
  - Fuel price decrease reduced average fuel economy 0.4 mpg, offsetting 15 percent of 2014/2015 fuel economy gains
    - the proportion declines over time as the standards tighten
- Why has the effect of fuel prices diminished?
  - Some evidence that prices have a bigger effect when they are rising than when they are stable or falling
  - Also some evidence that the effect decreases when high prices persist

# Broader implications and future research

- Will declining prices have a larger effect in the long run?
  - Short-run analysis does not include production or vehicle design response
  - Consumers may not respond immediately following a period of high prices
- Footprint-based standard causes fuel economy requirement to depend on fuel prices, but in practice the relationship is modest
- Future research: using consumer data, how do fuel costs affect vehicle purchases?
  - Transaction-level data 2010-2013, with 200,000 observations per year
  - Use the data to explore alternative explanations for the apparent diminishing effect of fuel prices
  - Other questions: what are the implications of low fuel prices for the cost of meeting the standards?

# New Markets for Pollution and Energy Efficiency: Credit Trading under Automobile GHG and Fuel Economy Standards

Benjamin Leard  
Virginia McConnell

Discussion Paper

<http://www.rff.org/files/sharepoint/WorkImages/Download/RFF-DP-15-16.pdf>



**RESOURCES**  
FOR THE FUTURE

# Added Flexibility Under New CAFE: Credit Trading

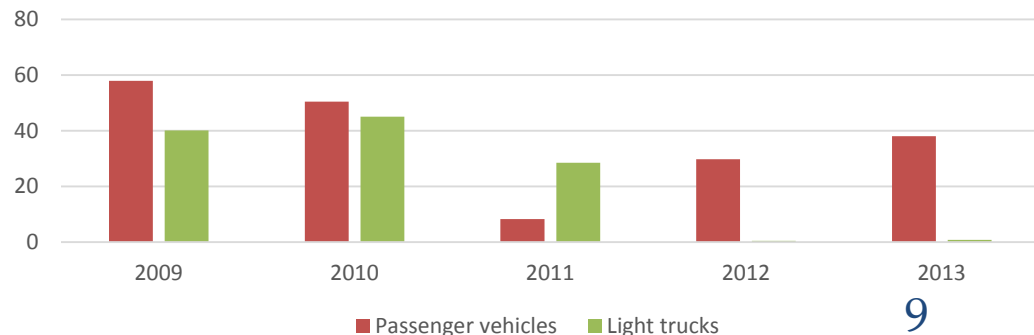
- New provisions added to give manufacturers flexibility in meeting the tighter standards.
  - Credits can be traded
    - within the same manufacturer across car and truck fleets.
    - between model years (banking), and
    - between manufacturers
  
- Intent of credit systems is to reduce overall cost of compliance for all manufacturers
  
- The Federal Register states that trading “...resolves issues of cost or technical feasibility which might otherwise arise, allowing EPA to set a standard that is numerically more stringent.”



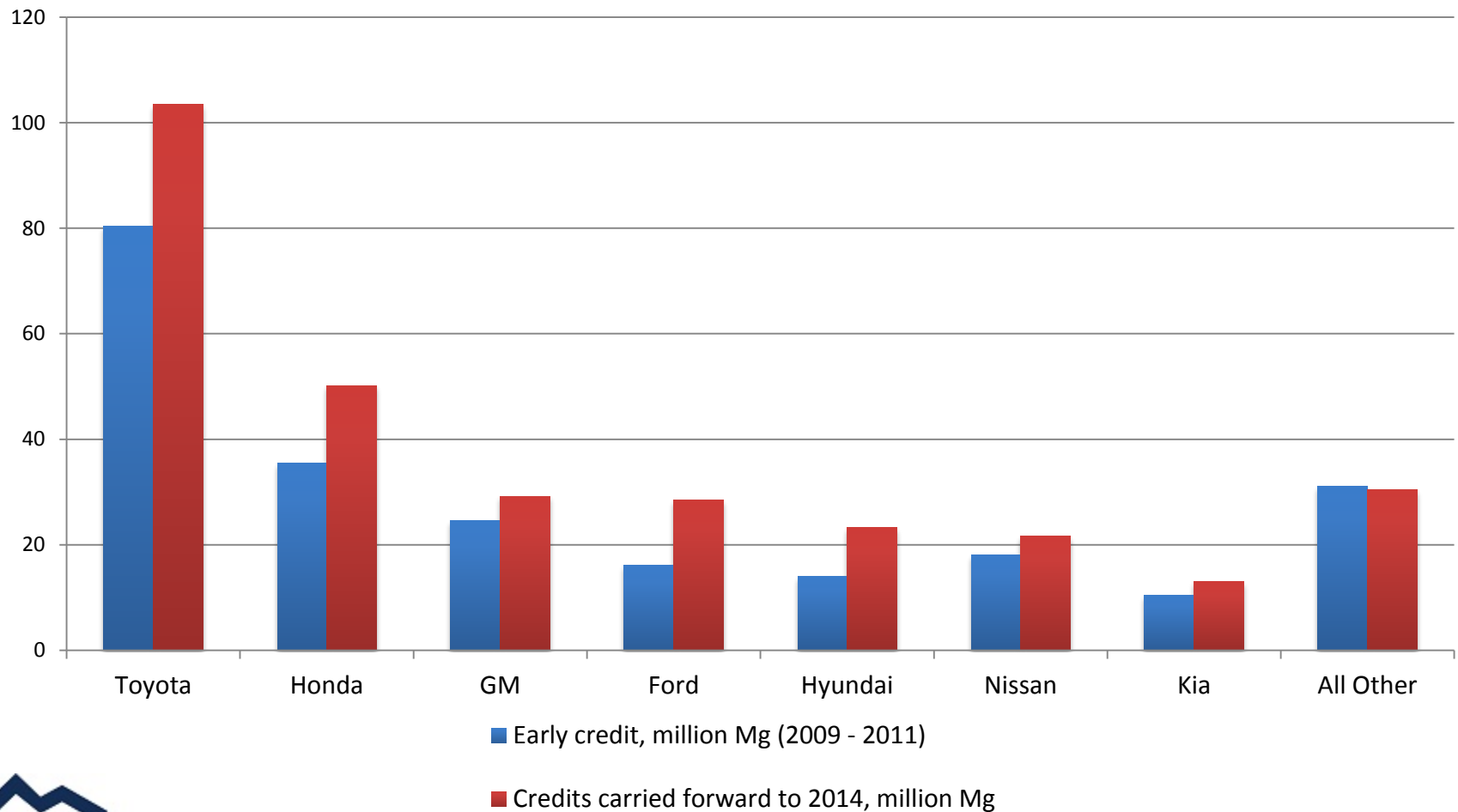
# Banking of Credits

- Manufacturers can use credits to comply with both the NHTSA and EPA regulations, and bank them for compliance in future years
  - Currently, large banked holdings of both types of credits, but distributed unevenly among manufacturers
  - In total, enough credits banked to offset roughly 20% of expected required reductions up to 2025
- More credits banked (over compliance) for cars than trucks in recent years

Net GHG Credits from Cars and Trucks  
(million Mg)



# Credits by Manufacturer, million Mg GHG



# Two Regulations, Two Sets of Credits

- The two programs differ in stringency
  - NHTSA allows companies to pay a fine.
  - NHTSA restricts the amount of credit transferring between car and light truck fleets.
  - EPA initially allows companies to bank credits for a longer period.
- Result is two distinct credit markets, even though they regulate virtually the same thing:
  - NHTSA credits traded on the basis of fuel used (gallons per mile)
  - 1 gallon of gasoline contains 8,887 grams of CO<sub>2</sub>

# The Market for Trading Across Firms

- The Agencies report credit holdings and in the case of EPA, credit trades:
  - Only 10 trades of EPA credits involving 6 companies through 2013
- For promoting an active market for credit trading, it would be better to do the opposite – publish prices but not who traded.
- Though no prices reported, we were able to infer the prices of two GHG-related transactions

	Hyundai and Kia CAA settlement	Tesla sales of GHG credits	Social Cost of Carbon
2012	\$42/Mg	\$36/Mg	\$40/Mg

- NHTSA fee sets effective limit on price: \$55/ mpg/vehicle.
- EPA cannot allow fees under CAA, but
  - Could they consider policies to buy or sell credits as safety valve and to reduce uncertainty?

# Summary

- Credits systems important – allow flexibility in meeting standards that become increasingly strict
  
- To date, credits programs successful in a number of ways
  - A great deal of banking of credits over the last few years
  - Ability to trade credits between car and truck appears to lower cost
  
- But some issues with the current trading programs
  - Trading of credits across firms limited; high transactions costs, lack of price information, uncertainty about future costs
  - Conflicting rules about trading among the Agencies influence the overall stringency and cost of the regulations
    - E.g. NHTSA limits credit trading between cars and trucks for a given manufacturer, EPA does not
    - NHTSA allows for fee in lieu of compliance, EPA cannot