

How sensitive are consumers to expected future gasoline costs when they make new car purchases?

with focus on the reading "Are Consumers Myopic? Evidence from New and Used Car Purchases, Busse et al., 2013"

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Background: how to reduce petroleum consumption in transportation?

The sector has a long history of direct regulations of fuel efficiency:

- ▶ after the oil price shocks of the 1970s, the United States adopted Corporate Average Fuel Economy (CAFE) standards, which set minimum average fuel economy thresholds for the new vehicles sold by an automaker
- ▶ MPG (miles per gallon), about 25 MPG in the early 1980s; increased by only 0.5 miles per gallon (MPG) from 1984 to 2010.
- ▶ European Union standard was roughly 17 MPG more stringent in 2010 than the U.S. standard

Why do we need such regulations?

- ▶ If consumers are very myopic, meaning that their willingness-to-pay for a car is little affected by changes in the expected future fuel costs of using that car, then a gasoline price instrument will not influence their choices very much and will not be sufficient to achieve the first-best 

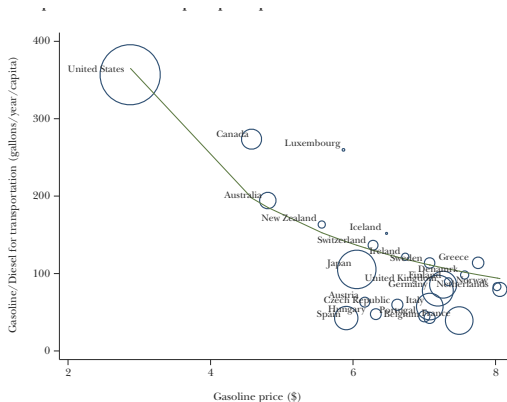
Taxes differ across countries..

<i>Country</i>	<i>Gasoline</i>	<i>Diesel</i>
United States	\$0.49	\$0.59
Canada	\$0.96	\$0.77
New Zealand	\$1.20	\$0.00
Australia	\$1.34	\$1.34
Iceland	\$2.28	\$2.03
Japan	\$2.59	\$1.55
Korea	\$2.64	\$1.87
Spain	\$2.66	\$2.08
Hungary	\$2.68	\$2.17
Austria	\$2.77	\$2.18
Luxembourg	\$2.90	\$1.94
Czech Republic	\$3.04	\$2.59
Switzerland	\$3.09	\$3.15
Slovak Republic	\$3.23	\$2.31
Sweden	\$3.24	\$2.56
Ireland	\$3.41	\$2.82
Italy	\$3.54	\$2.65
Belgium	\$3.58	\$2.10
Denmark	\$3.58	\$2.68
Portugal	\$3.65	\$2.28
France	\$3.80	\$2.69
Greece	\$3.82	\$2.39
Norway	\$3.87	\$2.97
Finland	\$3.93	\$2.28
United Kingdom	\$3.95	\$3.95
Germany	\$4.10	\$2.95
Netherlands	\$4.19	\$2.29

Source: Taken from an Alternative Fuels and Advanced Vehicles Data Center (AFDC) worksheet: (www.afdc.energy.gov/afdc/data/docs/fuel_taxes_by_country.xls). AFDC's source is the OECD/EEA database on instruments for environmental policy: (<http://www2.oecd.org/ecoinst/queries/index.htm>).

Figure: Source: Knittel, 2013, dropbox

...the differences in fuel costs correlate with consumption



Source: Data from Worldbank.org.

Notes: Size of the circle proportional to population. The line is the fitted value from a regression of the log of consumption on the log of price.

Figure: Source: Knittel, 2013, dropbox

The research question

To estimate the effect of gasoline prices on the short-run equilibrium prices, market shares, and sales of new and used cars of different fuel economies.

- ▶ one dollar increase in the price of gasoline increases the market share of cars in the highest fuel economy quartile by 21.1 percent and decreases the market share of cars in the lowest fuel economy quartile by 27.1 percent.
- ▶ one dollar increase in the price of gasoline is associated with an increase of \$ 354 in the average price of the highest fuel economy quartile of cars relative to that of the lowest fuel economy quartile. For used cars, the estimated relative price difference is \$1,945.
- ▶ Using assumptions about vehicle miles traveled, a range of assumptions about the elasticity of demand, and comparing the relative price differences between different quartiles, little evidence of consumer myopia. Implicit discount rates are small: consumers are not myopic.

The approach

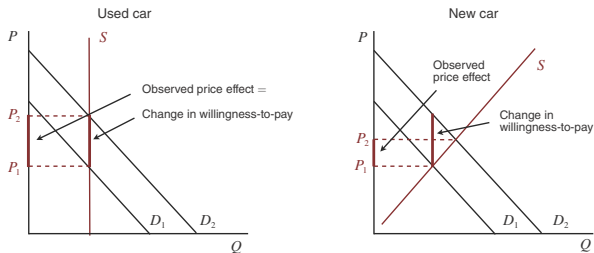


Figure: The idea is to estimate how the fuel price contributes to the equilibrium price of the car. Then, using external information about the slopes of the curves, it is possible to quantify the willingness to pay for the fuel economy. The difficulty is to keep "all else equal" but the fuel cost.

The results

TABLE 3—GASOLINE PRICE COEFFICIENTS FROM NEW CAR PRICE SPECIFICATION

Variable	Coefficient	SE
GasolinePrice × MPG Quart 1 (lowest fuel economy)	−250***	(72)
GasolinePrice × MPG Quart 2	−96***	(37)
GasolinePrice × MPG Quart 3	−11	(26)
GasolinePrice × MPG Quart 4 (highest fuel economy)	104**	(47)

TABLE 4—GASOLINE PRICE COEFFICIENTS FROM USED CAR PRICE SPECIFICATION

Variable	Coefficient	SE	Coefficient	SE
GasolinePrice × MPG Quart 1 (lowest fuel economy)	−1,182***	(42)	−783***	(49)
GasolinePrice × MPG Quart 2	−101	(62)	118**	(54)
GasolinePrice × MPG Quart 3	468***	(36)	369***	(33)
GasolinePrice × MPG Quart 4 (highest fuel economy)	763***	(44)	360***	(36)
Depreciation varies by	Segment × PADD		MPG Quartile × PADD	

***Significant at the 1 percent level.

Figure: estimates indicate that a \$1 increase in the price of gasoline is associated with a lower negotiated price of cars in the lowest fuel economy quartile (by \$250). but a higher price of cars in the highest fuel economy quartile (by \$104), a relative price difference of \$354.

Automobile Taxation in Finland

Car Tax (*ensirekisteröinnin jälkeinen autovero*)

- at purchase / first registration
- in addition to value-added tax (VAT)

Registration Tax (*ajoneuvovero*)

- daily while car is registered

Fuel Taxes (*polttoaineverot*)

- excise taxes (fixed amount per liter)
- in addition to VAT
- petrol more heavily taxed than diesel

Fuel Taxation in Finland

Petrol 95E10

euro / liter	0.56
tax	+ 0.93
euro / liter (incl. tax)	<hr/> 1.49

tax rate **165%**

Petrol 98E5

euro / liter	0.62
tax	+ 0.94
euro / liter (incl. tax)	<hr/> 1.57

tax rate **151%**

Diesel

euro / liter	0.62
tax	+ 0.72
euro / liter (incl. tax)	<hr/> 1.34

tax rate **116%**

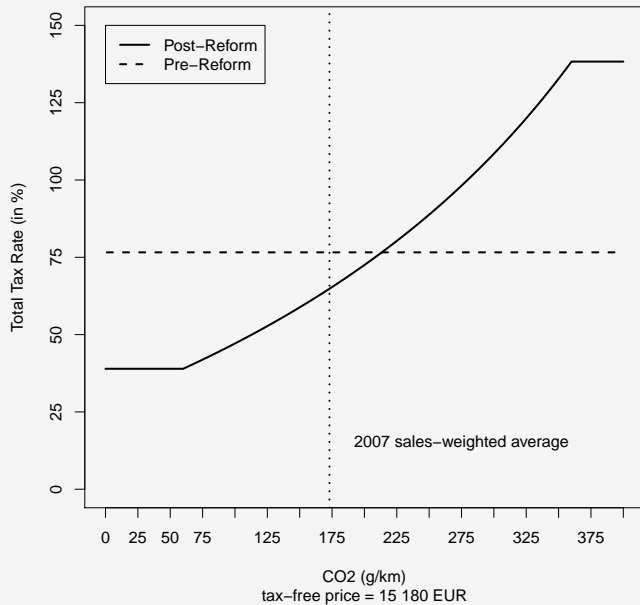
- Helsinki average prices for April 1-24 2015
- source: tankkaus.com

Car Tax 2003-2007

- 28% of tax-inclusive retail value minus 650 Euros (450 for diesel)
- Total tax rate incl. VAT: ca. 70-85%

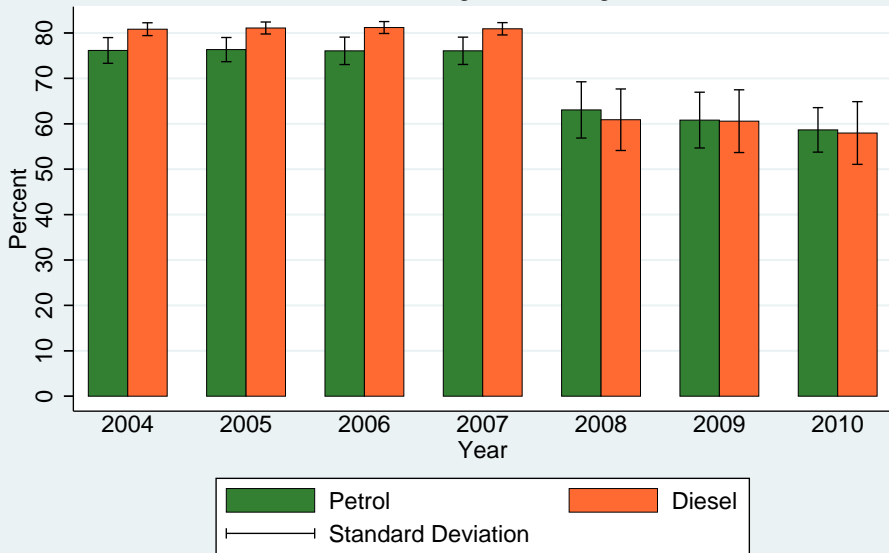
2008 Emissions Differentiation

- announced November 2007, implemented January 2008
- average CO₂ emissions (g/km) determine car tax share
- range of car tax share: 10-40%
- total tax rate: 38-140%



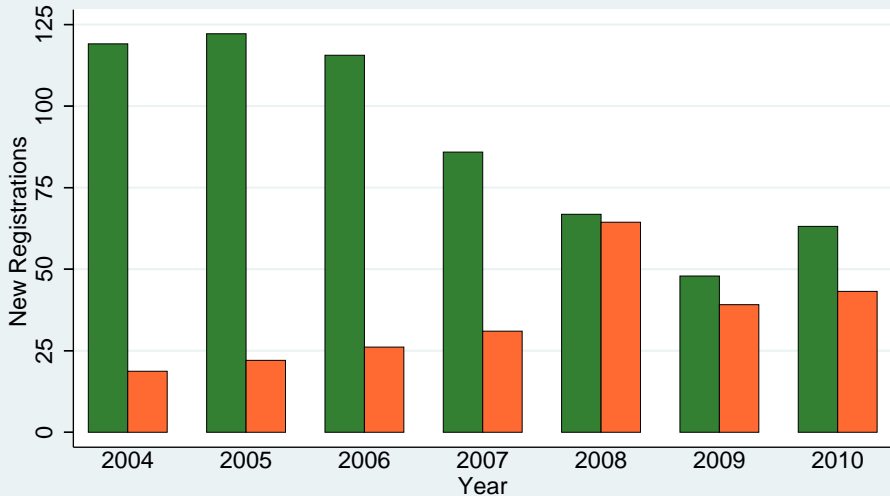
Total Tax Rates by Year and Fuel Type

Sales-Weighted Average



New Registrations by Year and Fuel Type

x 1000



Comparison 2004-2007 to 2008-2010 (1)

Statistic	Price (EUR) ^a	Tax (EUR) ^a	Tax rate (%) ^b	CO2 (g/km)	Power (hp)	Weight (kg)
2004-2007						
Average	36,874	16,383	78.4	194	103	1,494
Average ^c	26,983	11,805	76.6	176	87	1,364
2008-2010						
Average						
Average ^c						

^a in 2005 Euros

^b percentage rate of both VAT and car tax

^c Sales-weighted average.

Comparison 2004-2007 to 2008-2010 (2)

Statistic	Price (EUR) ^a	Tax (EUR) ^a	Tax rate (%) ^b	CO2 (g/km)	Power (hp)	Weight (kg)
2004-2007						
Average	36,874	16,383	78.4	194	103	1,494
Average ^c	26,983	11,805	76.6	176	87	1,364
2008-2010						
Average	31,480	12,677	63.7%	167	107	1,474
Average ^c	25,611	9,733	60.0	154	91	1,404

^a in 2005 Euros

^b percentage rate of both VAT and car tax

^c Sales-weighted average.



Car Tax and Incentives

BMW 5 Sedan, 306hp 2,979cm³

Model:	535i	ActiveHybrid5
CO2:	186	149
l/100km:	8.0	6.4
Price incl. VAT:	53 650	68 720
Car Tax:	24 512	22 259
Total Price:	78 162	90 979

- Lower emissions → lower tax rate
- Higher cost → higher tax base

→ **Limited incentive** to purchase clean but costly technology