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California Feebate: Revenue Neutral Approach to Support Transition Towards More Energy Efficient Vehicles

A Research Report from the University of California Institute of Transportation Studies

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June 2017

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16. Abstract Markets and regulation are getting out of alignment due to vehicle fuel economy and greenhouse gas standards becoming increasingly stringent. If gasoline prices stay relatively low, then consumers will have little incentive to purchase more expensive fuel-efficient vehicles. California can provide tax incentives to consumers to purchase more fuel-efficient vehicles, but the cost to taxpayers of doing so grows exponentially if sales of these vehicles increase. As a result, this report explores the possibility of imposing fees to less fuel efficient vehicles and smaller rebates to more fuel efficient cars and trucks. The goal of the proposed program is to design a revenue neutral program corrects market signs to consumers and provides an incentive to purchase higher fuel efficient vehicles.			
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ABOUT THE UC ITS

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UNIVERSITY OF CALIFORNIA INSTITUTE OF TRANSPORTATION STUDIES

June 2017

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Goal

Increase sales of electric vehicles in California while reducing taxpayer burden, preserve the integrity of “54 mpg” vehicle standards by aligning market price signals, and improve social equity by reducing the cost of vehicles for low income buyers.

Problem

- 1) Markets and regulations are getting out of alignment due to vehicle fuel economy and greenhouse gas (GHG) standards becoming increasingly more stringent and low oil prices. If gasoline prices stay relatively low, as seems likely (in part due to tightening vehicle standards in US, Europe, and elsewhere), then consumers will have little incentive to buy a more expensive, fuel efficient car. As vehicle fuel and GHG standards become more stringent, the misalignment will worsen.
- 2) The cost to taxpayers of providing incentives grows exponentially as sales of plug-in and fuel cell electric vehicles increase due in part to zero emission vehicle requirements of California and 9 other states. Currently, \$7,500 in tax credits are provided nationally and \$2,500 in California for each electric vehicle sold. If, for example, 1 million electric vehicles are sold per year, the annual cost to taxpayers will be \$10 billion (\$10,000 x 1 million).

Proposal

Feebates are a policy mechanism that charges a fee to buyers of “gas guzzlers” and provides rebates to buyers of fuel efficient and electric vehicles. We analyzed historic vehicle sales in California and explored possible feebate designs, as shown in Table 1.

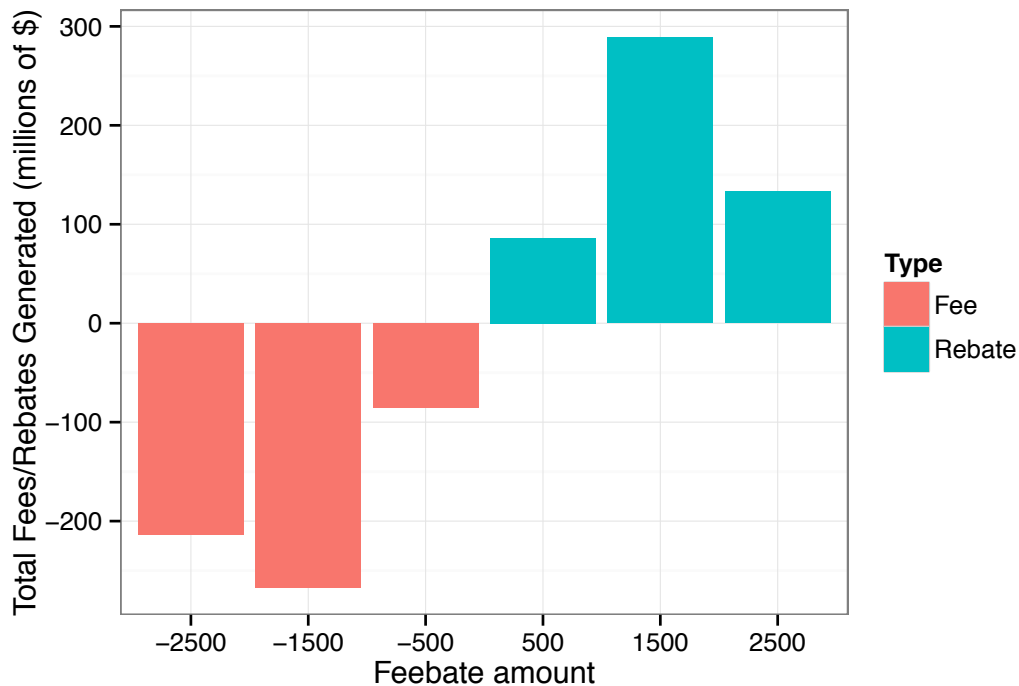
Table 1 Sample feebate structure

Fees		Rebates	
Amount per vehicle	Cutoff	Amount per vehicle	Cutoff
\$2,500	Cars: <25.9 mpg Trucks: <19.1 mpg (<5th Percentile)	\$500	Cars: 42.5-47 mpg Trucks: 31.2-33.9 mpg (>85th Percentile)
\$1,500	Cars: 25.9-31.5 mpg Trucks: 19.1-23.4 mpg (10 th Percentile)	\$1,500	Cars: 47-71 mpg Trucks: 33.9-36.4 mpg (90 th Percentile)
\$500	Cars: 31.5-33.2 mpg Trucks: 23.4-24.6 mpg (15 th Percentile)	\$2,500	Cars: > 71 mpg Trucks: > 36.4 mpg 95 th Percentile

As indicated, in the sample feebate payment design shown in Table 1, based on 2015 vehicle purchases, buyers of cars rated at less than 25.9 mpg and of light trucks (SUVs, minivans, pickups, crossovers) rated less than 19.1 mpg, would pay \$2,500. On the end, buyers of cars with better than 71 mpg and light trucks with better than 36.4 mpg, would receive rebates of \$2,500. In the sample program above, cars and light trucks with fuel economy with ratings between the high and low values, would get smaller rebates or pay smaller fees. The 70% of buyers in the middle would neither receive a rebate nor pay a fee, in this example.

The policy is designed to be revenue neutral, with no cost to taxpayers. This is achieved by redistributing the collected fees as rebates: for every dollar that is collected as a fee, a dollar is returned as a rebate (with a very small administrative charge used to pay for handling costs). A feebate structure as shown in Table 1 would yield a total of \$500 million in rebates in 2015 for the top 15% most fuel efficient vehicles, paid for by the worst 15% gas guzzlers. An important point to note is that the feebate only applies to 30% of the fleet, half of which receive a rebate while the other half pay a fee. The remaining 70% of vehicle purchases are unaffected by the feebate program.

Figure 1: Feebates in Table 1 applied to 2015. The policy is entirely revenue neutral with a total of \$500 million annually raised in fees and paid out in rebates. The bulk of the revenue is generated from the \$1,500 and \$2,500 portion of the feebate.



To avoid penalizing sellers and buyers of light trucks (SUVs, etc), the feebate is separated into two categories: cars and light trucks. In this way, the feebate does not simply shift from large

trucks into small cars. Instead, trucks, vans, and SUVs have their own feebate rules which will charge a fee for the worst trucks, vans, and SUVs but also provide a rebate for the most efficient vehicles in this class. The dual feebate structure will prevent any funds from trucks going towards light-duty cars and vice versa. This provides a level playing field for all automakers.

Implementation

The fees and rebates could be handled by the automakers or the dealers. Because fees are involved, in California the Legislature would have to approve this program by a 2/3 vote.

Benefits

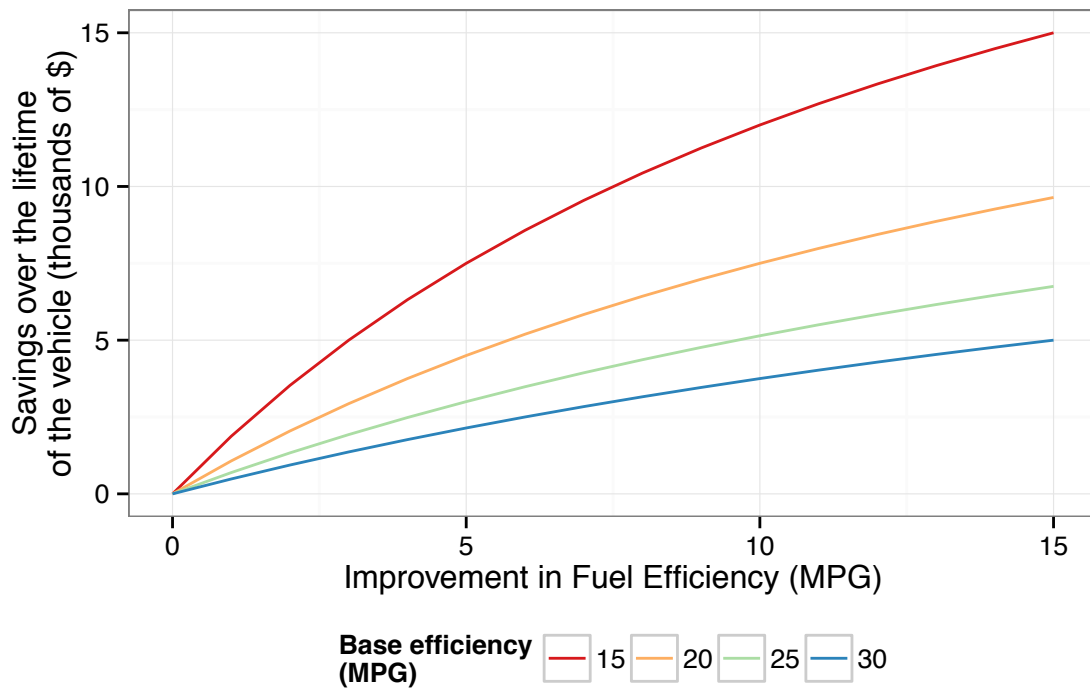
1. Correct Market Signs

Feebates provide the correct market signals to consumers and automakers to favor vehicles with higher fuel efficiency. Low gasoline prices can undo gains in vehicle fuel economy because consumers will care less about purchasing an efficient vehicle. However, a feebate will simultaneously disincentivize lower fuel efficiency vehicles by making them more expensive and at the same time incentive higher fuel efficiency vehicles by making them more affordable.

2. Low Income Consumers Benefit

Consumers who are price conscious, including low-income buyers, will benefit. If a low-income consumer decides to switch from a 30 MPG sedan to a 45 MPG hybrid, not only would he/she receive a \$500 rebate but will also save \$5,000 on fuel costs over the lifetime of the vehicle. Even for consumers who end up paying a fee, any switch to a higher MPG vehicle will often yield savings that outweigh the fee. The presence of a feebate can be considered a win-win, even for the fee payers, because the higher fuel efficiency that the program promotes inherently will save drivers money in fuel costs.

Figure 1: Lifetime savings for consumers switching to higher fuel efficient vehicles. A modest 1-5 MPG improvement will entirely negate the fee while a switch to a much more efficient vehicle can yield savings in excess of \$15,000.



3. Revenue neutral and sustainable

A feebate program is revenue neutral – any amount of money collected from fees is returned in the form of rebates. A small handling fee can be used to pay all administrative costs. The policy is straightforward to implement. The rates would be adjusted each year to recognize changes in fuel economy of vehicles and shifts in demand that might result from the feebate and other factors (such as changing gasoline prices). In addition, the feebate requires no funding from taxpayers or other programs. This would replace funding of electric vehicle rebates through the Clean Vehicle Rebate Project (CVRP). CVRP funds could be used for other purposes. A feebate program provides certainty for electric vehicle incentives into the future (until they become a large share of the market).

In summary, feebates are necessary and inevitable if we intend to continue ramping up the efficiency of our vehicles and incentivizing electric vehicle sales. The urgency of feebates will grow as oil prices stagnate. In addition, as government incentive payouts for electric and fuel cell vehicles increase, feebates will become a compelling solution for supporting California's transition to more fuel efficient vehicles while reducing the burden on taxpayers.

Appendix

Choosing cutoffs for fees and Rebates

We examine the density of vehicles by fuel economy in order to choose which vehicles are charged fees and which vehicles are offered rebates. The 5th, 10th, and 15th percentiles of lowest fuel economy vehicles are charged fees while the 85th, 90th, and 95th percentiles of highest fuel economy vehicles receive rebates. The densities of passenger cars is shown in Figure 3 while Figure 4 presents the densities of fuel economies for trucks, vans, and SUVs. In 2015, cars below 33.2 MPG are assessed fees and above 42.5 MPG are given rebates but the 70% of vehicles in between these two fuel economy numbers are exempt and unaffected by the feebate. Likewise, the cutoff for trucks, vans, and SUVs in 2015 is below 24.6 for fees and above 31.2 for rebates. The actual values change from year to year. In order to remain as revenue neutral as possible, if the cutoff values are chosen based off the previous years' sales weighted average fuel efficiency, a small adjustment is needed to avoid shortfalls or banking too much money. The adjustment is approximately 1.46 MPG increase per year for cars and 1.54 increase MPG per year for trucks, vans and SUVs, though these amounts will vary by the percentile.

Figure 2: Density of passenger car fuel economies from 2010 through 2015. The dotted lines represent the cutoffs for the feebates corresponding to the 5th, 10th, 15th, 85th, 90th, and 95th percentiles.

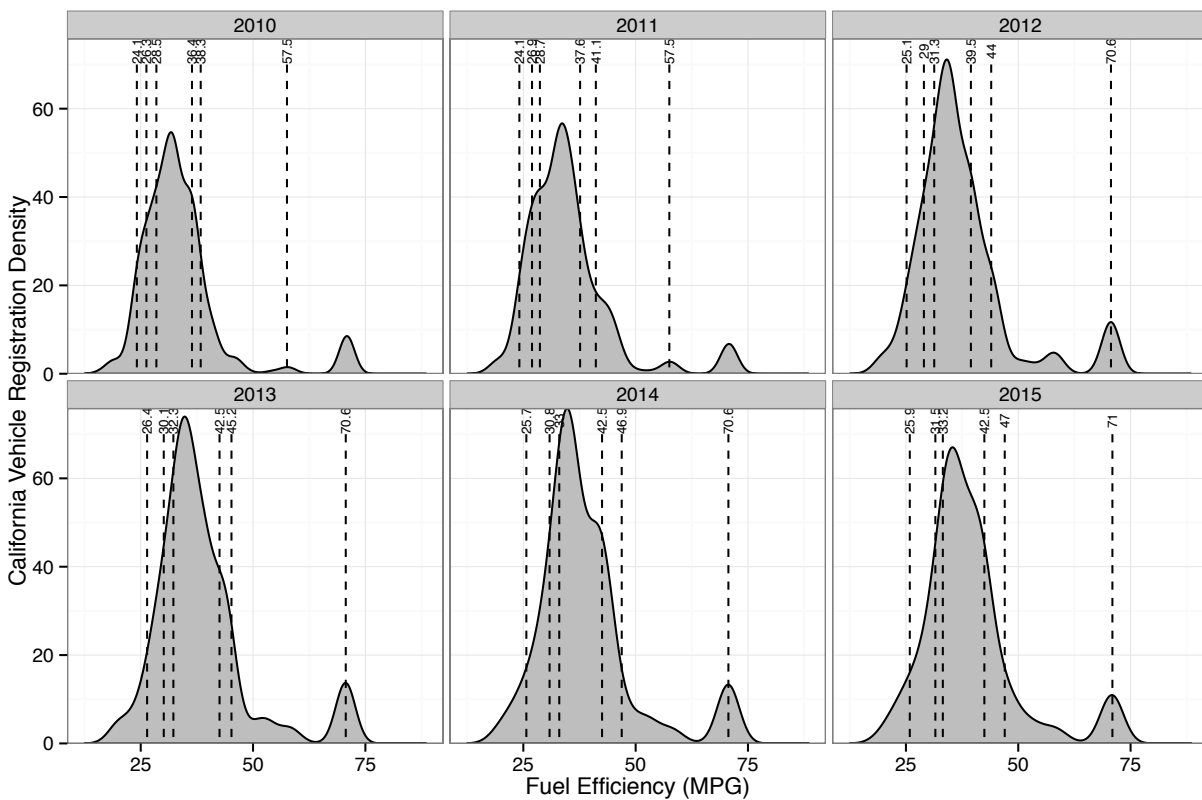
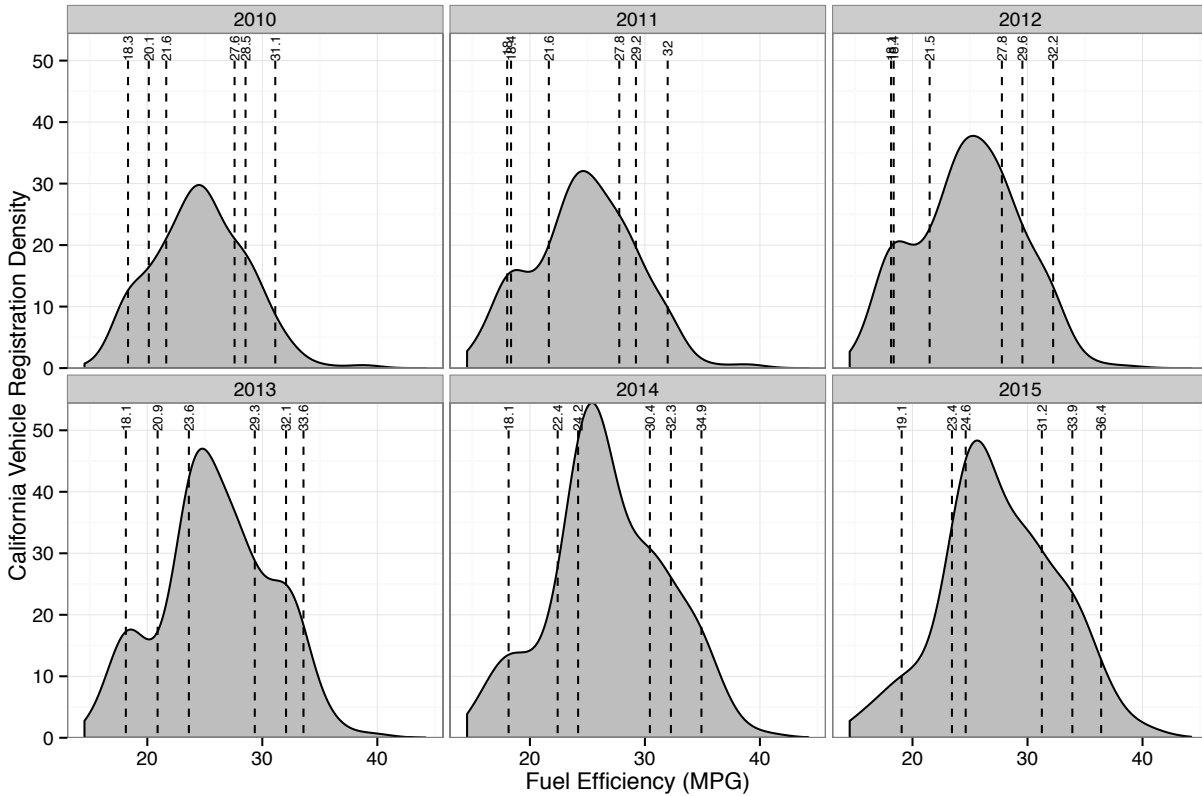


Figure 3: Density of truck, van, and SUV fuel economies from 2010 through 2015. The dotted lines represent the cutoffs for the feebates corresponding to the 5th, 10th, 15th, 85th, 90th, and 95th percentiles.



Automaker outcomes

The presence of a feebate will affect automakers in a different way since each vehicle manufacturer produces different vehicles from another manufacturer. To observe how different companies are affected by the feebate, we examine vehicle sales in 2010 through 2015 and sum up the total fees and rebates generated at the cutoffs. The total fees and rebates for passenger cars can be seen in Figure 5 while the totals for trucks, vans, and SUVs can be found in Figure 7. Similarly, the average feebate on a per-vehicle basis for each automaker can be found for passenger cars in Figure 6 and for trucks, vans, and SUVs in Figure 8.

For passenger car totals, Toyota generates the most rebates while General Motors and Daimler vehicles are typically assessed the most fees. For trucks/vans/SUVs, Nissan and Subaru vehicle receive the most rebates while Ford and GM vehicles are most often hit with fees.

Figure 4: Breakdown of feebates on automakers for passenger cars: sum of all fees assessed on an automaker's passenger cars (red), sum of all rebates received on an automaker's passenger cars (green), and the difference between fees and rebates (dot).

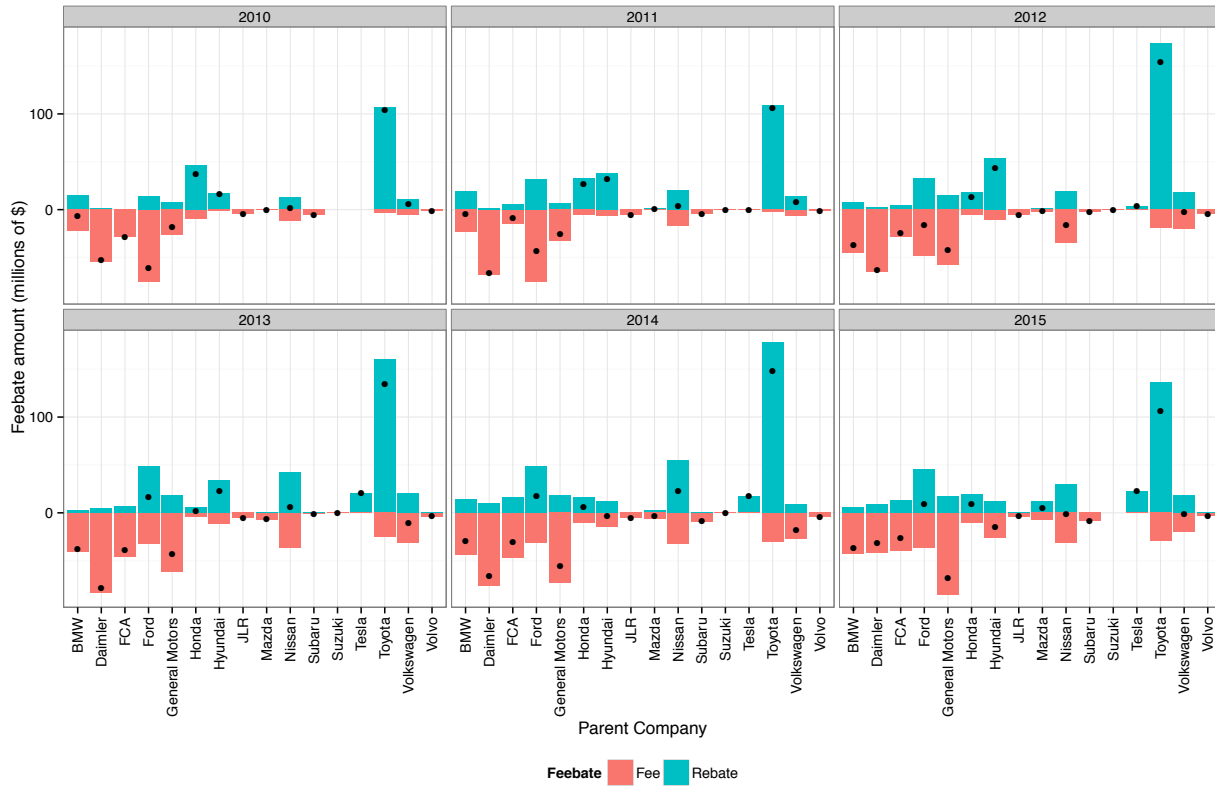


Figure 5: Breakdown of feebates on automakers for passenger cars: average per vehicle fee assessed on an automaker's passenger cars (red), average per vehicle rebate received on an automaker's passenger cars (green), and the difference between average fees and rebates (dot).

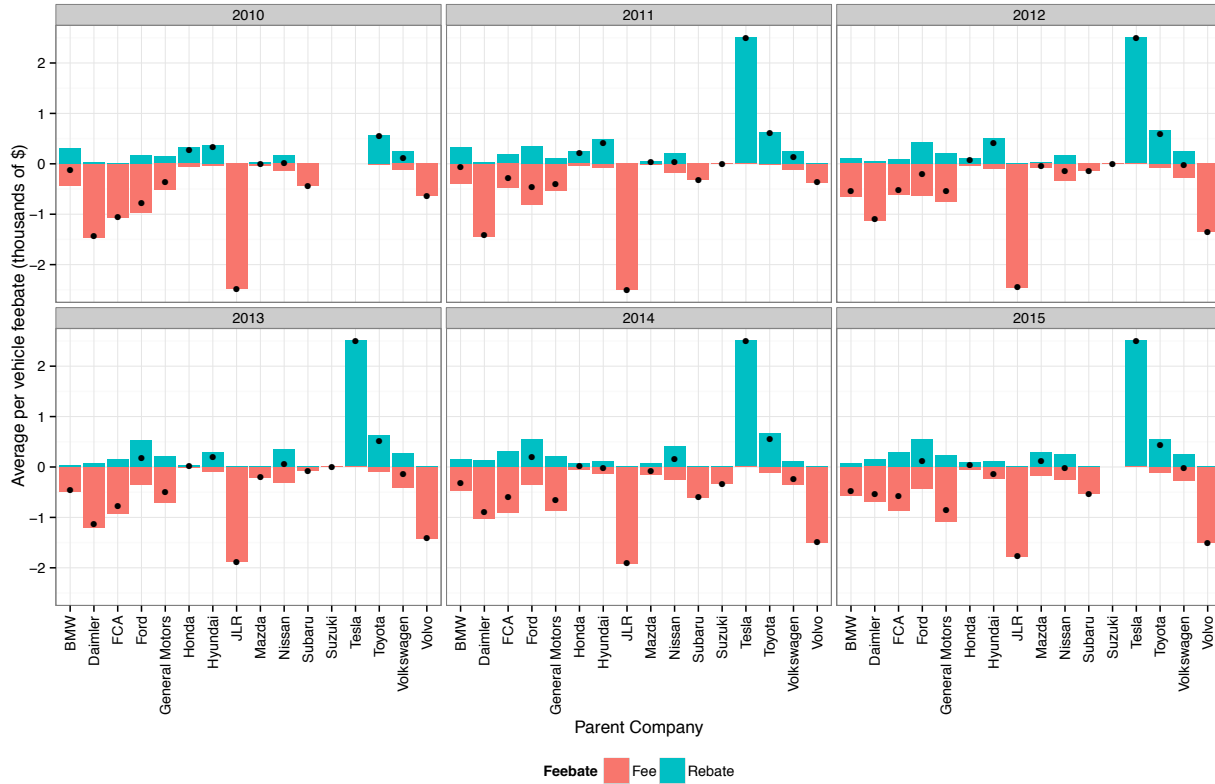


Figure 6: Breakdown of feebates on automakers for light-duty trucks, vans, and SUVs: sum of all fees assessed on an automaker's trucks/vans/SUVs (red), sum of all rebates received on an automaker's trucks/vans/SUVs (green), and the difference between fees and rebates (dot).

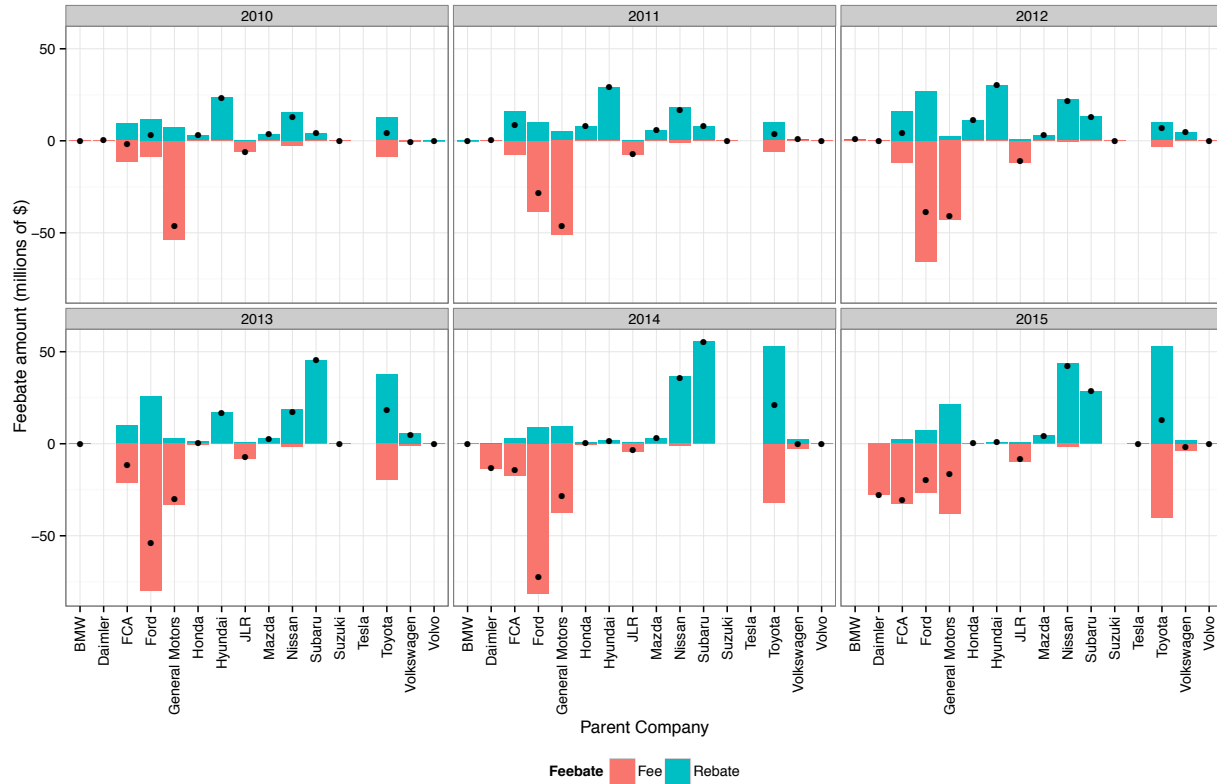
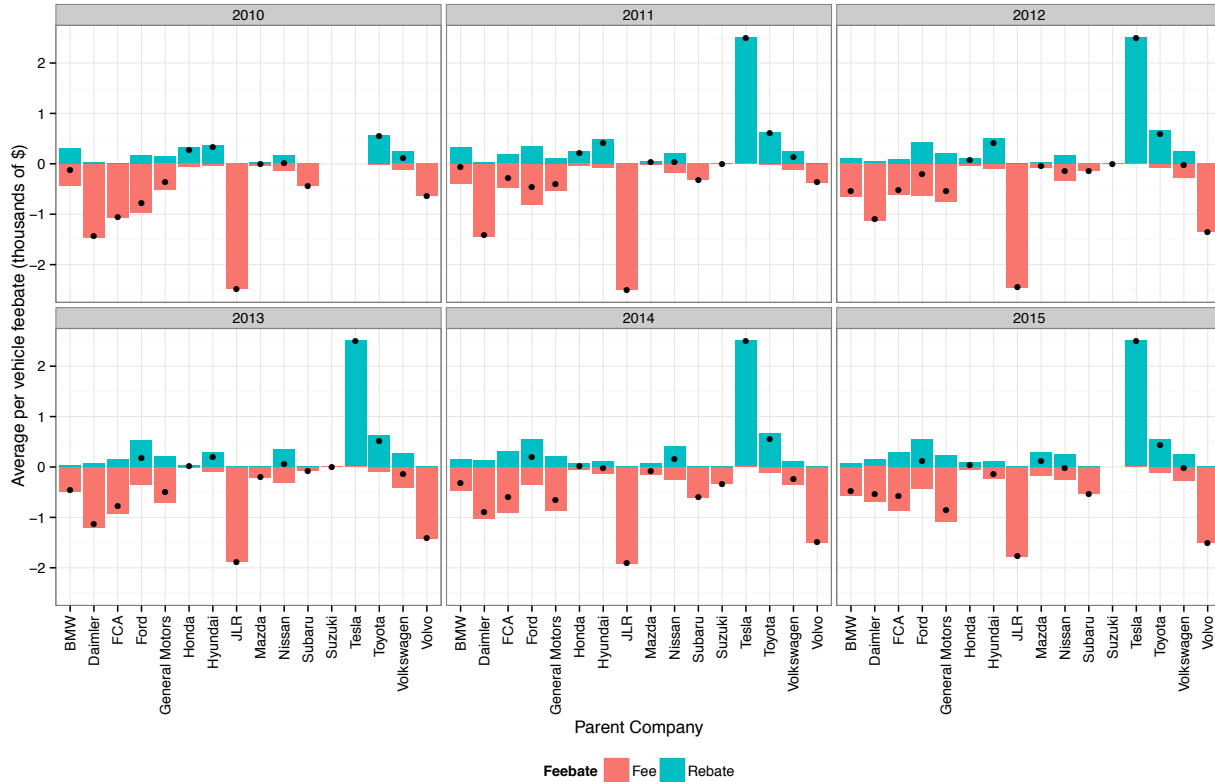


Figure 7: Breakdown of feebates on automakers for light-duty trucks, vans, and SUVs: average per vehicle fee assessed on an automaker's trucks/vans/SUVs (red), average per vehicle rebate received on an automaker's trucks/vans/SUVs (green), and the difference between average per vehicle fees and rebates (dot).



Vehicle class effects and switching

In addition to observing effects on automakers, we also examine how different vehicle classes are affected by the feebate. Figure 9 provides the average fees and rebates associated with a particular vehicle class while Figure 10 shows the total fees and rebates. The only class assessed an average fee of over \$2,000 is the van (though the fee associated with minivans is significantly smaller). The recipient of the highest average rebate is the midsize station wagon followed by the mini-compact car, small SUVs, and small station wagons. The presence of both a fee and rebate (both red and green bars) in a single class means that there is an opportunity for the consumer to switch from a vehicle with a fee to a vehicle with a rebate within the same vehicle class.

Figure 8: Breakdown of feebates by vehicle class: average per vehicle fee (red), average per vehicle rebate (green), and the difference between average per vehicle fees and rebates (dot).

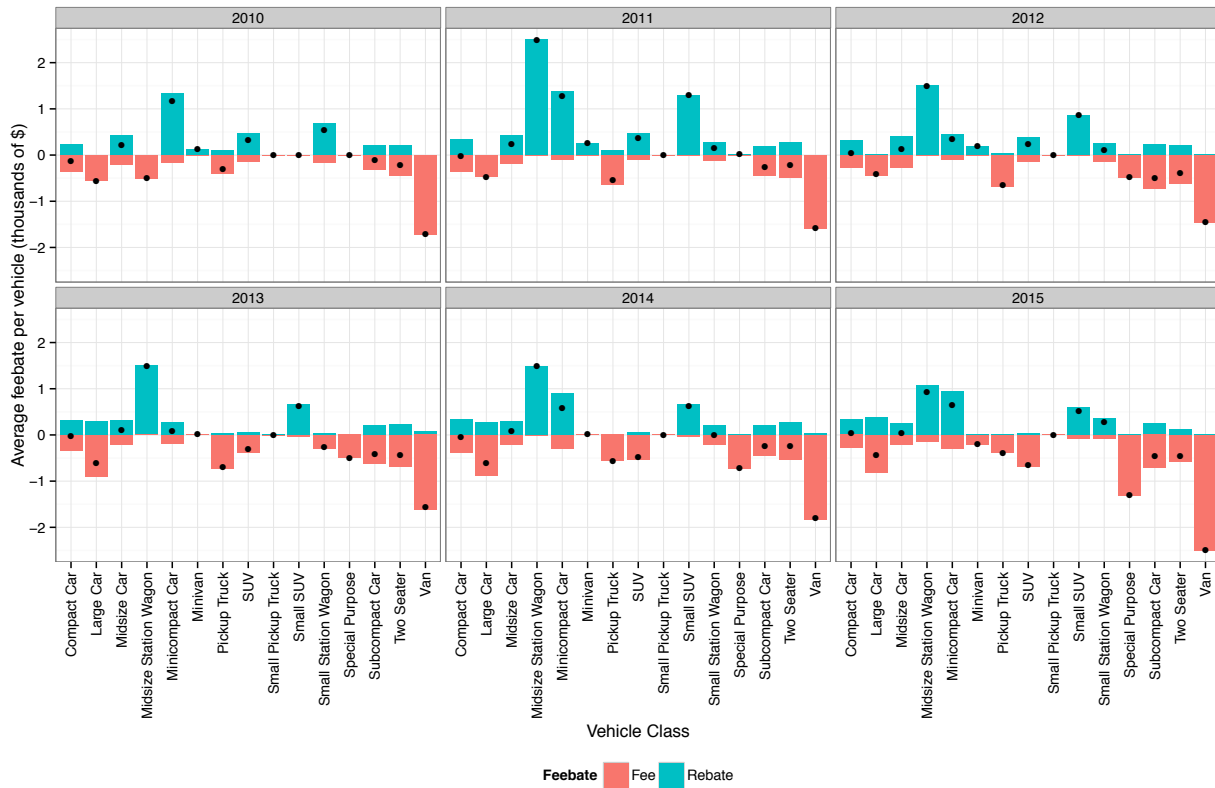
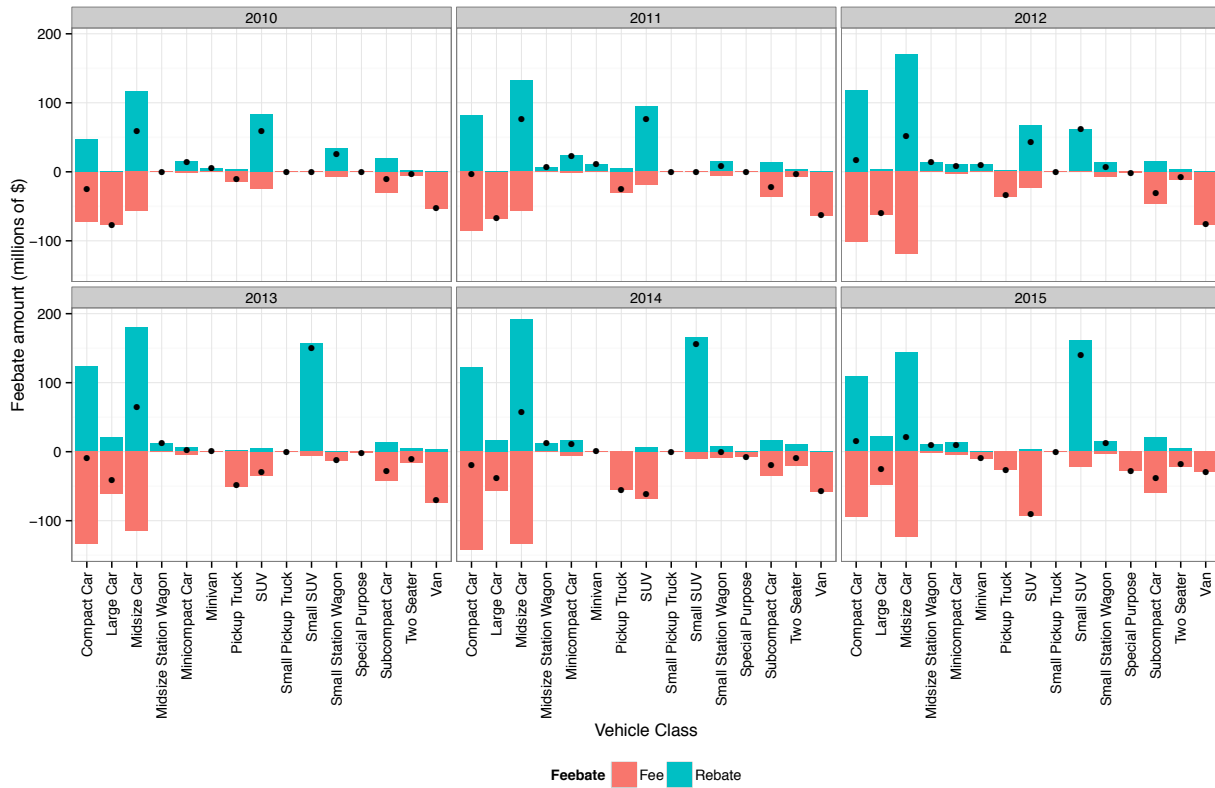


Figure 9: Breakdown of feebates by vehicle class: total vehicle fee (red), total vehicle rebate (green), and the difference between total vehicle fees and rebates (dot).



Feebate and vehicle prices

One crucial piece we wanted to examine was the equity effects of introducing a feebate. Under the proposed feebate structure, we found that the cheapest vehicles typically receive the rebate while fees are distributed among more expensive vehicles. In this way, the affordability of the lowest priced vehicles actually improves with the presence of a feebate.

Figure 10: Distribution of rebates (above 0) and fees (below 0) based on the MSRP of the vehicle. Each bar represents the count of vehicles within a “MSRP bin” that receives a rebate or a fee.

