UCDAVIS
POLICY INSTITUTE FOR ENERGY, ENVIRONMENT, AND THE ECONOMY

Impact of the Clean Vehicle Rebate Project's income cap on California's ZEV Market

ISSUE PAPER
May 2019

A research summary whitepaper for the California Air Resources Board*

ABSTRACT

This paper reviews and summarizes the research regarding California's Clean Vehicle Rebate Project's (CVRP) implementation of income caps in March 2016 and increase of income caps in November 2016. Due to the recent nature of the program, no peer-reviewed research has been published about the specific effects of CVRP. Consequently, we review the literature regarding past and present programs with similar policies as well as studies that first identified the inequitable[1] and inefficient distribution of incentives in the CVRP and other programs.

Research indicates that the inequitable distribution of incentives is a problem for the sustainability and efficiency[2] of incentive programs. While we are limited in determining the specific effects of CVRP's income cap, but find evidence to suggest that income caps may be an efficient tool for increasing equitability while maintaining similar levels of rebated vehicles, since rebates matter less to high-income purchasers. Finally, we suggest a path forward for future research to identify the specific impacts of CVRP's income caps.

* This project was funded by the California Air Resources Board. The contents may not necessarily reflect the official views or policies of the State of California.
[1] Inequitable in the context of CVRP incentives primarily refers to income inequality. If 50% of incentives are realized by those in the top 20% of the income distribution, then the incentives are inequitable.
[2] Efficiency in the context of CVRP incentives refers to dollars spent per zero-emission vehicle (ZEV) purchase induced by the rebate.

1 Purpose

Assembly Bill (AB) 615 requires the California Air Resources Board (CARB) to "prepare and submit to the Legislature a report on the impact of the Clean Vehicle Rebate Project on the state's zero-emission vehicle market...The report shall include, but is not limited to, the impact of income caps, increased rebates for low-income consumers, and increased outreach on the electric vehicle market." This whitepaper supports CARB in fulfilling AB 615's mandate by assessing the impact of California's Clean Vehicle Rebate Project (CVRP) implementation of income caps in March 2016 and increase of income caps in November 2016. The assessment is based on a review of literature related to zero-emission vehicle (ZEV) incentive programs, including general findings, research gaps, and policy implications of both.

2 Policy description

California is a leader on combating climate change. The state has set bold goals of reducing statewide greenhouse gas (GHG) emissions to 80% below 1990 levels by 2050, as well of achieving 5 million ZEVs on the road by 2030. Reaching these goals will require effective policies and programs, as well as periodic assessment of both. A key state effort to incentivize ZEV adoption, and thus reduce emissions from the light-duty transportation sector, is the Clean Vehicle Rebate Program (CVRP).

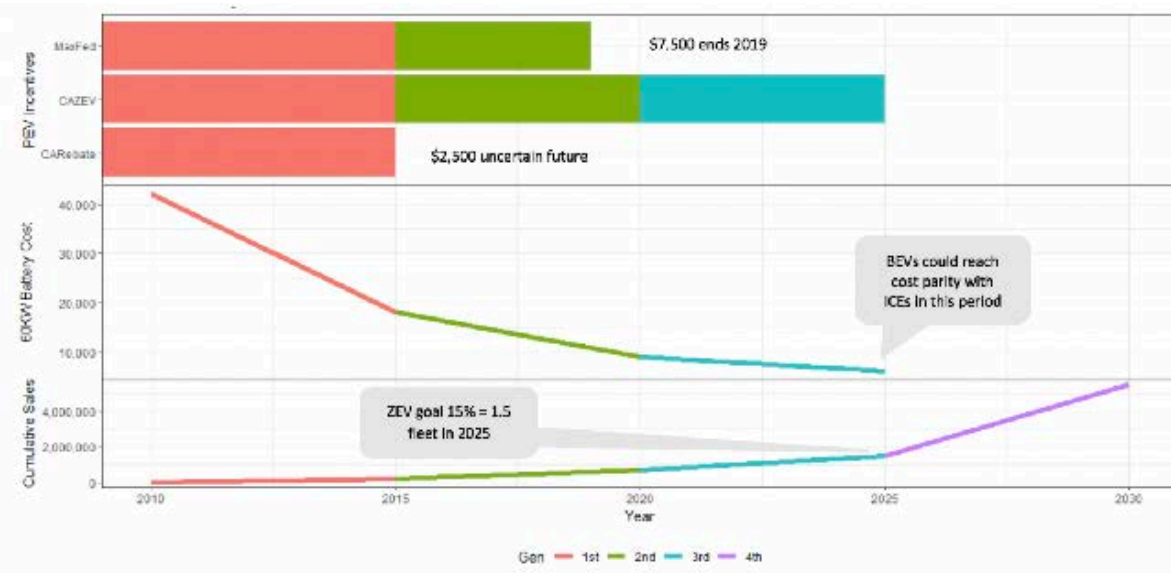
The CVRP was created by AB 118 in 2007 to incentivize ZEV purchasing and leasing. The CVRP's primary purpose is to support widespread commercialization of the cleanest vehicles by helping to motivate consumer purchase decisions. The program was originally designed to be "first-come, first-served" and only expected to be funded through 2015. Consequently, the program had no means-testing requirement at its inception, leading to a significant portion of incentives concentrated among high-income individuals.[3]

Senate Bill (SB) 1275, passed in 2014, was designed to address these issues. SB 1275 required CARB to develop a plan for realizing California's then-goal of achieving 1 million ZEVs on the road by 2023 without excluding low-income individuals. This bill required CARB "to adopt, no later than June 30, 2015, specified revisions to the criteria and other requirements for the Clean Vehicle Rebate Project; and to establish programs that further increase access to and direct benefits for disadvantaged, low-income, and moderate-income communities and consumers from electric transportation."[4] In March 2016, acting on CARB's recommendations, the state set income caps for CVRP participants so that financial incentives for ZEV purchases would not be wasted on those who did not need them. The caps were set at $250,000 for single individuals, $340,000 for a head of household, and $500,000 for a joint filing. In November 2016, SB 859 reduced the income caps to $150,000 for single individuals, $204,000 for a head of household, and $300,000 for joint filings.

3 Designing incentive programs

As seen in Figure 1, incentives are critical for spurring increased adoption in the first three generations of plug-in electric vehicles (PEVs).[5] Well-designed incentives should be efficient and equitable. Increasing ZEV incentive efficiency requires increasing the percentage of recipients who are induced to purchase a ZEV because of the incentive while decreasing the percentage of recipients who would have purchased a ZEV anyways. Increasing ZEV incentive equity means ensuring that incentives are evenly distributed across a range of demographics, especially income. These two objectives often go hand-in-hand, as low- and moderate-income individuals are the most likely to be influenced by incentives that reduce the financial impact of buying a ZEV. Failing to reach low- and moderate-income individuals will likely result in California missing its 5 million ZEVs by 2030 goal.

[3] Means testing is any requirement for a program that uses an individual's financial status to determine eligibility (normally income subset by tax filing status).
[4] It should be noted that while CVRP was an integral part of the state's efforts to increase ZEV adoption, the program was not the sole focus of SB 1275. For example, the mandate helped lead to the creation of EFMP Plus-Up, BlueLA, and Our Community Car Share.
[5] PEVs are a subset of ZEVs that excludes fuel-cell vehicles.



	1st Gen Innovators	2nd Gen Innovators & Followers	3rd Gen Innovators & Followers Next Purchase
PHEV Miles Traveled	10 – 40	15 – 50	50+
BEV Miles Traveled	80 – 250	150 – 300	200+
# of Models	20 – 30	30 – 100	200+
Designs	Compact, Subcompacts	Crossover, Midsize Sedans	Full-sized Vehicles

Figure 1. Charting the California plug-in electric vehicle (PEV) market from 2010–2030: past, present, and future.[6] *This figure highlights the importance of maintaining rebates (top panel) until battery-electric vehicles (BEVs) and ZEVs reach cost parity with internal combustion engine vehicles (ICEVs, middle panel). Moreover, these rebates will be necessary to spur enough adoption to reach California's ZEV goals (bottom panel). The figure also highlights the different stages of ZEV adoption (tables). Different groups of individuals are assumed to adopt ZEVs at different times. Innovators lead, then followers, then the second purchase of a ZEV by innovators and followers. Mass adoption occurs in the fourth generation.*

Multiple options exist for tackling both of these significant issues. Some have already been implemented in other states, such as manufacturer's suggested retail price (MSRP) caps on EV rebates in New York, Massachusetts, and Connecticut.[7] Two different approaches were implemented in California in 2016: (1) income caps and (2) increased incentives for low- and moderate-income individuals. Income caps are designed to prevent subsidizing ZEV purchases for high-income individuals, since these individuals have the means to purchase a ZEV without assistance and will hence ascribe less value to financial purchase incentives. By preventing resources from being "wasted" on the wealthy, income caps increase incentive availability for low- and moderate-income individuals. This increases incentive efficiency and equity alike.

Another critical determinant of incentive efficiency and equity is outreach. For incentives to reach target populations, individuals in those populations must be aware of both the qualifying product and the existence of the incentive. Hence outreach around ZEVs in general as well as ZEV purchase incentives is an essential aspect of efforts to increase ZEV deployment.

This whitepaper focuses on literature and analysis relevant to adding an income cap to the CVRP. For more information on the related policy of increased incentives for low- and moderate-income recipients, see a separate whitepaper in this series, "Impact of the Clean Vehicle Rebate Project's Increased Rebates for Low- and Moderate-Income Individuals on California's ZEV Market."

[6] Figure adapted from Turrentine et al. (2018). Note that CAZEV is comprised of all CA ZEV programs, including CVRP.

[7] MSRP caps essentially prevent expensive ZEVs like the Tesla Model X from qualifying for rebates, such that cheaper vehicles like the Chevy Bolt are the only subsidized ZEVs. These caps are designed to encourage manufacturers to produce vehicles that are more accessible to low- and moderate-income individuals. MSRP caps do not preclude high-income individuals from purchasing (and realizing subsidies on) eligible vehicles.

4 Key findings

These are the top findings based on our review of relevant literature.

- New buyers of ZEVs tend to be higher income than average buyers of new cars. This is shifting over time—likely because of changes in policy, such as income caps and increased rebates (Borenstein & Davis 2016; Helveston et al. 2015; Lee, Hardman, & Tal 2019).
- Past hybrid electric vehicle (HEV)[8] and ZEV subsidies predominantly went to higher-income buyers and many who are likely to have purchased EVs anyway (Chandra et al. 2010[9]; Diamond 2009; Helveston et al. 2015; Hardman & Tal 2016; Rubin & St. Louis 2016).
- The purchase decisions of higher-income car buyers appear to be far less sensitive to ZEV rebates than the purchase decisions of low- to moderate-income car buyers (Diamond 2009[10]; Hardman & Tal 2016; Helveston et al. 2015).
- Rebate recipients are becoming increasingly demographically similar to new car buyers overall, according to rebate program data (Williams 2018).
  - Literature has not yet demonstrated a conclusive causality between income caps and a more equitable rebate distribution, but the correlation between the implementation and the shift in rebates toward lower-income individuals is dramatic (Williams 2018).
  - Since introduction of income caps, the share of rebate recipients earning more than $300,000 annually (household income) has dropped from ~16% in March 2016 (when the income cap and increased rebates were implemented) to ~2% in June 2017. The share of rebate recipients with an annual household income lower than $50,000 increased from ~5% to ~10% over the same period (Williams 2018; Figure 2).[11]
- Rebate importance, captured in stated-preference surveys, has increased since the enactment of income caps and increased rebates. This is because more price-sensitive buyers have entered the market (Williams 2018).

In sum, the research indicates that without income caps or mean-testing in general, financial incentives for HEV and ZEV purchases are inequitably distributed based on income and demographics (Borenstein & Davis 2016; DeShazo 2010; Diamond 2009; Rubin & St. Louis 2016). The literature also suggests that targeting larger incentives to low-income consumers (and other salient demographic groups) and capping purchaser income or vehicle MSRP for rebate eligibility can improve ZEV purchase equity, make incentive programs more cost-effective, and increase total ZEV purchases (DeShazo 2016; Skerlos & Winebrake 2010). Multiple findings indicate that high-income consumers mostly disregard incentives when purchasing luxury battery electric vehicles (BEVs), and that high-income consumers are the most likely to purchase ZEVs without a subsidy (Diamond 2009; Hardman & Tal 2016; Helveston et al. 2015). Income and MSRP caps are likely to have little or no impact on the purchase decisions of high-income consumers (Diamond 2009; Hardman & Tal 2016; Helveston et al. 2015). More research needs to be done on the implementation of income caps and progressive rebates to assess their costs and downsides, as well as to see if they actually increase ZEV adoption and ZEV purchase equitability. Sophisticated models that can predict the impact of different levels of income caps would be useful for future policymaking.

Early CVRP rebate/demographic data shows that the CVRP income cap had a major impact in reducing the percentage of rebates received by households with an annual income of $300,000 or more (Williams 2018; Figure 2). The cap, along with increased rebates for lower-income individuals, also seems to have increased the percentage of rebates

[8] While HEVs are not ZEVs (they still require gasoline to run), research on HEV incentives is still relevant as the incentive programs for these vehicles were similar to that of ZEVs and the purchase demographics of early HEV adopters is similar to that of ZEVs.
[9] This paper uses a hypothetical situation, not past data, and analyzes HEVs.
[10] This paper assesses HEVs.
[11] It should technically be impossible for this percentage to be above 0% after the implementation of the cap. The 2% figure results from individuals sometimes misreporting their income.

received by households with an annual income of $50,000 or less, and likely had an impact on increasing the relative percentage of rebates received by households with annual incomes between $100,000 and $150,000. The percentage of rebates received by household with annual incomes between $150,000 and $300,000 stayed approximately constant.[12]

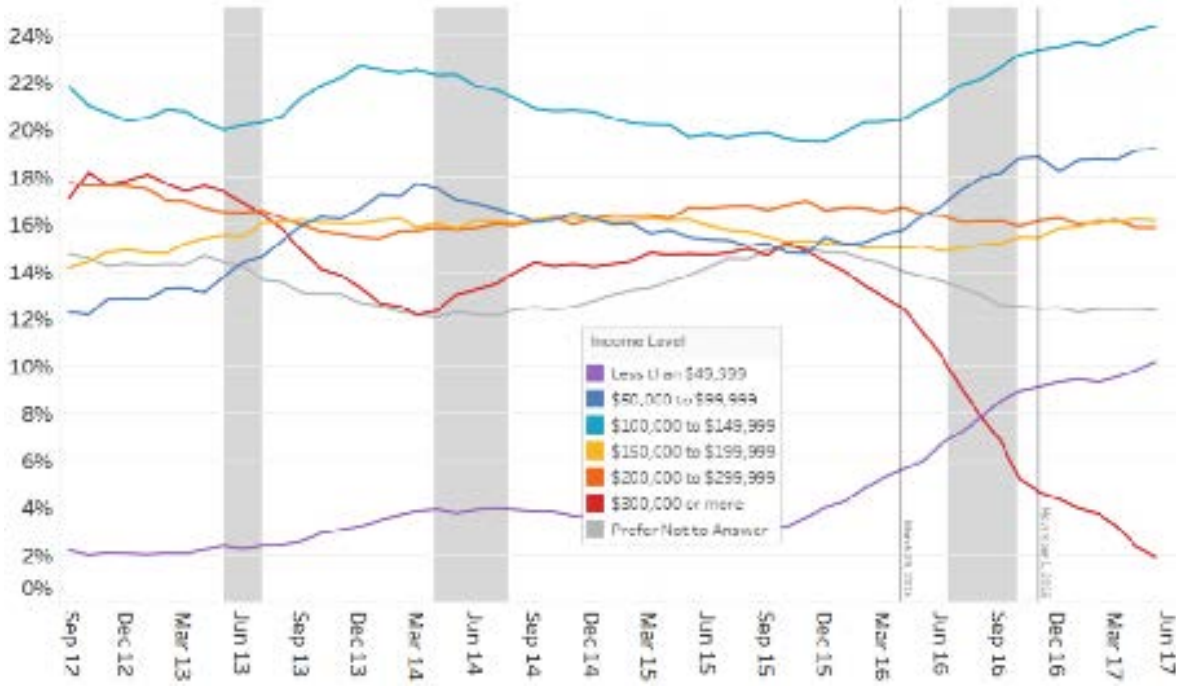


Figure 2. CVRP rebates by household income over time.[12] *This figure shows the percentage trend of CVRP rebates dispersed by household income bracket. The income cap and increased rebates implementation/adjustment are indicated by the two gray lines (March and November 2016). There is a marked decrease after March 2016 in rebates received by households earning $300,000 or more annually, and a significant increase among those earning less than $50,000 annually. This comparison gives us an indication of the effectiveness of means-testing policies on increasing equitability of rebates.*

Enacting income caps and increasing rebates for lower-income individuals does not seem to have had a significant impact on total number vehicles rebated (Figure 3). It is possible that the income cap marginally decreased ZEV sales, but that this decrease was offset by the positive effect of increased rebates for low-income individuals. It is also possible that neither policy had any effect and that changes in incentive distribution is due to other factors such as media coverage or the release of new vehicles that have better range and/or price. Conclusively determining whether the policies had significant effects—and separating the individual effects of each policy—requires substantial econometric analysis that is beyond the scope of this whitepaper.

5 Policy implications

Income caps are likely effective in improving efficiency and equity of ZEV purchase incentives

The research on high-income individuals' purchase intentions indicates that income caps likely have little effect on total ZEVs sold/leased. Furthermore, the initial CVRP data seems to show a strong correlation between the implementation of the income cap and increased rebates and an increase in low-income and decrease in high-income individuals receiving rebates. This indicates that the income cap had a significant effect on decreasing rebates for high-income "already-purchasers" while not reducing induced purchases by a significant amount.

[12] Figure taken from Williams (2018).

CVRP Rebates	
2010	135
2011	4,521
2012	11,219
2013	29,152
2014	43,702
2015	46,543
2016	44,455
2017	47,762
2018 *(thru Aug.)*	42,970
Total	270,459

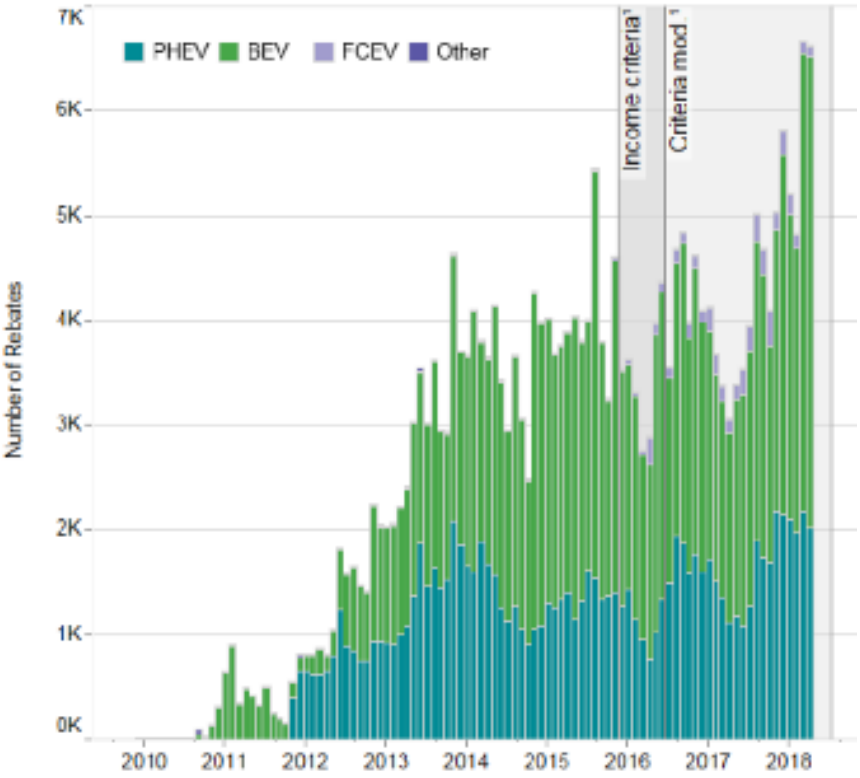


Figure 3. CVRP rebate volume over time.[13] *The data shows that an increasing trend in number of ZEVs rebated began before the implementation of income caps and increased rebates for lower-income individuals, suggesting that these policies have not had a substantial impact on total number of vehicles rebated.*

Sales of ZEVs in California have continued to grow despite income caps going into effect

Introducing income caps to the CVRP did not reverse an ongoing trend of increased ZEV purchases statewide. It is possible that income caps led to a marginal decrease in ZEV sales that was offset by increased rebates for lower-income individuals. The relative magnitude of the demand effects of each of these policies is difficult to assess without rigorous econometric analysis, and/or comparison with a reasonable control. However, for a given year, any change that reduces rebate availability overall would be expected to decrease sales, holding all other factors constant. According to the research, high-income individuals are the least likely to consider rebates "essential" for their purchase, and thus the removal of the rebate through an income-cap is unlikely to decrease a significant amount of ZEV purchases.

6 Highlighted works

This section summarizes some top findings and key methodological choices for the reviewed papers.

General (non-California-focused) studies

Borenstein & Davis (2016)
Study type: Observed data analysis
Geography: United States

The authors use U.S. tax-return data to examine the socioeconomic characteristics of "clean energy" tax credits. The authors compare effects across income groups, with other credits, and with other policies. They find that

[13] Figure taken from Williams (2018).
[14] Figure taken from Williams & Anderson (2018).

these credits are predominantly used by higher-income Americans. The most extreme is the PEV credit, where the top income quintile has received about 90% of all tax returns. Note that consumer eligibility to claim and benefit from CVRP rebates does not depend on tax liability.

Chandra et al. (2010)
Study type: Observed data analysis
Geography: Canada

The authors considered the cost and benefits of a potential tax rebate program for HEVs in Canada. The authors determined that those who would have benefited from the tax rebate due to sufficient tax liability were primarily consumers who would have purchased an HEV with or without a rebate. If early adopters of clean vehicles are likely to be higher-income consumers (which is backed up by the data), then the benefits of a tax incentive are not shared equally across income levels.

Diamond (2009)
Study type: Observed data analysis
Geography: United States

The author attempts to determine the factors driving HEV adoption in the United States using simple regressions on a panel dataset of market shares of different vehicle types in different states. The author finds no significant relationship between financial incentives and HEV adoption since incentive payments tend to be concentrated among high-income consumers who have sufficient tax liability to benefit, effectively subsidizing the wealthy without significantly affecting their purchase decisions. Note that consumer eligibility to claim and benefit from CVRP cash rebates does not depend on tax liability.

Helveston et al. (2015)
Study type: Survey, stated preference
Geography: United States and China

The authors aim to assess how vehicle preferences and the effects of subsidies differ across the world's two largest economies, the United States and China. The authors perform a stated preference survey comprising 312 and 667 respondents from the United States and China respectively. They find that older, wealthier and more educated consumers, especially those who own multiple vehicles and have children in households, are less sensitive to upfront and operating costs of PEVs. Furthermore, wealthy consumers are more likely to purchase PEVs without subsidy support. It should be noted that although the 384 respondents were weighted to better represent new car buyers in the United States, this analysis probably does not include enough respondents to reliably represent all U.S. consumers. The limited number of respondents included in this study stands in contrast to the tens of thousands of respondents included surveys conducted by the CVRP (e.g., to characterize rebate influence) and the University of California (e.g., to characterize rebate importance) that have reported similar findings.

California-focused studies

Hardman & Tal (2016)
Study type: Survey, stated preference
Geography: California

The authors conducted 553 surveys and 33 interviews to assess the motivation behind luxury BEV purchases. They found that purchasers of luxury BEVs (high-income earners) do not factor in incentives in their purchasing decisions, and thus an income cap could be implemented without reducing purchases from higher incomes.

Lee, Hardman, & Tal (2019)
Study type: Survey
Geography: California

The authors use a multi-year survey (2012–17) of the socio-demographic characteristics of 11,037 PEV adopters in California to analyze the different characteristics that drive early PEV adopters. This analysis identifies four groups of PEV buyers: high-income families (accounting for 49% of adopters), mid- to high-income older families (26%), mid- to high-income young families (20%), and mid-income renters (5%). The authors find that while high-income families are currently the largest group of PEV adopters, the relative size of this group may be decreasing. The authors stress the importance of meeting needs of the other groups in order to continue PEV market growth.

Rubin & St. Louis (2016)
Study type: Observed data analysis
Geography: California

The authors examine the distribution of CVRP rebates by census tracts in California. The authors find that the distribution of CVRP rebates is concentrated in higher-income census tracts. The authors also find that areas more affected by environmental issues receive more when income is controlled for, likely due to increased salience of emissions and their impacts. It should be noted that although the authors control for the number of vehicles in different census tracts, they do not control specifically for new-car buying volumes or consumer demographics. Thus, it is difficult to parse how large of a component of the findings is due to factors specific to EVs and EV rebates as opposed to the new-car market in general.

Williams (2018)
Study type: Initial data analysis
Geography: California

The author finds that since the introduction of CVRP income caps and increased rebates, the share of rebates received by households with annual incomes of more than $300,000 dropped from ~16% to ~2% (in June 2017). The share of rebate recipients with annual household incomes below $50,000 increased from ~5% to ~10% over the same time period, and the share of rebate recipients with annual household incomes between $50,000 and $150,000 increased as well (from ~21% to ~24%). The author also finds that rebate recipients are increasingly demographically similar to new car buyers overall, and that rebate importance for purchase has increased over time.

Williams & Santulli (2018)
Study type: Initial data analysis
Geography: California

The authors use CVRP data on reported household incomes to estimate the percentage of buyers that would have been excluded at different theoretical income caps. The authors suggest that lowering the cap further would likely have nonlinear effects as greater and greater fractions of buyers would be excluded. Further, the authors provide evidence that rebate influence decreases with income, and, as such, lowering caps is not only increasingly exclusionary, but increasingly excludes consumers who are more highly influenced by rebates. The authors do not quantify the components of the impacts of income caps that would contribute to a definitive characterization.

Arguments for means testing

DeShazo (2010)
Study type: Literature review
Geography: United States and California

The author provides a first-principles review of the economics behind and the characteristics of EV subsidies, as well as a history of EV subsidies in California. The author notes that EV subsidies are effective but inefficient, and recommends: (1) applying subsidies at point of sale; (2) increasing subsidies for BEVs relative to PHEVs; (3) linking vehicle purchase and retirement incentives; and (4) means-testing subsidies.

Skerlos & Winebrake (2010)
Study type: Observed data analysis
Geography: United States

The authors discuss the regional variability of PHEV social benefits and conclude that a uniform national policy for subsidizing PHEVs is at best sub-optimal, meaning that greater PHEV benefits could be achieved for the same government investment if subsidies were targeted to where the social benefits are largest. They argue that the federal PHEV tax credit would have higher social benefits if it were varied across income and location.

7 Ongoing research

UC Davis has several ongoing and planned projects that will continue to build knowledge on the impact of income caps. The majority of ongoing relevant research focuses on the characteristics of ZEV buyers and how those characteristics are changing over time, which will assist in evaluating the number of potential EV buyers who do not buy EVs due to the existence of caps. Forthcoming research will also consider how these characteristics interact with consumer purchase intentions and preferences regarding ZEVs. Other research projects at UC Davis are focusing on new buying populations, including repeat buyers, and buyers who already own various types of vehicles. Projects will assess the size of each potential ZEV market and the effect of changes in total cost of ZEV ownership on these markets, taking income caps into account.

8 Research gaps

Gaps in the research that could be filled by more targeted research efforts resulting from collaboration between academic researchers and regulatory agencies include:

- Modeling for the expected total market effects of different income caps.
- Benefit-cost analysis of the income cap approach, and how benefits and costs are expected to change over time as new ZEV models are introduced.
- Econometric assessments of the effects of the CVRP's income cap, i.e., that go beyond simple before-and-after comparisons.
- Exploration of whether high-income households became less likely to purchase ZEVs after income caps were implemented.

The research in its current state only allows for basic before-and-after comparisons of rebate recipient demographics, tangential inferences from other programs, and research on the drivers of ZEV purchases among high-income individuals. To fully understand the impact of income caps in general, and for CVRP specifically, more methodologically rigorous analyses need to be conducted.

The short time frame from when means-testing was implemented for CVRP (March/November 2016) does not lend itself to comprehensive analysis of the program's long-term impacts. However, the short-run impacts of these policies can be a bellwether for policymakers on how effective the program may be in the long run, and thus analyses can and should be done.

A notable gap in the literature is an analysis of the costs of an income cap, either a hypothetical or implemented one. Costs are driven by the possibility of lowering the total amount of ZEVs purchased (not rebated) due to the possible deterrence of purchases by high-income households. This concern is somewhat ameliorated by

research, mentioned above, that finds rebates to be of little importance to high-income individuals. Because that research is based on information surveyed from ZEV purchasers, it likely does not give a full picture of the market. For example, there could be a large portion of high-income consumers who would only purchase a ZEV with a rebate but have not yet been informed of ZEVs or their benefits. Future research needs to estimate the number of high-income consumers who would have, once informed, been induced to purchase with an incentive.

Exploring these questions is essential given preliminary estimates that lowering the income cap to exclude households earning more than $150,000 annually would make it more difficult to realize California's ZEV deployment goals. Whether lowering the income gap is good policy hence depends in part on whether the money saved from reducing rebate availability could be used more effectively to support ZEV deployment in other ways.

Several of the research questions posed above could be examined through difference-in-differences studies focused on the time period before and after means testing for the CVRP was implemented. Carrying out such a study would require an appropriate control/counterfactual. This would likely be difficult at the state level. It may be easier to conduct such studies on different areas of California that have larger or smaller low-income populations, but are similar on other characteristics. One shortcoming of this approach is that it would have limited ability to parse the relative effects of adding an income cap for ZEV rebates and of increasing rebates for low-income individuals, since these two methods of means testing were implemented for the CVRP simultaneously.

Another approach would be a regression discontinuity study design that looks at similar individuals who just barely fall on either side of the income cap cutoff. Such a design has high data requirements and has so far proven challenging. Researchers should looking to other branches of economics for alternative study designs that may be valuable when it comes to informing future changes to the CVRP.

9 Bibliography

Borenstein, Severin, and Lucas W. & Davis. "The Distributional Effects of US Clean Energy Tax Credits." Tax Policy and the Economy 30, no. 1 (2016): 191–234.

Chandra, Ambarish, Sumeet Gulati, and Milind Kandlikar. "Green Drivers or Free Riders? An Analysis of Tax Rebates for Hybrid Vehicles." Journal of Environmental Economics and Management 60, no. 2 (2010): 78–93.

DeShazo, J.R. "Improving Incentives for Clean Vehicle Purchases in the United States: Challenges and Opportunities." Review of Environmental Economics and Policy 10, no. 1 (2016): 149–165.

DeShazo, J.R., Tamara L. Sheldon, and Richard T. Carson. "Designing Policy Incentives for Cleaner Technologies: Lessons from California's Plug-in Electric Vehicle Rebate Program." Journal of Environmental Economics and Management 84 (2017): 18–43.

Diamond, David. "The Impact of Government Incentives for Hybrid-Electric Vehicles: Evidence from US States." Energy Policy 37, no. 3 (2009): 972–983.

Hardman, Scott, and Gil Tal. "Exploring the Decision to Adopt a High-End Battery Electric Vehicle: Role of Financial and Nonfinancial Motivations." Transportation Research Record: Journal of the Transportation Research Board 2572 (2016): 20–27.

Helveston, John Paul, Yimin Liu, Elea McDonnell Feit, Erica Fuchs, Erica Klampfl, and Jeremy J. Michalek. "Will Subsidies Drive Electric Vehicle Adoption? Measuring Consumer Preferences in the US and China." Transportation Research Part A: Policy and Practice 73 (2015): 96–112.

Lee, Jae Hyun, Scott J. Hardman, and Gil Tal. "Investigating the Buyers of Electric Vehicles in California: Are We Moving Beyond Early Adopters?" Transportation Research Board No. 19-05163 (2019).

Rubin, Dana, and Evelyne St-Louis. "Evaluating the Economic and Social Implications of Participation in Clean Vehicle Rebate Programs: Who's In, Who's Out?" Transportation Research Record: Journal of the Transportation

Research Board 2598 (2016): 67–74.

Skerlos, Steven J., and James J. Winebrake. "Targeting Plug-in Hybrid Electric Vehicle Policies to Increase Social Benefits." Energy Policy 38, no. 2 (2010): 705–708.

Turrentine, Tom, Scott Hardman, and Dahlia Garas. "Steering the Electric Vehicle Transition to Sustainability." National Center for Sustainable Transportation 2018.

Williams, Brett. "CVRP: Data and Analysis Update." California Clean Vehicle Rebate Project (2018).

Williams, Brett, and John Anderson. "Strategically Targeting Plug-in Electric Vehicle Rebates and Outreach Using Characteristics of Rebate-Essential' Consumers in 2016–2017." International Electric Vehicles Symposium (2018).

Williams, Brett, and Colin Santulli. "CVRP Income Cap Analysis: Informing Policy Discussions." California Clean Vehicle Rebate Project (2018).