35th International Electric Vehicle Symposium and Exhibition (EVS35)
Oslo, Norway, June 11-15, 2022

Lessons Learned from COVID-19 Impact on California's Transportation Market

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Summary

The effects of the COVID-19 are still being realized two years since lockdown measures were enacted in the California (CA). The lockdowns changed driving patterns as greater number of individuals started working remotely. Shifts in personal and shared transportation behaviors combined with significantly decreased automotive sales (due to economic downturn) to disrupt the status quo in how people moved. Preliminary data shows that some of these behavorial adaptations are likely to be permanent. Analyzing the shifts in individuals' behaviors and attitudes towards transportation during COVID-19 provides an opportunity to understand long-term implications on programs focused on electrifying transportation.

Keywords: transportation network, ZEV (zero emission vehicle), EV (electric vehicle) resilience, incentive

1. Introduction

COVID-19 caused economic stress among the zero-emission vehicle (ZEV) industry; however, while the Clean Vehicle Rebate Project (CVRP) applicants were reduced during the height of COVID-19 and sales slowed, as time went on, CVRP applications recovered, revealing resilience within CVRP and the industry. Several analyses were conducted throughout the pandemic period, defined as March 1, 2020, to June 15, 2021. Applicant and survey data of the CVRP were analyzed for behaviors among the general population, the low-to-moderate (LMI) population and priority populations. Priority populations are defined by California Climate Investments (CCI) as those that are economically disadvantaged, exposed to multiple sources of pollution or are especially vulnerable to the effects of pollution and a changing climate. A survey of Californians was conducted to understand purchasing and travel preferences during the pandemic.

1.1. California's Zero Emission Vehicle (ZEV) Market

California has a goal of 5 million ZEVs sold in the state by 2035. California's Clean Vehicle Rebate Project (CVRP) encourages and accelerates ZEV adoption by providing standard and increased rebates to California residents who purchase or lease qualifying ZEV [2]. The CVRP Increased Rebate provides an additional rebate incentive to CVRP participants of low-to-moderate income (LMI) status [3]. More than 419,000 CVRP rebates have been distributed since the first application in 2010 [4]. CVRP rebate statistics provide useful insight into demographic characteristics, vehicle preferences and incentive awareness of ZEV New Vehicle Buyers (CVRP participants) in CA.

1.2. COVID-19 Survey - Behavior and Attitudes Towards Transportation During COVID-19

CSE designed and executed a survey of licensed drivers in California to understand how the swift expansion of remote work and health concerns about the use of public transportation has influenced consumers' views towards transportation options and ZEV. Consumers were asked about their interactions with transportation, vehicle purchasing and environmental concerns commencing with the State's Executive Order declaring a statewide emergency that set forth travel and other restrictions. The survey collected 2,330 responses.

2. Methodology and Analysis

Several analyses were conducted keeping in mind the COVID-19 impact on ZEV new car buyer market in California. This included understanding trends in CVRP applicants before and since COVID-19 pandemic, comparing demographic composition changes in CVRP, assessing priority population participation in CVRP to find out if the demographic composition of the group has similar participation trends as other participants in CVRP since COVID-19. General licensed driver population behavior towards personal and public transportation.

2.1. ZEV New Car Buyer Market Segmentation Before and During COVID-19

The goal of this study is to examine rebate patterns of CVRP applicants who applied as an individual before and during the COVID-19 pandemic. The analysis was conducted by disaggregating the rebate data in multiple ways including agreement type (purchase versus lease), pricing categories and rebate type.

Assumptions used in this analysis include the following:

- The start date for the analysis is November 1, 2016. This was selected because the program changed two eligibility requirements. First, applicants who had gross annual incomes less than or equal to 300 percent of the federal poverty level (FPL) were eligible to receive an additional $2,000. Second, applicants with gross annual incomes above certain thresholds (based on IRS filing status) were no longer eligible for the program.
- Before COVID dates were defined as November 1, 2016, to February 29, 2020. During COVID dates were defined as March 1, 2020, to June 15, 2021.
- Incomplete records were marked as missing data and removed from sections of analysis.
- All dates were based on rebate application received date because eligibility for the programs and various changes in the program all refer to this date rather than the date the vehicle was attained.

2.1.1. Rebate Count Grouped by Vehicle Price: Before vs During COVID-19

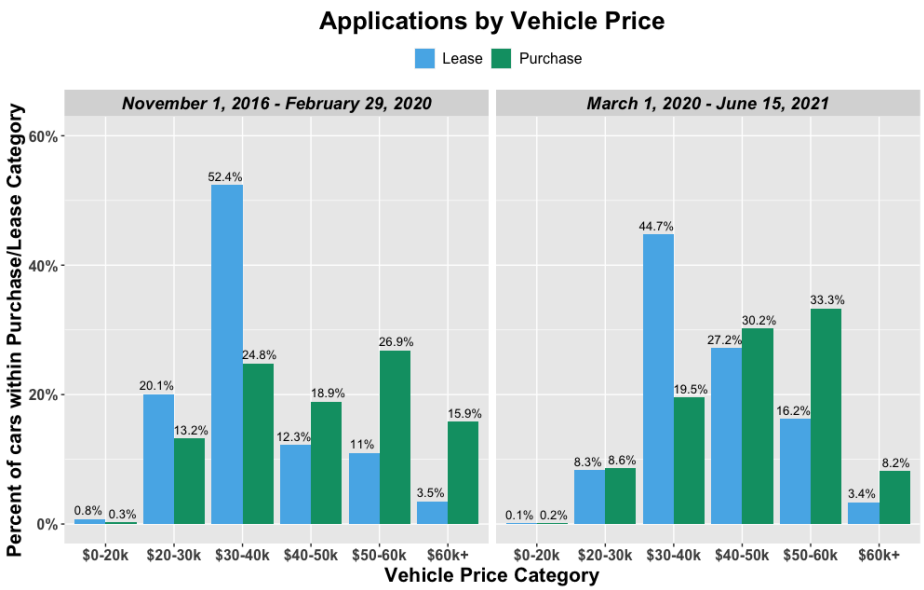

Figure 1. Applications by Vehicle Price. This figure illustrates the price points for vehicle rebate applications prior to and during COVID disaggregated by purchase and lease categories.

Prior to the pandemic, over half (52.4%) of all lease rebates were for vehicles priced between $30,000-$40,000. During the pandemic, leased vehicles in the $30,000-$40,000 range continued to be the most dominant segment, although this percentage fell from 52.4% to 44.7% of all lease rebates during COVID. A second noticeable decrease occurred in leased vehicle rebates at the lower price point of $20,000–$30,000 falling from 20.1% to only 8.3% during COVID. These decreases were accompanied by a 14.9 percentage point increase to those who leased vehicles in the $40,000–$50,000 range and a 5.2 percentage point increase in vehicles leased at the $50,000–$60,000 level (See Figure 1).

The price segment garnering the highest share of purchase rebates both before and during the pandemic comprised vehicles costing between $50,000 and $60,000. The largest increases in percentage of purchase rebates during COVID were seen in the $40,000–$50,000 range (gaining 11.3 percentage point during COVID) and in the $50,000-$60,000 range (gaining 6.4 percentage points in that higher-end market). It is important to note that the drop in high-end vehicle rebates (from 15.9% to 8.2% of buyers during COVID) coincides with a change in the CVRP rebate guidelines that excluded vehicles with a base MSRP priced over $60,000 after December 3, 2019. Therefore, this analysis does not clarify whether the decline may have been due to COVID, or the cap, or both (See Figure 1)

2.1.2. Rebate Count Grouped by Vehicle Lease vs Purchase Price: Before vs During COVID-19

Figures 2 and 3 also examines rebate trends for buyers and lessees but drills down to a yearly scale. This analysis highlights the year-to-year decrease in rebates for vehicles either leased or purchased under $40,000. This decrease, which occurred between November of 2016 and December of 2020, was gradual for lessees but more dramatic for buyers beginning in 2018 (See Figures 3-4).

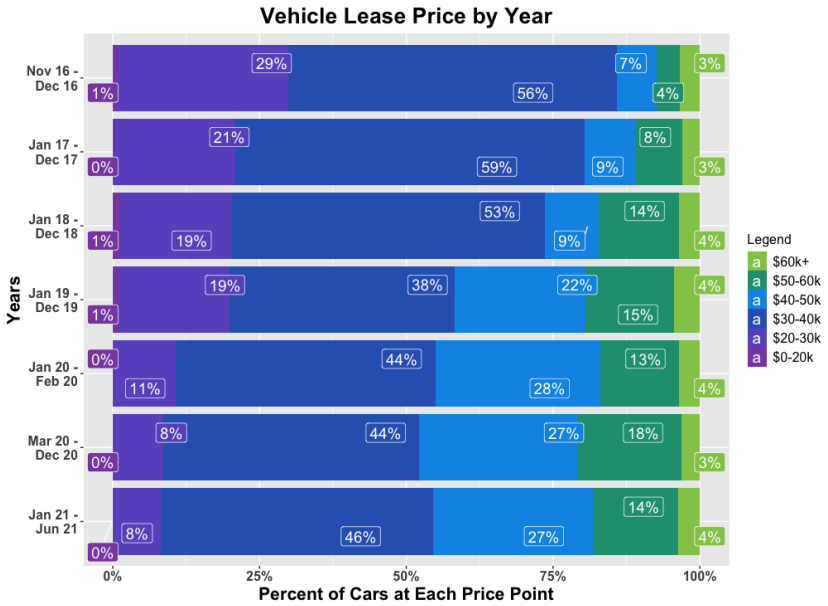

Figure 2. Vehicle Lease Price by Year. This figure illustrates the price points for leased vehicle rebates by year.

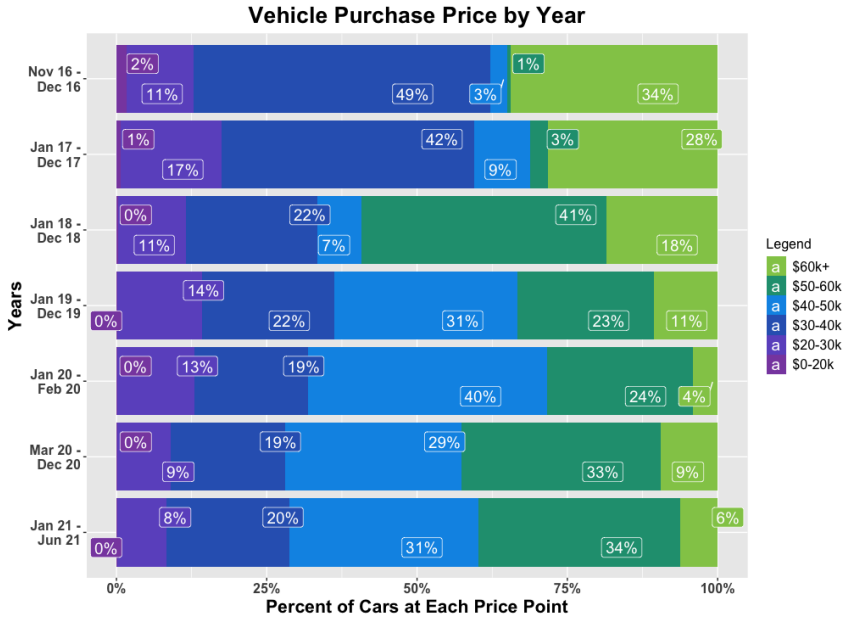

Figure 3. Vehicle Purchase Price by Year. This figure illustrates the price points for purchased vehicle rebates by year.

One take-away from this analysis is that from 2019 onward, $40,000 seems to be a critical price point: Over 50% of all *lease* rebates were associated with vehicles costing less than $40,000 while over 50% of all *purchase* rebates were associated with vehicles costing more than $40,000 (See Figures 2-3).

2.1.3. Rebate Count Grouped by Rebate Types

Both before and during COVID, recipients of the increased rebate purchased or leased the largest percentage of vehicles falling in the price range of $30,000–$40,000. Prior to COVID, the second most frequent price category for increased rebates comprised vehicles priced between $20,000–

$30,000 (23% of all increased rebates). However, during COVID the second highest percentage shifted up to the $40,000–$50,000 range (27% of all rebates) (See Figure 5).

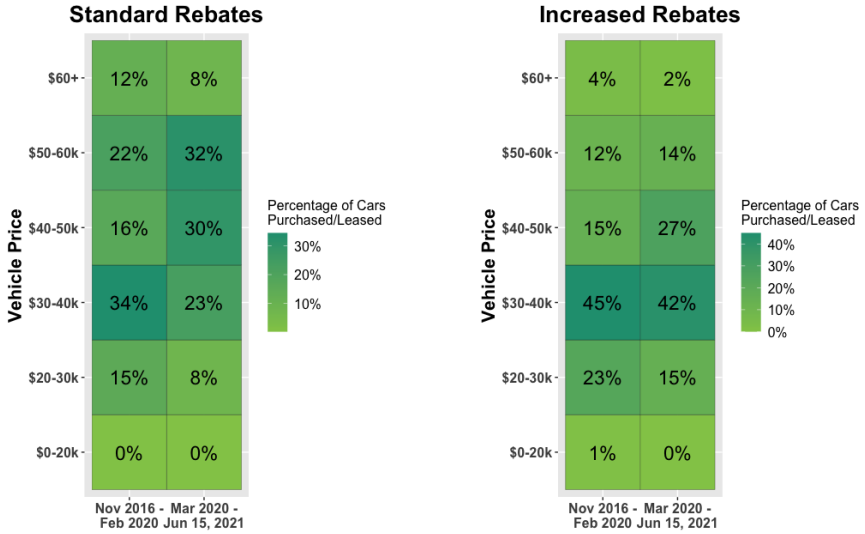

Figure 4. Standard versus Increased Rebate Volume by Price Category. Figure illustrates price points for vehicle rebates before and during COVID grouped by rebate type.

2.2. ZEV New Car Buyers Composition Changes During COVID-19

The purpose of the study was to understand the effect of COVID-19 on the demographic composition changes of ZEV New Vehicle Buyers. The analysis shows monthly CVRP applications by market segment. The market is segmented by Tesla and Non-Tesla vehicle share to highlight potential differences between Tesla and Non-Tesla buyers. Although overall CVRP applications decreased by 43% in 2020 we see there was a sustained recovery starting in September 2020 (See Figure 5)

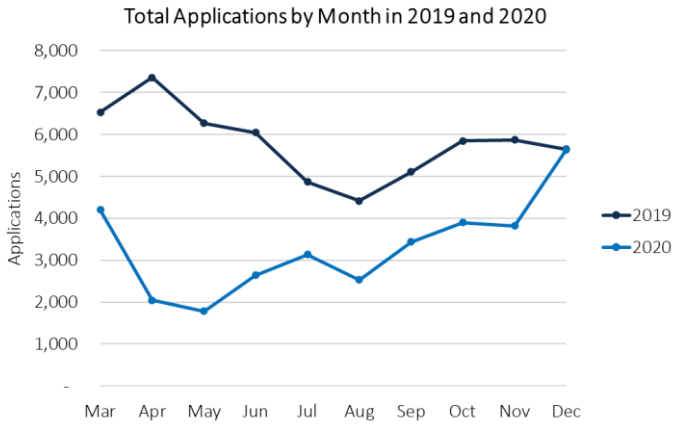

Figure 5. Total CVRP applications in 2019 and 2020

The applications demographics were segmented by income, race, age, county, vehicle category and Vehicle Make. Figures and tables below give a high-level summary of the results. Figure 6 shows the percent share of applications within less than $150,000 household income group increased for both Tesla and non-Tesla vehicles during COVID-19.

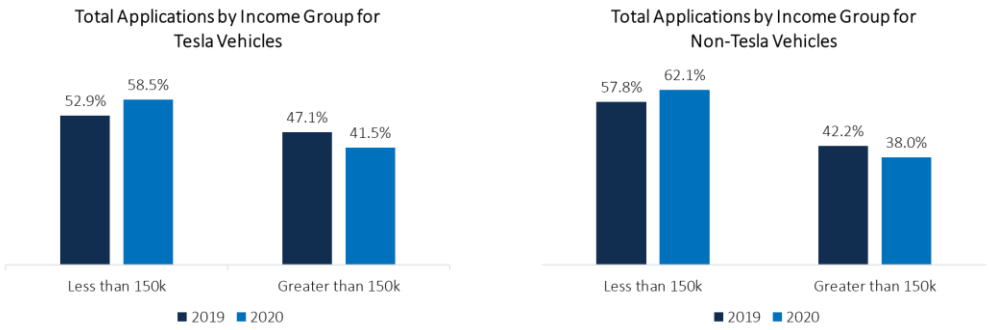

Figure 6. Total CVRP applications by income group in 2019 and 2020

Figure 7 shows that female applicants increased for both groups during CVOID-19. Figure 8 shows that percentage share of South Asian and East Asian applicants slightly decreased during COVID-19. Figure 9 shows percentage share of Tesla applications for 21-29 age group increased by 2.3% whereas for non-Tesla applications increased by only 0.3%.

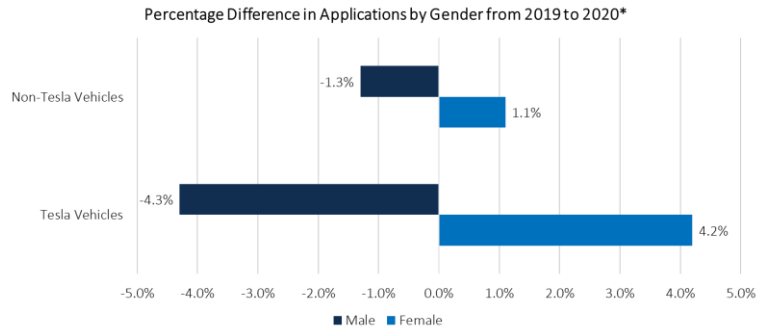

Figure 7. Percent difference in CVRP applications by gender from 2019 in 2020

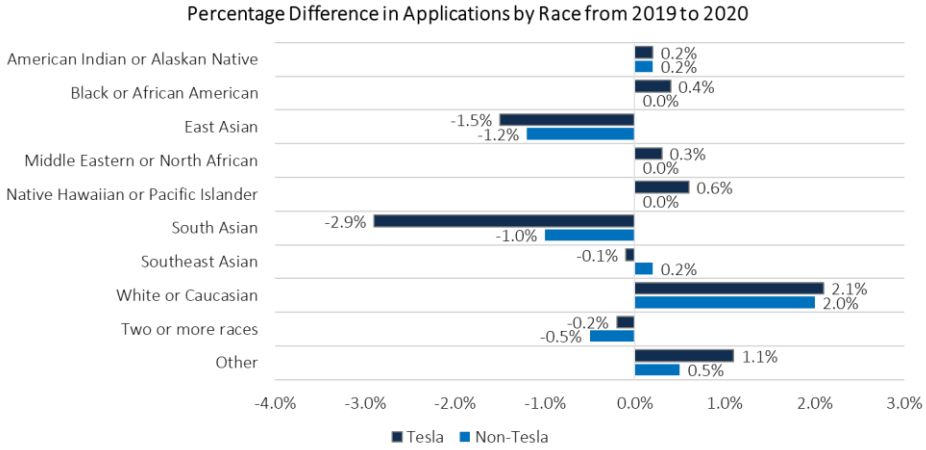

Figure 8. Percent difference in CVRP applications by race type from 2019 in 2020

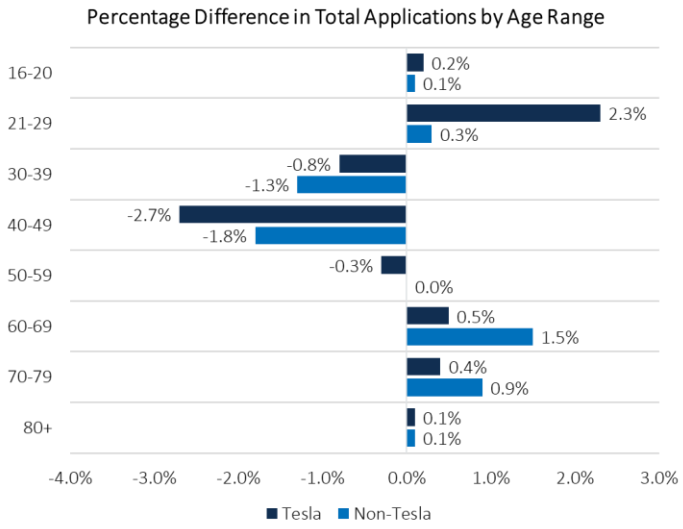

Figure 9. Percent difference in CVRP applications by age from 2019 in 2020

Table 1 shows top 5 counties that have had highest percentage of applications increase since 2020. Los Angeles had the highest increase of 1.5% in percent share of CVRP applications during COVID-19.

Table1: Percent share difference in applications from 2019

County	Vehicle Share Difference from 2019
Los Angeles	1.5%
Riverside	0.4%
San Joaquin	0.3%
San Bernardino	0.3%
Contra Costa	0.2%

Figure 10 shows PHEV applications decreased by 9% whereas Tesla applications increased by 12.6%. The increase in Tesla applications was due to Tesla Model Y sales starting in June 2020 (See Figure 11)

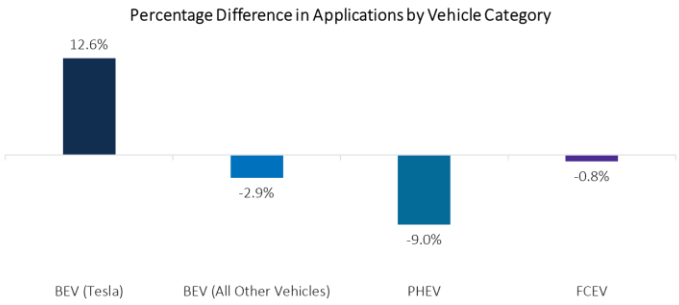

Figure 10. Percent Difference of applications by Vehicle Category in 2020

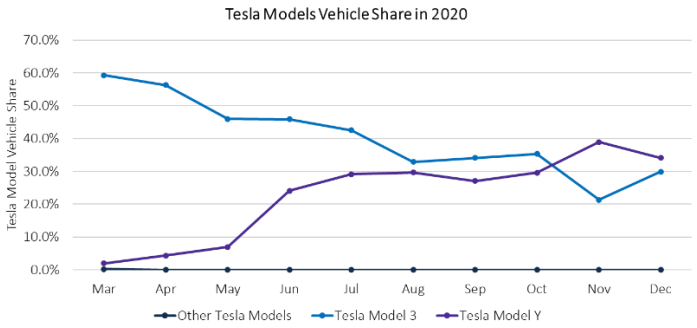

Figure 11: Tesla Models Vehicle Share in CVRP applications in 2020

2.3. ZEV New Car Buyer Priority Population Participation During COVID-19

38.2% of CVRP rebates were used by the priority population during COVID-19. Priority populations are defined by California Climate Investments (CCI) as those that are economically disadvantaged, exposed to multiple sources of pollution, or are especially vulnerable to the effects of pollution and a changing climate. The study was conducted to understand trends and behaviors observed of priority ZEV New Car Buyer before and during COVID-19.

The percentage of CVRP applicants belonging to at least one priority population, denoted in Figure 1 as Priority Applicants, increased in relative year-over-year comparisons and overall monthly applications for January, February, March, and April 2020 (Figure 12). It is interesting to note a positive increase for both YOY and total applications observed in April and March of 2020, even though COVID-19 began in March. This group made up 38.2% of total CVRP applications during COVID.

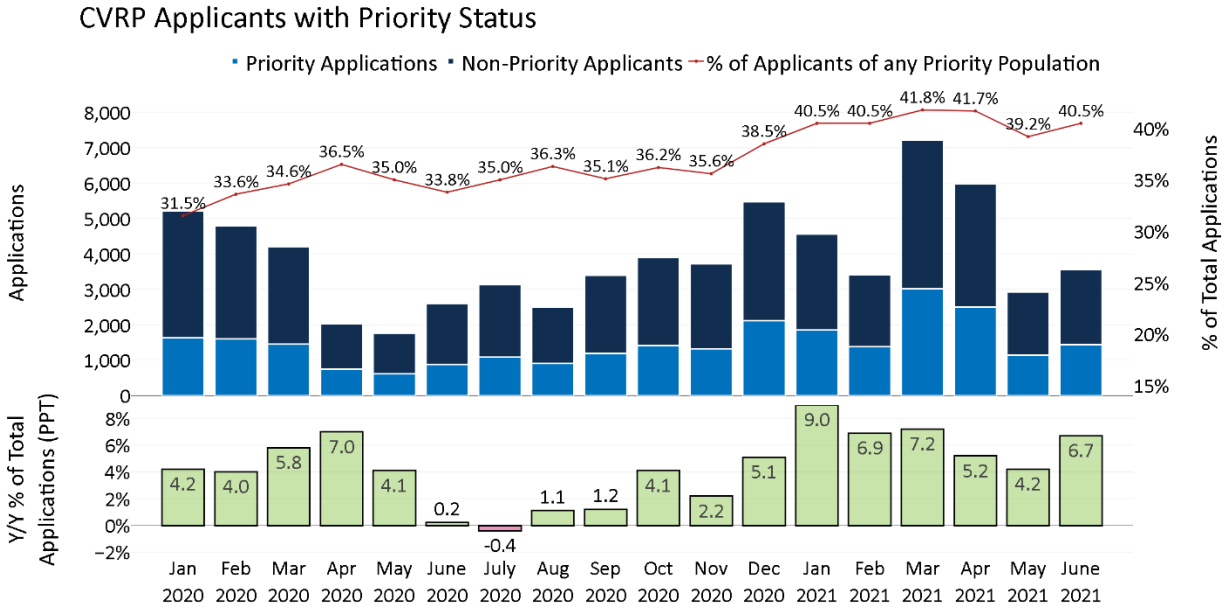

Figure 12: CVRP applicant total, percentage of priority CVRP applications and priority application rate year-over-year comparisons by month.

YOY comparisons for priority applicants began to decrease in May 2020, and we see the lowest YOY comparisons observed for this period from June-November 2020. Only one month yielded a negative YOY comparison to 2019, and this was in July with a rate of -0.4 percentage points (PPT). There is a notable increase from 5.1 PPT in December 2020 to 9.0 PPT in January 2021. Between January 2021 and May 2021, we see a general decrease for YOY comparisons, but the rates are still higher overall than those observed for the same months in 2020. June 2021 ends with a YOY rate of 6.7 PPT for priority applicants.

The lowest CVRP participation rates observed for priority applicants in 2020 are observed in January and February, at 31.5% and 33.6%. This rate increased to 36.5% in April 2020, then hovered between 34% and 36% for May through November 2020. In December 2020, a jump of 2.9% brought the total monthly participation of priority applicants in CVRP up to 38.5%. The observed rate continued to increase to the highest observed in March 2021, at 41.8%. By June 2021, the priority application rate was 40.5%. The largest drop observed was -2.5% from April to May of 2021. The largest increase observed was 2.9% from November to December of 2020.

2.4. Behavioral Changes of Licensed Drivers in CA During COVID-19

The purpose of the study was to understand how licensed drivers in CA were impacted by COVID-19 due to remote work, travel restrictions, limited public and personal transportation and its effect on commute and travel and future vehicle considerations. The study differentiated between individuals who are under 400% of the Federal Poverty Line (LMI) and those above (non-LMI) to understand how different income levels were influenced by the COVID-19.

2.4.1. Commute and Travel

Increase in personal vehicle use is similarly reflected to the decrease in the use of public transportation (See Figure 13)

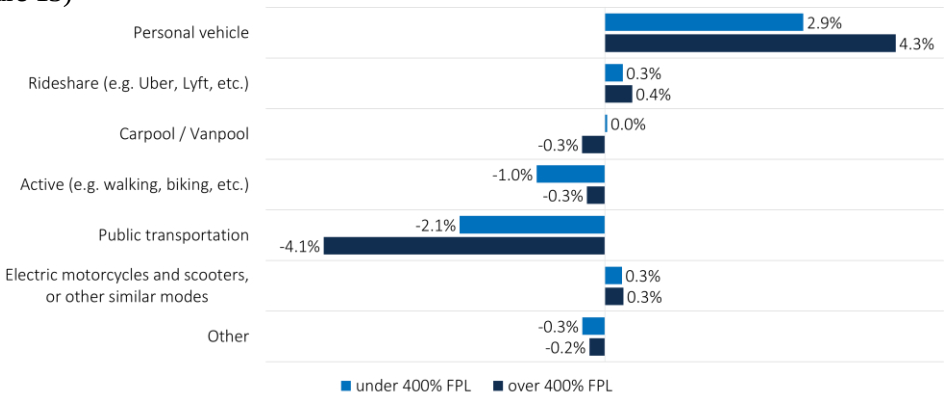

Figure 13: Commuting changes during COVID-19

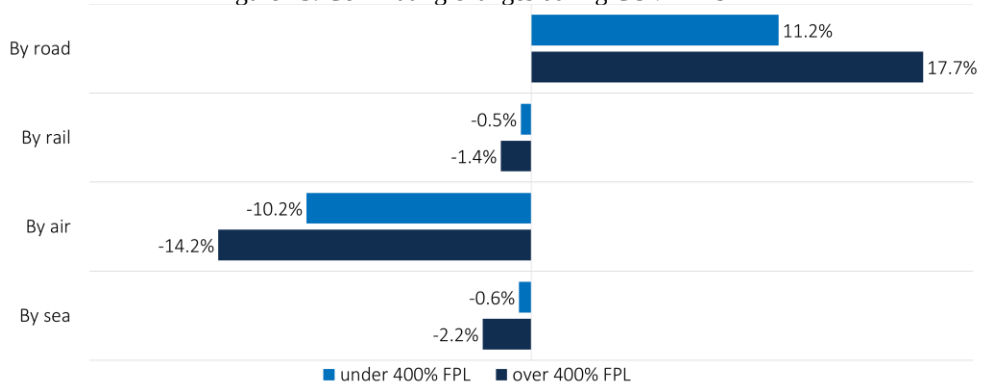

Figure 14: Preferred modes of long-distance trips during COVID-19

Although there has been an increase in preference of road travel and a decrease in preference in air travel (Figure 14), number of miles driven by road for a commute since the start of the pandemic decreased for all economic groups (Figure 15)

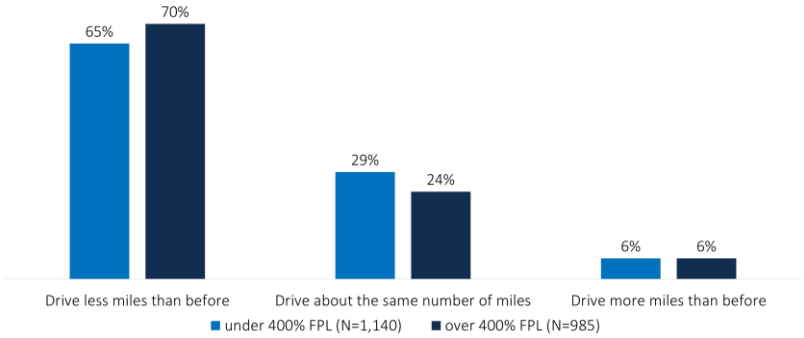

Figure 15: Commuting changes during COVID-19

2.4.2. Future Vehicle Preferences

PHEV is still the vehicle category that is preferred over BEV for both LMI and non-LMI groups. (Figure 16). Of the group of respondents who had plans to purchase or lease a vehicle, 66% of respondents decided to delay their vehicle purchase. Of those that decided to delay their purchase, 56% of LMI group plan to acquire a less expensive vehicle compared to 38% of non-LMI groups.

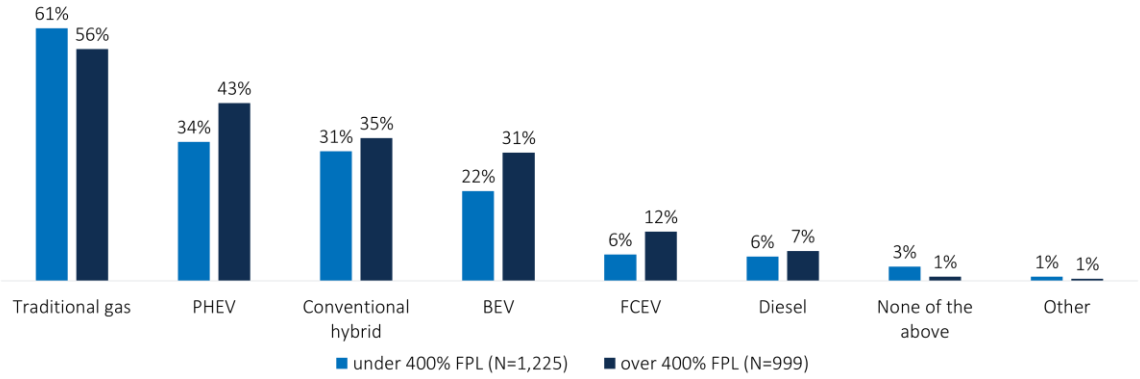

Figure 16: Vehicle fuel type consideration for next vehicle

For non-BEV owner respondents who are considering purchasing a vehicle, majority of LMI population within this group said they were not going to consider BEV as their next vehicle purchase whereas non-LMI population of respondents said they were more likely to consider a BEV. (See Figure 17)

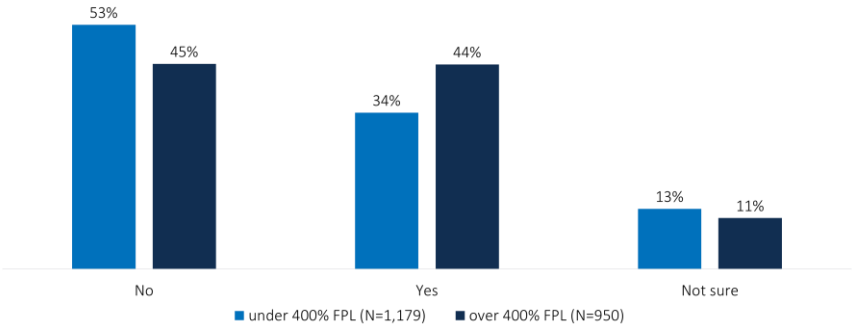

Figure 17: BEV consideration for next vehicle (non-BEV owners)

47% of LMI respondents in the survey consider current BEV options unaffordable. (See Figure 18)

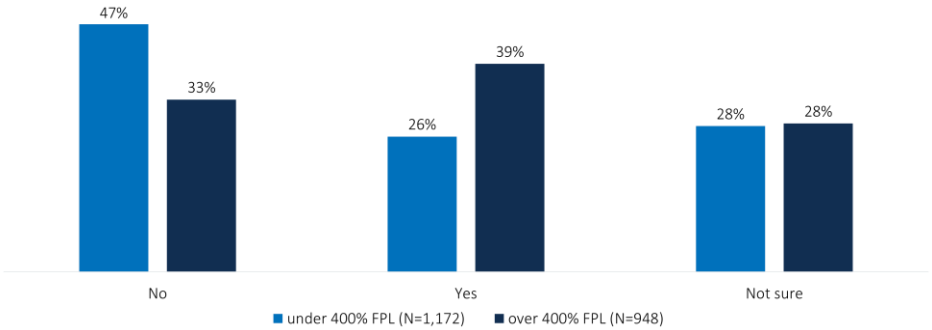

Figure 18: Current BEV options affordability (non-BEV owners)

3. Key Findings

Error! Reference source not found.This analysis identified CVRP behaviors before and during COVID-19 and found that among CVRP applicants, purchases as opposed to leases increased in popularity. During COVID-19, while the number of applicants fluctuated, the average price of the vehicle rebated remained between $44,000 and $45,000.

3.1. ZEV New Car Buyers Composition Changes During COVID-19

This analysis found a 43% decrease in total CVRP applications during COVID-19. However, most demographics saw little or no change in their share of applications, suggesting that while the total volume of applications decreased, there was no significant change in who was buying EVs.

3.2. ZEV New Car Buyer Priority Population Participation During COVID-19

Applications among priority populations[1] initially decreased during the onset of COVID-19, but year-over-year comparisons showed that applications ultimately increased during the COVID-19 period. The negative economic impacts to the groups examined in this report may be offset by programmatic policies focused on increasing their participation.

3.3. Behavioral Changes of Licensed Drivers in CA During COVID-19

Survey participants reported that COVID-19 reduced their travel in general, commuting to work and air travel. Approximately 29% of participants also reported that COVID-19 affected their vehicle purchases. Of this group, about two thirds delayed their purchase. This contributed to the decrease in sales in 2020 as well as pent up demand and the early 2021 sales surge.

4. Conclusion

Common among the analyses studied are findings that show an initial impact to trends at the onset of COVID-19 followed by a recovery or increase in participation in around Q1 2021. CVRP participation demonstrated resilience during this time, likely due to policy consistency and consumer choice as well as consumer demand. For example, consumers maintained the need to use rebates in order to purchase or lease ZEVs and increased their interest in using personal vehicles above other forms of transportation. Interest in leasing also helped, indicating that consumer choice within policies is ideal for maintaining resilience. Lessons can be learned for

future economic uncertainty: maintain consistency, offer choice, and make sure the needs of customers are being met.

Acknowledgements

Anjelica Thang, Ben MacNeille, Jamie Orose, Janet Bowers, Madelyn Stafford and Regina McCormack

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