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Driving A-loan: Automobile debt, neighborhood race, and the COVID-19 pandemic

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ABSTRACT

COVID-19 altered travel patterns in the U.S. Studies have analyzed the effect of the pandemic on travel mode, including working from home, but few have focused on automobile ownership—a relationship with potentially long-term consequences for accessibility, household budgets and debt, and policy efforts to meet climate goals.

To understand the association between the pandemic and automobile ownership, we rely on a unique credit panel dataset from Experian and examine three different automobile loan-related outcome measures: annualized growth rate of new automobile loan balances, average new loan size, and the number of new loans. We focus specifically on changes across loans in neighborhoods by race/ethnicity, hypothesizing larger increases in automobile debt in Black and Latino/a neighborhoods, where workers are less likely to be able to telework. The annualized growth rate of new automobile loans increased during the pandemic across all neighborhoods by race/ethnicity, increasing most rapidly in Latino/a neighborhoods. Controlling for other factors, loan *size* increased similarly across neighborhoods by race/ethnicity. The increase in automobile lending in Latino/a neighborhoods, therefore, likely was explained by a significant uptick in the *number* of new loans.

The growth in automobile lending during the pandemic was potentially prompted by pandemic-induced changes in the need for automobiles and facilitated by an expanded social safety net. As the pandemic and its various forms of public financial assistance recede, the findings underscore the importance of ongoing assistance in enabling automobile ownership or shared access among households with limited means whose livelihoods depend on the access that vehicles provide.

1. Introduction

The Coronavirus Disease 2019 (COVID-19) crisis elevated the importance of private vehicles. Concerns about the transmission of the virus kept many former transit riders away from buses and trains (Hu and Chen, 2021; Parker et al., 2021). At the same time, despite stay-at-home orders early in the pandemic, many workers employed in essential occupations that required their physical presence continued to work in person. Numerous studies have analyzed the effect of the pandemic on travel mode; however, very few have focused on automobile ownership—a relationship with potentially long-term consequences for accessibility to opportunities, household budgets and debt, and policy efforts to meet climate goals.

In this study, we examine whether the pandemic was associated with an increase in automobile borrowing in California—particularly in non-white neighborhoods where workers were more likely to travel outside of the home for work—as a proxy for automobile purchasing and ownership. We use a unique credit panel dataset to examine annualized growth rate of new automobile loan balances by neighborhood race/ethnicity leading up to and during the COVID-19 pandemic. To help explain these patterns, we then analyze change over time in both average loan size and number of new loans.

We find that, after falling in early 2020, the annualized growth rate for new loans increased dramatically from the second quarter (April–June) to the third quarter (July–September) of 2020 across all neighborhoods by race/ethnicity. The growth rate was larger in Latino/a neighborhoods than in other neighborhoods. A model of the determinants of the inflation-adjusted size of new loans shows that loan

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size increased for borrowers across all neighborhoods by race/ethnicity, with no added influence in Latino/a neighborhoods. The data suggest that the high growth rate in Latino/a neighborhoods was due to the increase in the number of new automobile loans rather than in their size.

The high growth rate of automobile loans during the pandemic was potentially prompted by pandemic-induced changes in the need for automobiles and facilitated by an expanded social safety net. However, household savings declined significantly from early 2021 to June 2022 and remained lower than pre-pandemic rates through January 2023 (Chien et al., 2021), underscoring the importance of ongoing assistance in enabling automobile ownership among households with limited means whose livelihoods depend on the access that vehicles provide.

2. Automobile loans and lending

Historically, automobiles have played important roles during periods of crisis. For example, during Hurricane Katrina, households with access to automobiles were able to safely evacuate, while those without cars were largely dependent on limited emergency public transportation and were the group most likely to be left behind (Berube et al., 2006; Bullard et al., 2009). Automobiles also played an important role in enabling access to essential destinations during the COVID-19 pandemic. While most U.S. households own at least one automobile, automobile ownership rates vary significantly across racial and ethnic groups (Blumenberg et al., 2021), suggesting racial and ethnic variation in the demand for vehicles during the pandemic.

In U.S. metropolitan areas and most neighborhoods within them, automobiles provide substantially greater access to opportunities within a reasonable travel time than other modes (Murphy and Owen, 2019; Shen, 2001). Most metropolitan areas grew alongside the automobile, resulting in neighborhoods of relatively low density best suited to private vehicle travel (Jackson, 1987). Automobiles confer additional benefits such as convenience in scheduling and routing (particularly for travelers with complicated trip patterns), personal safety in neighborhoods where walking to and waiting at transit stops is unsafe or perceived to be so, and protection from inclement weather. The many advantages of automobiles help to explain why vehicle ownership rates are so high. As of 2019, more than 91 percent of all U.S. households had at least one automobile (Ruggles et al., 2021).

In general, non-Hispanic white households have higher automobile ownership rates (94%) than Hispanic (90%), Asian (89%) and Black (82%) households (Ruggles et al., 2021). Non-white households also have fewer vehicles per adult, suggesting that some household drivers may have only limited access to a household vehicle (Blumenberg et al., 2018). Potential explanations for racial differences in automobile ownership largely center on household income and residential location (Raphael et al., 2001). On average, Black and Hispanic households have lower incomes than non-Hispanic white households (Ruggles et al., 2021) and, therefore, may have difficulty managing the costs associated with automobile ownership. Households needing to finance their vehicle purchases also may be hindered by inflated prices due to predatory lending practices that result in higher-cost loans for non-white and female borrowers (Cohen, 2012; Cross et al., 2019; Rice and Schwartz, 2018; Van Alst, 2019; Van Alst et al., 2017). Finally, housing discrimination has limited the residential location of non-white families and resulted in significant segregation (Menendian et al., 2021). Compared to higher-income white households, non-white households are more likely to live in—and if they do not have a car, to move to—dense urban areas where they can access destinations by public transit (Glaeser et al., 2008; Massey and Tannen, 2018).

Over time, automobile ownership rates have increased among almost all population groups (Ruggles et al., 2021). However, households are less likely to purchase vehicles during economic recessions (Amromin and McGranahan, 2015; Johnson et al., 2014; Meisenzahl, 2017; Thakuriah and Keita, 2014). Consumers respond to periods of economic uncertainty by delaying the purchase of large consumer goods, such as automobiles, due to declining current and/or expected future income (Attanasio et al., 2020; Dupor et al., 2020; Haughwout et al., 2019). Other factors contribute to the decrease in automobile purchases during recessions, including declining home values that reduce home equity and household net worth (Dupor et al., 2020; McCully et al., 2019), reduced supplies of credit (Benmelech et al., 2017; Johnson et al., 2014; Meisenzahl, 2017), and increased oil prices (Dupor et al., 2020).

During the Great Recession (2007–2009), for example, vehicle purchases declined by more than 20 percent and automobile loan originations fell by a third (Johnson et al., 2014). Many lower-income households obtain vehicles without financing through friends and family, other individual sellers, or other means (e.g., repair shops and auctions) (Klein et al., 2022; Pierce et al., 2019). However, for some households, loans enable automobile purchases by distributing the upfront costs across numerous years. Amromin and McGranahan (2015) examined automobile credit trends by neighborhood income in the quarters leading up to, during, and after the Great Recession. They too conclude that the business cycle largely explains vehicle lending patterns. However, compared to the highest-income ZIP codes, automobile credit in the lowest-income neighborhoods grew faster during economic expansions and contracted more significantly during economic recessions (Amromin and McGranahan, 2015).

The COVID-19 pandemic put a stop to years of economic growth coming out of the Great Recession. Early in the pandemic, stay-at-home orders, job losses, and business closures resulted in a significant economic downturn. Gross domestic product dropped in two consecutive quarters in 2020 (January–March and April–June), with the second quarter of 2020 experiencing the steepest quarterly decline on record (−9.1%) (Bauer et al., 2020). The repercussions of the pandemic fell disproportionately on people of color, young adults, women, parents of young children, and low-income workers—who were more likely to have contracted the virus, to have lost their jobs, and to have been without necessary services (e.g., health care and child care) (Office of Human Services Policy, 2021).

Like the Great Recession, the COVID-19 pandemic led to substantial changes in consumer spending, including spending on automobiles. In the early days of the pandemic, automobile dealers closed due to stay-at-home orders, making it difficult for consumers to test-drive and purchase vehicles (Wayland, 2020). Additionally, a shortage of computer chips greatly reduced the supply of new automobiles and resulted in significant price increases, particularly for used vehicles (Boudette, 2021), the vehicle type favored by lower-income households (Federal Reserve, 2016). The price of vehicles increased—1.4 percent for new vehicles and 8.4 percent for used vehicles from the first quarter of 2019 to the first quarter of 2021; these prices continued to rise well into 2022 (Fig. 1) (Bureau of Labor Statistics, 2022a, 2022b). Automobile loan originations declined in March and April 2020, immediately followed by a rebound in May and June; the decline was more substantial and persistent among subprime than prime borrowers (Canals-Cerda and Lee, 2022).

At the same time, the pandemic elevated the importance of automobiles. In the early months, cars enabled families to access testing and vaccination sites, many of which were drive-through operations. Although effective, drive-through sites often either required that people have a vehicle or that they forgo social distancing to carpool with others (Evans et al., 2022; Blumenberg and Brozen, 2020). Additionally, COVID-19 transmission fears shifted many transit riders off of buses and trains (Hu and Chen, 2021; Parker et al., 2021) and increased households' interest in both acquiring and using vehicles (Basu and Ferreira, 2021; Palm et al., 2024; Soza-Parra et al., 2023).

The effect of the COVID-19 crisis on automobile ownership and automobile debt likely varied by race/ethnicity. More than 70 percent of white and Asian transit commuters owned at least one automobile (Ruggles et al., 2021) and, therefore, could easily adjust their travel mode if necessary. In contrast, vehicle ownership among Hispanic and Black transit commuters was far lower: 59 percent and 54 percent

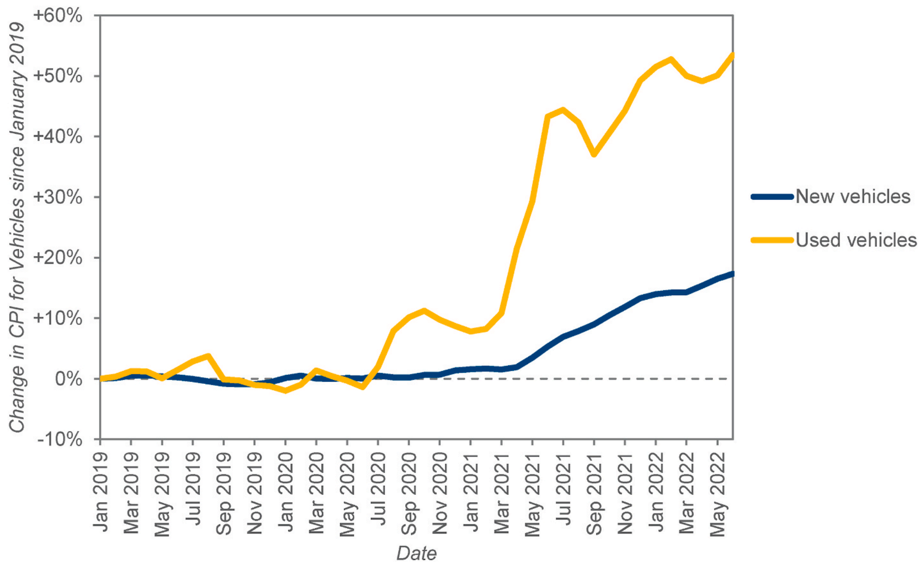

Fig. 1. Line graph of change in Consumer Price Index for vehicles since January 2019 for new and used vehicles, between January 2019 and June 2022.
Data sources: Bureau of Labor Statistics, 2022a, 2022b

respectively. Black and Latino/a adults were more likely than white adults to travel outside of their homes for both work and non-work purposes (Lu and Giuliano, 2023), were less likely than white workers to have jobs that enabled them to work from home (Bureau of Labor Statistics, 2019; Marshall et al., 2021), and were more likely to be essential workers (Blau et al., 2021; Kearney and Munana, 2020). Particularly relevant for these groups, increased demand for cars likely was abetted by federal economic assistance (including stimulus checks and enhanced unemployment insurance payments), which reduced poverty rates (Center on Budget and Policy Priorities, 2022) and potentially enabled some households to purchase vehicles or to avoid defaulting on existing automobile loans. Conversely, workers who were able to work from home may have been less likely to purchase vehicles than they would have otherwise.

3. Methods

As we note previously, numerous studies examine the effect of the pandemic on mode choice, particularly related to declines in transit ridership (Hu and Chen, 2021; Parker et al., 2021). In this study, we analyze whether the pandemic was associated with an increase in automobile borrowing in California, particularly in non-white neighborhoods where workers were more likely to travel outside of the home for work. We use automobile borrowing as a proxy for automobile purchases and ownership. However, it is an imperfect proxy since automobile loan data do not account for all vehicle acquisitions; many people purchase vehicles without financing (both high-income purchasers buying vehicles outright and low-income purchasers unable to obtain credit). Nonetheless, other studies indicate that monthly automobile loan originations are high even among low-income households (Consumer Financial Protection Bureau, 2019; Pierce et al., 2019).

3.1. Data

This study relies on data from a one-percent sample of the University of California Consumer Credit Panel (UC-CCP), a dataset from Experian of every loan and every borrower in California. For this analysis, we draw on 29 quarters of data, from the first quarter of 2014 to the first quarter of 2021. These quarters each include roughly 270,000 active borrowers and 1.4 million open loans, about eight percent of which are automobile loans. For every loan, the data include loan type, initial balance (i.e., the original loan size), and current balance. The data also include the borrowers associated with the loan, some of whom have shared ownership of the asset; to minimize double-counting, we restrict our analysis to the primary borrower. Data on the primary borrowers include age, sex, marital status, education, number of household adults, homeownership status, and VantageScore (a consumer credit rating that ranges from 300 to 850). We restrict our analysis to borrowers less than 100 years old and with vehicle debt.[1] We adjusted all dollar values for inflation to be in terms of real dollars in the first quarter of 2021, based on the Consumer Price Index in California (California Department of Industrial Relations, 2022).

The credit data do not include race or ethnicity identifiers. However, the data for our selected quarters are geocoded to the census tract of the borrower's residential address. We matched UC-CCP data to socioeconomic characteristics of these census tracts from the U.S. Census Bureau's American Community Survey (ACS) 2015–2019 five-year estimates (Ruggles et al., 2021). We draw on these demographic data to explore racial/ethnicity variation in automobile loans, an approach used in a number of studies to examine variation by income (Amromin and McGranahan, 2015; Consumer Financial Protection Bureau, 2019).

3.2. Exploring growth in automobile loan balances, 2014–2021

We begin by examining the annualized growth rates of outstanding balances and new balances for loans from 2014 to 2021, with a focus on growth rates during the COVID-19 pandemic. We use the following formula, shown as Equation (1), to calculate the annualized growth rate:

$$g_m = \left(\left(\frac{X_m}{X_{m-1}} \right)^4 - 1 \right) \times 100 \quad (1)$$

where X_m and X_{m-1} are the values of the total outstanding balance or initial balance for automobile loans in quarters m and $m-1$, respectively; the fourth power reflects the fact that there are four quarters in a year; and g_m is the annualized percent change.

We first compare the growth rates of new automobile loans to all automobile loans. We then examine variation in the annualized growth rate of new automobile loans across neighborhoods by race and

[1] 46 percent of all borrowers in the sample from 2014 to 2021; 41 percent of all borrowers in the sample from Q1 2019 to Q1 2021, as used to model loan size

ethnicity. To obtain sample sizes large enough for analysis, we classify borrowers by whether they live in a census tract in the top quintile of share of residents of each racial/ethnic group: Asian, Black, Latino/a, and non-Hispanic white. It is important to note the significant variation in the concentration of these groups in top-quintile tracts and, therefore, to caution against ecological fallacy in interpreting our results. Across all California neighborhoods, the mean percentage of Latinos/as in top-quintile Latino/a neighborhoods is almost 80 percent, compared to only 19 percent of Black residents in top-quintile Black neighborhoods. The characteristics of the neighborhood (e.g., the percentage of residents that are of a particular racial/ethnic group) cannot necessarily be attributed to an individual borrower.

3.3. Modeling new automobile loan size, 2019–2021

Finally, we test whether average new loan size increased significantly during the COVID-19 pandemic, controlling for other factors that influence the initial balance/loan size, and whether changes in loan size varied for borrowers in neighborhoods that differed by race/ethnicity. To focus on the effects of the pandemic, we narrowed the time range considered in this part of our analysis to the first quarter of 2019 through the first quarter of 2021. We model the average new loan size as a function of the three sets of characteristics depicted in Fig. 2: borrower characteristics, neighborhood socioeconomic characteristics, and time (the COVID-19 pandemic).

The models take the following basic form, shown in Equation (2):

$$\text{Average new loan size} = f\ (B, S, C, I) \tag{2}$$

where B denotes a vector of borrower characteristics, S represents a vector of neighborhood socioeconomic characteristics, C denotes a dummy variable indicating the quarters during the pandemic, and I denotes interaction terms for the dummy variable for the pandemic and neighborhood socioeconomic characteristics.

The bottom of Fig. 2 lists the independent variables. We designate the first quarter of 2019 until the last quarter of 2019 as the pre-pandemic quarters and the second quarter of 2020 until the first quarter of 2021 as the quarters during the pandemic (We omit the first quarter of 2020 since the pandemic emerged during this quarter.). We follow consumer credit reporting company Experian's classification of VantageScore into the four categories in Table 1 (Akin, 2020). We include both age and age squared in our model to capture life-cycle variation in debt profile. The distribution of average loan size, the share of the Black and Asian population in the census tracts, and the poverty rate of census tracts are positively skewed. Hence, we use the logarithmic transformations of these variables in the model. Unlike the descriptive analysis above, for the models, the independent racial/ethnic variables are simply the percentages of the population by race/ethnicity. We decided to use these variables to capture variations across the distribution and to avoid the double counting of neighborhoods, since some neighborhoods fall into multiple racial/ethnic group top-quintile tracts.

Table 1 includes the descriptive statistics for the dependent and independent variables in the regression models. The mean new loan size was $25,527. We note that the characteristics of people with automobile loans differ from the characteristics of Californians overall. For example, 56 percent of new automobile loans were held by men, a percentage notably higher than the percentage of men in the adult population (ages 18 and over) (49%) (Ruggles et al., 2021). This disparity is probably due to men (higher-wage earners on average) being more likely than women to be designated as the primary borrower, the person legally responsible for the loan.

4. Findings

4.1. Annualized growth rates

Fig. 3 shows the annualized growth rate of outstanding balances of new automobile loans compared to all automobile loans. Over this period, there was relatively little fluctuation in the growth rates of all automobile loans, since most loans were carried over from previous quarters. The annualized growth rate for all automobile loans ranged between negative four percent and 15 percent. In contrast, there was much greater quarterly fluctuation in the annualized growth rate for new automobile loans, with a significant spike in the growth rate (240%) of new loans in the third quarter of 2020, immediately after the historic economic downturn at the outset of the COVID-19 pandemic. In aggregate, the initial balance of new automobile loans was $50.8 billion in the last two quarters of 2020, a figure six percent higher than in the last two quarters of 2019.

New automobile loan growth rates fluctuated by quarter for borrowers across neighborhoods by race/ethnicity. However, with one exception, prior to the pandemic, the pattern was not cyclical. Only Latino/a top-quintile neighborhoods showed a cyclical pattern, with growth rates peaking in the second quarter of every year. But COVID-19 upended borrowing patterns. Borrowers in all neighborhood types experienced a sharp increase in growth rate in the third quarter of 2020, as we described earlier; however, the degree to which loans grew varied across borrowers in neighborhoods by race/ethnicity (Fig. 4). In 2020, the highest growth rate for new automobile loans was in the third quarter among borrowers in Latino/a top-quintile neighborhoods. The growth rate in the top-quintile Asian and Black neighborhoods was similar to that of the top-quintile white neighborhoods (approximately 225%), whereas Latino/a neighborhoods experienced a substantially higher annualized growth rate (approximately 325%) of new automobile loans in that quarter. The aggregate initial balance of new automobile loans was $8.07 billion in the last two quarters of 2020 in Latino/a top-quintile neighborhoods, 11 percent higher than in those same quarters in 2019.

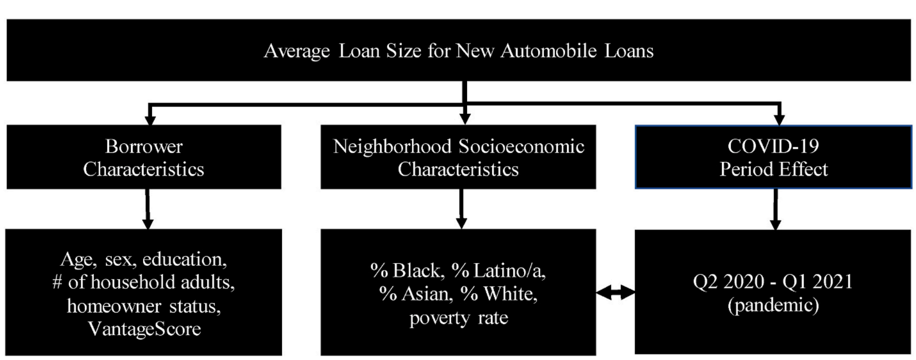

Fig. 2. Average Loan Size for New Automobile LoansBorrower Characteristics: Age, sex, education, # of household adults, homeowner status, VantageScoreNeighborhood Socioeconomic Characteristics: % Black, % Latino/a, % Asian, % White, poverty rateCOVID-19 Period Effect: Q2 2020-Q1 2021 (pandemic).

Table 1
Descriptive statistics for model (Q1 2019-Q4 2019, Q2 2020-Q1 2021)[a].

Variables				Data Source	Mean	Standard Deviation	Share
	Dependent Variable	Average new loan size (in Q1 2021 $)		UC-CCP	$25,527	$15,498	
Independent Variables	Borrower Characteristics	Age (years)		UC-CCP	43.0	14.4	
		Number of household adults		UC-CCP	2.6	1.7	
		Male		UC-CCP			56%
		Highest Education Level	Less than high school	UC-CCP			20%
			High school	UC-CCP			21%
			Some college	UC-CCP			32%
			College degree	UC-CCP			17%
			Graduate degree	UC-CCP			10%
		Homeownership		UC-CCP			46%
		Vantage Score (credit rating)	Poor (300–579)	UC-CCP			10%
			Fair (580–669)	UC-CCP			27%
			Good (670–739)	UC-CCP			25%
			Very good (740–799)	UC-CCP			22%
			Exceptional (800+)	UC-CCP			15%
	Borrowers' Neighborhood Characteristics	Share non-Hispanic white		ACS	38.1%	24.7 pct. pts.	
		Share Asian		ACS	13.4%	14.7 pct. pts.	
		Share Black		ACS	5.7%	8.0 pct. pts.	
		Share Latino/a		ACS	39.3%	25.6 pct. pts.	
		Share in poverty		ACS	12.0%	8.0 pct. pts.	

[a] Note: We omit the first quarter of 2020, as the pandemic emerged in the U.S. during this quarter.

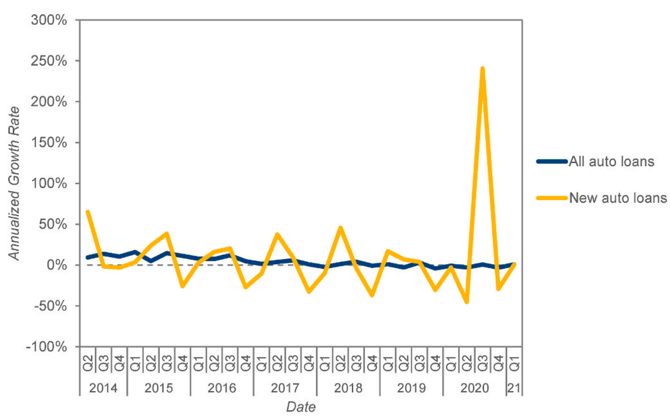

Fig. 3. Line graph of annualized growth rate of all auto loans and new auto loans, from Q2 2014 to Q1 2021.

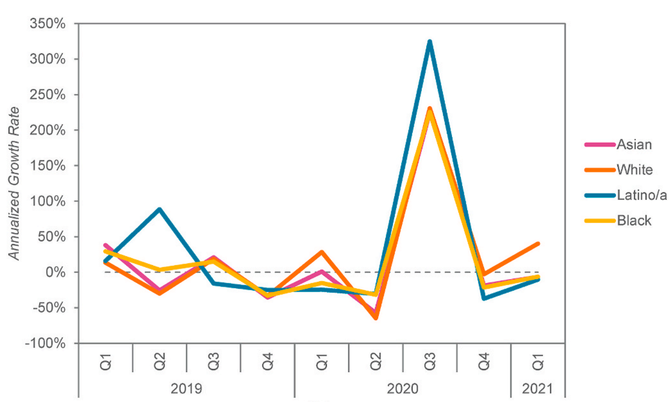

Fig. 4. Line graph of annualized growth rate for new automobile loans in top-quintile Asian, white, Latino/a, and Black neighborhoods, from Q1 2019 to Q1 2021.

Fig. 5. Line graph of difference in annualized growth rate for new automobile loans between top-quintile white versus Asian neighborhoods, top-quintile white versus Black neighborhoods, and top-quintile white versus Latino/a neighborhoods, from Q1 2019 to Q1 2021.

To highlight this finding, Fig. 5 depicts the differentials between the annualized growth rates for new loans in neighborhoods in the top quintile of other races/ethnicities relative to the growth rates for neighborhoods in the top quintile of white residents. Again, this figure shows a striking difference in the patterns for loans in Latino/a neighborhoods compared to those in Asian and Black neighborhoods during the pandemic. Taken together, the findings indicate that the borrowing patterns in majority-Asian, -Black, and -white neighborhoods tracked with each other since 2019. In contrast, in the quarters since the pandemic, borrowing in majority-Latino/a neighborhoods grew at a much faster pace.

4.2. Predictors of new automobile loan size

There are two potential explanations for these differences: changes in loan size and changes in the number of loans. We turn first to loan size. Fig. 6 shows the average inflation-adjusted loan size for new loans from 2014 to 2021 by neighborhood race/ethnicity. In most quarters, the average new loan size was highest in top-quintile white neighborhoods, followed by top-quintile Asian neighborhoods. Top-quintile Latino/a

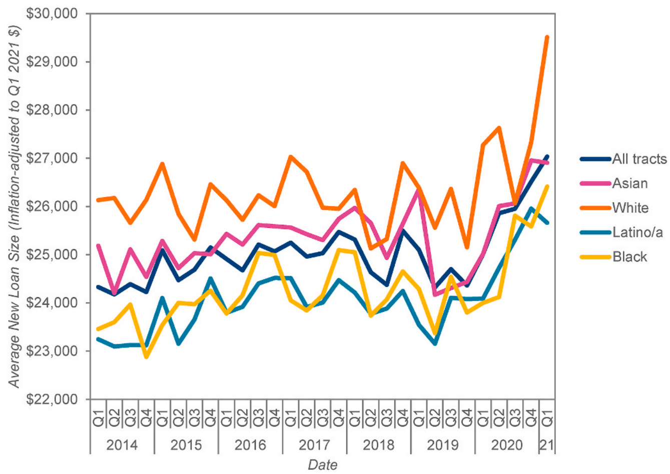

Fig. 6. Line graph of average new loan size, in inflation-adjusted Q1 2021 dollars, in all tracts and Asian, white, Latino/a, and Black top-quintile tracts, from Q1 2014 to Q1 2021.

neighborhoods had the lowest average new loan size in most quarters. While average loan size increased for borrowers in all neighborhoods during the pandemic, the pre-pandemic trend of loan size differentials across neighborhoods by race/ethnicity persisted. Borrowers in white neighborhoods continued to have more expensive loans than borrowers in other neighborhoods.

To isolate the effect of the pandemic from other determinants of new loan size, we predicted average new loan size through a series of regressions. Table 2 shows the results of our three models. First, we examined the overall relationship between neighborhood race/ethnicity and loan size. Model 1 includes only the neighborhood race/ethnicity variables as predictors of loan size. It shows that loan size is negatively associated with the share of the tract population that is Black and Latino/a, *ceteris paribus*, consistent with Fig. 6. However, the model predicts very little of the variation in the size of new loans.

Next, to test the effect of the pandemic, we added a dummy variable for the pandemic in our model (Table 2, Model 2). The effect of the pandemic is statistically significant and positive, and while the model's explanatory power remains small, it nearly triples in size. This effect also is borne out descriptively; the average new loan size rose from $24,751 in 2019 to $26,367 during the pandemic period, an increase of nearly seven percent.

Model 3 includes additional control variables that prior studies suggest are related to loan size. Most of the variables in this model are statistically significant. In Table 2, the standardized coefficients are shaded according to the magnitude of their association with automobile loan size, among significant predictors; standardized coefficients should be compared within each model, not across them. The variables with darker-shaded coefficients have a greater influence on new automobile loan size, all else equal. Age has the strongest effect size, followed by VantageScore, homeownership status, and the pandemic. Age is typically correlated with income, as workers tend to earn more as they age. Individuals with higher credit ratings will be more likely to gain approval for larger loans to purchase more expensive vehicles. Homeowners tend to have both higher credit ratings and higher incomes. And finally, vehicle prices and demand both increased during the pandemic.

In Model 3, controlling for borrower and neighborhood socioeconomic characteristics, there is a significant association between the pandemic and average loan size. Additionally, the shares of the tract population that are Asian and white are statistically significant (unlike in Models 1 and 2) and negatively associated with automobile loan size. This finding is puzzling since the bivariate correlation between the share of the tract that is white and loan size is positive, but likely explained by the other covariates, potentially homeownership and VantageScore,

Table 2
New automobile loan balance.

Independent Variables			Model 1 Estimate	Model 1 Standard Error	Model 1 Standardized Coefficient	Model 2 Estimate	Model 2 Standard Error	Model 2 Standardized Coefficient	Model 3 Estimate	Model 3 Standard Error	Model 3 Standardized Coefficient
Intercept			4.353***	0.009		4.342***	0.009		4.079***	0.015	
Borrowers' Neighborhood Characteristics		Percent non-Hispanic white	0.000	0.000	0.004	0.000	0.000	0.003	-0.000**	0.000	-0.026
		Percent Asian (log)	-0.004	0.003	-0.009	-0.004	0.003	-0.009	-0.018***	0.003	-0.042
		Percent Black (log)	-0.010***	0.002	-0.025	-0.010***	0.002	-0.025	-0.002	0.002	-0.006
		Percent Latino/a	-0.000*	0.000	-0.025	-0.000**	0.000	-0.027	-0.000	0.000	-0.010
		Percent in poverty (log)							-0.034***	0.004	-0.043
Pandemic						0.026***	0.002	0.052	0.026***	0.002	0.051
Borrower Characteristics		Age							0.010***	0.000	0.561
		Age squared							-0.000***	0.000	-0.561
		Number of household adults							-0.003***	0.001	-0.020
		Male							0.014***	0.002	0.028
	Highest Education Level (reference: < high school)	High school							-0.008*	0.003	-0.014
		Some college							-0.004	0.003	-0.008
		College degree							0.001	0.004	0.002
		Graduate degree							0.004	0.004	0.004
		Homeownership							0.039***	0.002	0.078
	Vantage Score (reference: poor)	Fair							0.072***	0.004	0.128
		Good							0.107***	0.004	0.185
		Very good							0.107***	0.004	0.177
		Exceptional							0.112***	0.005	0.160
R^2			0.0015			0.0042			0.0463		
Adjusted R^2			0.0014			0.0041			0.0460		

Note: *p < 0.05; **p < 0.01; ***p < 0.001.

which are associated with race and are positively related to loan size.

We also tested whether there was a differential impact of the pandemic on neighborhoods of various races/ethnicities by including interaction terms of the dummy variable for pandemic and racial/ethnic share of the tract population (not shown in Table 2). None of the interaction terms were statistically significant. While the pandemic had a substantial effect on the price of vehicles and loan size, the effect was similar for borrowers across neighborhood types. It also did not alter the pre-pandemic differences in average new loan size across neighborhoods. Neighborhoods with larger shares of Latino/a and Black residents continued to have lower average loan sizes than neighborhoods with larger shares of white residents.

Model 3 still explains very little of the variation in new loan size. However, a number of the additional variables were statistically significant. Variables associated with economic status—homeownership status and VantageScore—were positively associated with loan size, and neighborhood poverty rate was negatively associated with automobile loan size; as we note previously, higher-income households tend to purchase more expensive vehicles. We also tested whether the pandemic had a differential effect on borrowers across neighborhoods with different levels of poverty. Like the race/ethnicity interaction terms, this interaction also was not statistically significant (not shown in Table 2).

Finally, among the other borrower characteristics, sex, age, household size, and education were associated with new loan size in Model 3, largely in the expected direction. Men had larger loans than women. New automobile loan size increased with age, with an effect that lessened among older borrowers. This finding suggests that although borrowers tend to buy more expensive vehicles, after a certain age they cease doing so, perhaps due to constraints from fixed incomes in retirement or changes in automobile preferences. The number of household members was negatively related to new loan size, perhaps because households allocate primary borrower status for different loans across multiple household members. Finally, borrowers with at least a high school education borrowed *less* per loan than borrowers with less than a high school education—an unexpected finding, as we would have expected those with higher levels of educational attainment to have been able to secure relatively more expensive loans.

4.3. Number of new loans during the pandemic

If the pandemic did not have differential effects on new automobile loan size across neighborhoods by race/ethnicity, what might explain the substantial increase in the annualized growth rate in Latino/a neighborhoods (Figs. 4 and 5)? In our final analysis, we turn to a second potential explanation: if not new loan size, then perhaps differences in the number of new loans. Before the pandemic, the number of new loans was typically highest in top-quintile Asian neighborhoods, followed in order by Black, Latino/a, and white top-quintile neighborhoods (Fig. 7). The pandemic disrupted this pattern; the number of new loans in top-quintile Latino/a and Black neighborhoods began to exceed that of top-quintile Asian neighborhoods. Additionally, from the first to the second quarter of 2020, new loan numbers in top-quintile Asian and white neighborhoods declined steeply and nearly in parallel but more shallowly in Black and Latino/a neighborhoods, which were also nearly parallel. Then, between the second and third quarters of 2020, after car dealerships began to reopen under adjusted protocols and many Americans received their first federal stimulus payments, Latino/a neighborhoods' spike notably outpaced the other three neighborhood types, which otherwise all grew at roughly equal rates. Underlining all of this, the number of loans in top-quintile white neighborhoods remained the lowest of the four neighborhood types.

Fig. 7. Line graph of number of new automobile loans in top-quintile Asian, white, Latino/a, and Black neighborhoods, from Q1 2019 to Q1 2021.

5. Automobile debt moving beyond the pandemic

This study addresses a gap in understanding how COVID-19 has reshaped automobile ownership. While many studies have analyzed changes in travel behavior, those changes and trends may be more temporary; however, purchasing, financing, and operating an automobile—especially for those who did not previously own one—bears both benefits and consequences at both the individual and societal levels that are likely to persist for years.

From millions of loans' worth of available data, it is clear that Californians borrowed more for cars after the initial shock of the pandemic receded. The lifting of stay-at-home orders combined with residential relocation to lower-density suburbs (Ramani and Bloom, 2021) and lingering safety fears about using public transit (Dong et al., 2021; Zhao and Gao, 2022) likely motivated some consumers to purchase vehicles. At the same time, the federal Coronavirus Aid, Relief, and Economic Security (CARES) Act of 2020 (as well as the two following stimulus bills) put money in people's pockets, through direct relief payments, augmented unemployment insurance benefits, and business support for continued employment. The future of automobile ownership and borrowing—especially for those with financial constraints—beyond the pandemic era is still uncertain.

After a decline in early 2020, the annualized growth rate for new automobile loans rebounded and increased enormously from the second to the third quarter of 2020, across all neighborhoods by race/ethnicity (Fig. 4). This growth in automobile lending was associated with both an increase in new loan size (Fig. 6) and in the number of new loans (Fig. 7). The growth in the number of new loans was particularly steep in top-quintile Latino/a neighborhoods, potentially due to the overrepresentation of Latino/a adults as essential workers who, for fear of infection and/or due to reduced services provided on public transit, needed a vehicle for commuting safely to work. Indeed, in California, in top-quintile Latino/a neighborhoods, only 32 percent of jobs can be done at home on average, while in top-quintile Asian and top-quintile white neighborhoods, about 40 percent of jobs can be done at home on average (Dingel and Neiman, 2020).

In addition to need, this increased borrowing may be associated with the sudden financial ability to borrow for and purchase a vehicle. Past research has shown an association between the receipt of lump-sum payments—such as rebates from the federal Earned Income Tax Credit—and vehicle purchases (Mendenhall et al., 2012). Although most households saved or used federal stimulus funds to pay off debt, spending was higher for individuals with financial constraints (Coibion et al., 2020); therefore some individuals may have put the funds toward automobile purchases. Meanwhile, automobile dealers and lenders made special efforts to accommodate the needs of car-buyers during the early stages of pandemic recovery. For example, many moved sales online, delayed payment starts, and allowed consumers to return vehicles if they had difficulty making payments (Foohey, 2021).

These financial stimuli had positive outcomes beyond personal mobility. Studies show that this more generous welfare state contributed to significant reductions in poverty during the pandemic (Burns et al., 2021; Center on Budget and Policy Priorities, 2022). However, with the expiration of federal COVID-19 relief benefits, the poverty rate began to rise (Center on Poverty and Social Policy at Columbia University, 2022), potentially placing a heavy financial burden on households whose incomes could not support the costs of owning and operating vehicles. As we note at the outset, automobiles provide immense access benefits in metropolitan landscapes largely built around them, and in many places have become nearly essential for daily life. Continued economic assistance could permanently lift many families out of poverty and, at the same time, provide households with the financial security they need to purchase essential goods such as automobiles.

However, policymakers will need to intervene for this to materialize, with pandemic-era benefits and protections expired. Automobile loans enable lower-income families—who might otherwise be priced out of automobile ownership—to make payments over time and thus are a major avenue for acquiring vehicles. At the same time, automobile debt puts significant strains on many of these families, who face higher levels of debt-based vulnerability due to shouldering high debt burdens—debt as a percentage of household income. Low-interest loans for car purchases and repairs and lower-cost car insurance could lessen the financial burden of automobile ownership on these households. Further, to reduce race-based disparities in loan costs, economic assistance must be coupled with fair lending rules and enforcement to combat discriminatory and predatory practices.

Alternatively, well-regulated car-based services—car sharing, ridehailing, etc.—can provide households with the benefits of automobility without having the financial burden of automobile ownership. The pandemic did not treat all forms of car-based services equally. Because ridehailing services require travelers to ride with at least the driver and, in some cases, other passengers, these services experienced substantial declines in trip-making during the pandemic (Brown and Williams, 2021; Du and Rakha, 2020). In the short run, car-sharing services—services that allow consumers to rent vehicles for a fixed period of time—may hold promise (del Mar Alonso-Almeida, 2022). And in the long run, ridehailing's popularity may return.

Nevertheless, car ownership and travel are more expensive than public transit. During the pandemic, many income-constrained households were priced out of automobility and, therefore, experienced greater difficulty accessing essential destinations—due to a lack of alternative modes as well as reduced transit service (He et al., 2022; Palm et al., 2021). As policymakers plan for a post-pandemic future, attention should be given to how public transit service can be restored and expanded to better serve the needs of those dependent on the mobility it provides. In doing so, transit agencies need to respond to riders' concerns about infection risk, public safety, and other pandemic-exacerbated concerns (Parker et al., 2021). However, transit ridership was declining on most U.S. systems prior to the pandemic (Erhardt et al., 2022), and even then, transit carried a very low share of trips overall (though a higher share among persons of color) (Giuliano, 2003). While the pandemic depressed transit ridership, the resulting mode shift thus accounted for relatively few travelers in absolute numbers and, therefore, cannot explain changes in automobile ownership alone. For these longer-term reasons, in addition to increased safety protocols, policymakers will need to address the underlying factors that contribute to automobile dependence and debt—low-density development that limits the access benefits of public transit (and other modes) relative to the automobile.

Unfortunately, our models' explanatory power in explaining these changes in automobile borrowing is limited. This may be due to the complex set of factors that influences borrowing decisions. The limited borrower-specific attributes available in the dataset also likely contributes to the low coefficient of determination value. While we were able to increase the explanatory power of the models by adding borrowers' neighborhood characteristics, we hope future research could securely access more detailed credit data, including the income and race/ethnicity of individual borrowers. Future research should examine automobile debt burden and track automobile loan delinquency rates by race and income. There is precedent for obtaining this type of information for other types of loans. For example, the Home Mortgage Disclosure Act requires financial institutions to publicly disclose loan-level information about mortgages including the race, ethnicity, and income of applicants. This information would provide a better picture of vehicle lending patterns across socioeconomic and demographic groups and allow for more-focused interventions to enhance mobility and access to opportunities for those who face the greatest difficulties in obtaining and paying for automobiles.

Author statement

The authors confirm contribution to the paper as follows: study conception and design: E. Blumenberg; data assembly: F. Siddiq and S. Speroni; analysis and interpretation of results: E. Blumenberg, F. Siddiq, S. Speroni, and J. Wasserman; draft manuscript preparation: E. Blumenberg, F. Siddiq, S. Speroni, and J. Wasserman. All authors reviewed the results and approved the final version of the manuscript.

Data availability

The authors do not have permission to share data.

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